United States Department of Agriculture

Nez Perce-Clearwater National Forests Road, Administrative and Recreation Site Maintenance Project

Environmental Assessment

USDA Forest Service

June 2016

For More Information Contact:

Zach Peterson
Forest Planner
903 3rd. St.
Kamiah, Idaho 83536
208-935-4239

Photo credits: Jeanette Dreadfulwater, Don Jaques, McCall Smokejumpers.

Contents

List of Tables

List of Figures

Chapter 1: Purpose and Need for the Proposal

1.1 Introduction

The Forests prepared this environmental assessment to determine whether effects of the proposed activities may be significant enough to prepare an environmental impact statement. By preparing this environmental assessment, we are fulfilling agency policy and direction to comply with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This environmental assessment discloses the direct, indirect, and cumulative environmental impacts that would result from implementing the proposal.

1.2 Background

The 2015 fire season on the Nez Perce-Clearwater National Forests was exceptionally severe. Approximately 300 fires burned over 184,000 acres, with a high proportion of the acres burned in lower elevation front country, where much of the Forests' infrastructure is located.

Fires on the Nez Perce-Clearwater National Forests killed and weakened trees along many Forest roads, recreation and administrative sites. Falling trees can damage the structure of the road surface, impede or capture runoff, or contribute woody material that plugs ditches and culverts designed to allow for drainage and maintenance of the road surface in a navigable condition. Falling trees can also block safe passage along roads and near high-use structures.

While many trees were killed as a direct result of wildfire, many more trees were intolerably stressed and will die over a period of several years. Secondary effects of the wildfires, including increases in insect and disease activity within burnt stands of timber will continue to increase for a period of several years, resulting in ongoing threats to human safety and safe access.

1.3 Location of the Proposed Project Area

This project is located in the state of Idaho within Clearwater and Idaho Counties, on the Salmon River, Red River, Powell, North Fork, and Lochsa Ranger Districts of the Nez Perce-Clearwater National Forests. The road segments that comprise this project are all within the fire perimeters of the Teepee Springs, Wash, Woodrat, Baldy and other fires (Appendix A, Figure 1, *Vicinity Map)*.

1.4 Purpose and Need for Action

The purpose of this project is to provide safe and unimpeded access along National Forest System roads, and around administrative facilities and recreation sites. The project is needed to maintain the routes, administrative facilities, and trailheads which were damaged by wildland fire.

This action is needed because the roads within the project area are used by Forest Service employees, contractors, and Forest visitors (for recreational activities, woodcutting, hunting and fishing). A need exists to remove the trees before they further deteriorate from infestation by insects, decay organisms and/or succumb to high winds or heavy snows. Merchantable value of logs removed could be used to offset the service cost of mitigating the hazards in these areas.

Figure 1-1. Hazard trees in mixed severity burned areas posing risk to forest users and employees. Several trees have already fallen across the road, others have been uprooted and many others meet definitions of hazard trees and may be removed due to the likelihood of them impacting the road or travelers of the road.

The Forest Service Manual on Transportation Systems directs the Agency to plan for danger tree management in a timely manner (FSM 7733.32 10) and in the case of fire to "Promptly start planning the commercial removal along medium and low priority roads if suppression and Burned Area Emergency Response (BAER) activities have not mitigated the hazard and roads will remain open for administrative, commercial, or public traffic." (FSM 7733.32 (14) (e)). The Forest Service Transportation Handbook 7709.59_41.7 further states that "Road maintenance includes removing danger trees that threaten the safe use of the transportation system" (FSH 7709.59_41.7).

Burned Area Emergency Response (BAER) analysis and reports were completed for many of the fires included in this project. These BAER reports, completed by interdisciplinary teams, cited high risks to forest visitors and Forest Service employees in the human life and safety category as a result of hazard trees and snags. High risks to road and trail infrastructure were noted in the property category. Hazard tree mitigation as part of BAER was designed to only address the immediate safety needs of BAER personnel. BAER reports noted that additional hazard tree removal will be needed for long-term safety.

1.5 Proposed Action

The Nez Perce-Clearwater National Forests are proposing to perform maintenance on Forest Service system roads, recreation and administrative sites that were affected by the 2015 wildfires. The maintenance actions would include road blading, ditch cleaning, removal of minor slides, and cleaning of culverts on 133 miles of Forest roads. Hazard trees (also referred to as danger trees) that pose a risk to infrastructure, access, and public and Forest worker safety would be mitigated. Felled trees would be available for commercial removal surrounding 9 administrative and recreation sites and on 102 miles of Forest System Roads. Hazard trees on the remaining 31 miles of road would be felled and left on site due to resource concerns. For more details of the proposed action, see the Chapter 2, "Proposed Action and Alternatives".

1.6 Decision Framework

The need for the proposal outlined earlier sets the scope of the project and analysis to be completed. Based on the analysis, the Nez Perce-Clearwater National Forests Supervisor will determine whether the proposed project and alternatives could result in a significant impact. If there is a finding of no significant impact, the forest supervisor will select an alternative deciding:

- Whether to implement the selected alternative, in whole or in part;
- What specific design criteria or mitigation measures are needed;
- What specific project monitoring requirements are needed to assure design criteria are implemented and effective?

The decision will be based on:

- How well the selected alternative achieves the purpose and need;
- How well the selected alternative balances the purpose and need with resource impacts and addresses issues and concerns; and
- How well the selected alternative complies with relevant policies, laws and regulations.

Figure 1-2. Prior to felling, trees will be evaluated as to whether they meet hazard tree and fire mortality definitions and whether they have potential to impact roads, recreation sites or administrative sites. Width of tree mitigation area is dependent on slope, tree height and burn severity, not to exceed 200 feet.

1.7 Emergency Situation Determination

The Forests submitted a request for or an Emergency Situation Determination (ESD) for this project to the Chief of the Forest Service in May 2016. An ESD is defined under 36 CFR 218.21(b) as "A situation on National Forest System (NFS) lands for which immediate implementation of a decision is necessary to achieve one or more of the following:

- Relief from hazards threatening human health and safety;
- Mitigation of threats to natural resources on NFS or adjacent lands;
- Avoiding a loss of commodity value sufficient to jeopardize the agency's ability to accomplish project objectives directly related to resource protection or restoration".

Under 36 CFR 218.21(d), a proposed action is not subject to the pre-decisional objection process if the Chief of the Forest Service determines that an emergency situation exists with respect to the proposed action. Immediate implementation of this project is necessary to avoid further delay in addressing human health and safety concerns and to capture commodity value. Loss of commodity value could jeopardize the accomplishment of critical restoration and resource protection activities in the fire areas.

On May 13, 2016 the Chief of the Forest Service granted an Emergency Situation Determination (ESD) for the Road, Administrative and Recreation Site Maintenance Project per 36 CFR 218.21.

> *An ESD allows for immediate post-decision implementation enabling the Nez Perce-Clearwater National Forests to take action before substantial timber deterioration takes place, putting them in a better position to remove roadside hazards, restore the burned area and reduce the risk of no-bid timber sales (ESD page 3).*
>
> *Swift action is necessary to avoid impacts on human health and safety, natural resource protection, and loss of commodity value. A delay would jeopardize the Nez Perce-Clearwater National Forests' ability to accomplish critical restoration objectives (ESD page 4).*

The ESD formally forgoes the 36 CFR 218 objection process to be responsive to the urgency required to implement the proposed action without compromising human life and safety. As such, there is no administrative review of objection process for this project.

1.8 Public Involvement

This project has been posted on the Nez Perce-Clearwater National Forests project planning page at: http://prdp2fs.ess.usda.gov/project/?project=48213. The project was posted to the Schedule of Proposed Actions (SOPA in November, 2015).

The Forests conducted a number of public information efforts to inform the public concerning post fire recover activities on the Forest and this project in particular. These efforts include newspaper editorials, press releases, a media tour, and briefings to local officials, interest groups, the Nez Perce Tribe, and the Clearwater Basin Collaborative.

This proposal was originally scoped under three CE (Categorical Exclusion) categories: 36 CFR 220.6(d)(3) Repair and maintenance of administrative sites; 36 CFR 220.6(d)(4) Repair and maintenance of roads, trails, and landline boundaries; and 36 CFR 220.6 (d)(5) Repair and maintenance of recreation sites and facilities. A legal notice describing the proposal and inviting comment was published in the Lewiston Tribune on December 4, 2015. The Forests mailed 330 scoping letters and posted the legal notice and letter on the Nez Perce-Clearwater website. These notices requested that comments be received by December 28. The Forests received 20 comment letters in response; commenters included five interest groups, two county commissioners, thirteen individuals, and the Nez Perce Tribe.

The Forest Supervisor decided to transition from a CE to an EA for NEPA documentation based on comments from the public asking for additional analysis.

A 30-day notice and comment period began on March 29th, 2016 with publication of a legal notice in the paper of record, The Lewiston Tribune.

1.9 Issues

The proposed action was developed to meet the purpose and need for action and designed to minimize effects to forest resources. Public comments for this project identified the following concerns.

1. This proposal should be analyzed as an environmental assessment, not a categorical exclusion. Several commenters felt that the scope of the project is too large for the maintenance CE categories, and that additional effects analysis and opportunity for public comment is warranted. This EA was issued as a result of these comments.

2. The Forest Service should not harvest timber in roadless areas. A number of commenters wrote that the Forests should not harvest timber in inventoried roadless areas (IRAs), but if it is necessary for public safety to fall trees in an IRA the Forests should do so but leave the trees on the ground. This issue was addressed in an alternative considered but not analyzed in detail (see section 2.3, numbers 4 and 5). Mitigated hazard trees would not be removed from Idaho Roadless Areas, except in those areas where that removal is not precluded by law (Backcountry Restoration Theme). Section 3.11 analyzes the removal of mitigated hazard trees from the Backcountry restoration theme IRA's and the drop and leave prescription in the other portions of the proposed action within IRAs.

3. The 200 foot wide buffer is too large. Several commenters were concerned that the 200 foot wide (an average of less than two tree lengths) was too large. They noted that a similar project on the Boise National Forest proposed a 150 foot buffer, and suggested the purpose and need could still be fulfilled with an 80-100 foot salvage logging zone along roadsides. The extent of the buffer along roads, and adjacent to administrative sites and recreation sites is dependent on the likelihood of a tree negatively impacting the road.

> *Generally, hazard trees meeting the mortality guidelines within one tree length of the road or site would be felled. On the downhill side of steeper slopes, the distance would be reduced to only the distance in which trees would likely impact the road. On the uphill side of steep slopes, the extent may be extended to up two tree lengths (maximum extent 200 feet). The majority of the area would be treated to one tree length. Actual width will be based on the likelihood of a tree becoming a hazard to the road, recreation site or administrative site or users of the road/sites and will be determined during layout and implementation.*

The proposed action (section 2.4.2) has been updated to include this clarification of the project area.

4. The Forest Service should not harvest timber in burned areas because of possible detrimental environmental effects to soils, wildlife, fish, and watershed. One comment letter relayed concerns about the impacts of post-fire salvage logging on soils, water quality, fish habitat, roadless resources, and that the project fails to incorporate restoration elements that could offset some of the negative impacts associated with salvage logging. The course filter and fine filter processes used to develop the proposed action, coupled with the design features of the proposed action, reduce the impacts to resources. Site specific analysis was done and where needed, site specific design features were added to address potential impacts. This environmental analysis discloses the impacts of the proposed action on these resources. The Fish and Wildlife Service and National Marine Fisheries Services concurred with the Not Likely to Adversely Affect determination made by the Forests. While any action on the land has some impacts, the proposed action was developed in such a way as to reduce the impacts to the extent practicable while meeting the purpose and need for action.

5. *The Forest Service should use a science based approach to choosing which trees to fell in roadside areas.* One comment letter urged the Forests to use a scientifically accepted and tested protocol to determine post-fire mortality. The Forests should carefully consider whether larger, fire damaged could survive and if tree mortality is uncertain, the Forests should retain those trees. The proposed action incorporated the use of the guidelines for both hazard trees and post-fire mortality (section 2.4.2.1). These guidelines couple scientific, peer reviewed literature with on the ground, site specific monitoring data from the Clearwater National Forest to develop marking guidelines for trees that have a high probability of dying in the near future based on scientific literature.

6. *The proposed action as scoped lacks sufficient detail.* A number of commenters felt that the proposed action as scoped did not contain enough detail to enable the public to adequately understand the scale of the project and to understand its potential effects. The initial scoping document was released in December of 2015. In response to those comments, this EA was prepared. As part of the NEPA process and to fulfill 36 CFR 218 requirement, a 30 day notice and comment period on the Proposed Action for 30-day Notice and Comment document ended in April 2016. In May of 2016, a draft EA was posted to the public web-site. Comments were requested by May 11, 2016, however, it was noted that comments would be accepted at any time during the process. That draft EA will be left on the web-site until replaced with this final EA at the time of a decision. While the initial public outreach did not contain the full analysis and the proposed action has changed over time, the public has been continually involved and as more information has come available, it has been shared. This process both informed the public as early as possible, when more specific details were not available, and also provided additional detail as more details became known.

7. The Forest Service should first do a TAP (Travel Analysis Process), since some of the affected roads may be left out of the Minimum Road System. One comment letter noted that the Forest service should define the Minimum Road System before proceeding with the roadside project. Forest Service regulations [36 CFR 212.5(b) (1)] require the Forest Service to identify the Minimum Road System needed for safe and efficient travel. In determining the minimum road system, the Forest Service is directed to conduct a science-based roads analysis (the TAP), and to use this information to identify NFS roads that are no longer needed to meet forest resource management objectives. Travel Planning is ongoing on both the Clearwater National Forest (Clearwater Travel Plan) and on the Nez Perce National Forest (Designated Routes for Motorized Vehicle Use, DRAMVU). The proposed action is consistent with both proposed actions. A minimum roads analysis, subpart b, has been completed and submitted to the Washington Office for review and comment.

1.10 Regulatory Framework and Consistency

The Road, Administrative and Recreation Site Maintenance Project analysis and documentation of effects is consistent with direction described below.

a. Nez Perce and Clearwater National Forest Plans

The Nez Perce Forest Plan (Nez Perce FP) (1987) and Clearwater Forest Plan (Clearwater FP) (1987), as amended, guide all natural resource management activities by providing a foundation and framework of standards and guidelines for National system lands administered by the Forests. This proposed action responds to the goals and objectives outlined in these Forest Plans, and helps move the project area towards desired conditions described in these plans for safe and effective transportation systems (Clearwater FP, II-3; Nez Perce FP, II-1, 2). Forest-wide management direction relevant to this project is summarized below.

- Plan, construct and maintain a safe and cost-efficient Forest transportation system that will achieve Forest Plan resource management goals and objectives (Clearwater FP, II-3).
- Review existing system and non-system roads as part of transportation planning to determine road management needs, such as, closures, maintenance and obliteration (Clearwater FP, II-7).
- Provide a stable and cost efficient transportation system through construction, reconstruction, maintenance, or transportation system management (Nez Perce FP, II-1).
- Provide administrative sites and facilities that effectively and safely serve the public and accommodate the workforce (Nez Perce FP, II-3).

b. Watershed and Fisheries Regulatory Framework

All Federal and State laws and regulations applicable to water quality would be applied to the Road, Administrative and Recreation Site Maintenance Project, including 36 CFR 219.20, the Clean Water Act, and Idaho State Water Quality Standards, Idaho Forest Practices Act, Idaho Stream Channel Protection Act, and BMPs. In addition, laws and regulations require the maintenance of viable populations of aquatic species including the National Forest Management Act (36 CFR 219.19), subsequent Forest Service direction (Fish and Wildlife Policy, 9500-4) and Forest Service Manual direction (FSM 2470, 2600).

c. Idaho Roadless Rule

Portions of the Road, Administrative and Recreation Site Maintenance Project lie within the Bighorn-Weitas, Eldorado Creek, Gospel Hump, John Day, Lochsa Face, Mallard, Mallard Larkins, O'Hara-Falls Creek, Rackliff-Gedney, Sneakfoot Meadows and West Meadow Creek Idaho Roadless Areas which are managed under the Backcountry Restoration theme as identified under the Idaho Roadless Rule (36 CFR 294 Subpart C). Specifically, within these roadless areas, this project proposes to remove hazard trees from a maximum of 445 acres along 18.4 miles of existing Roads 111, 359, 9505, 9535, 9300A, 2038 and 2038H. These activities are consistent with the direction listed under 36 CFR 294.24 (c)(vii). Furthermore, up to an additional 489 acres of hazard tree mitigation along 29.9 miles of road adjacent to Idaho Roadless Area themes other than Backcountry Restoration would occur without removal of the timber or equipment leaving the road. This would affect the East Meadow Creek, Hoodoo, North Lochsa Slope, O'Hara-Falls Creek, Rackliff-Gedney and West Meadow Creek Idaho Roadless Areas. The Idaho Roadless Rule Commission was briefed on this project and concurred with this determination on November 10, 2015.

d. Idaho Forest Practices Act

The proposed action is consistent with the Idaho Forest Practices Act, including requirements to ensure reforestation, reduce impacts to soils and maintain water quality.

e. Clean Air Act

The Road, Administrative and Recreation Site Maintenance Project would adhere to the Clean Air Act and all post activity fuel reduction treatments would adhere to the requirements of the Montana/North Idaho Smoke management guidelines.

f. Endangered Species Act

A Biological Assessment would be completed for ESA listed fish species, concurrent with Section 7 consultation with the US Fish and Wildlife Service and National Oceanic and Atmospheric Administration, as required under the Endangered Species Act, prior to signing a Decision. The project

would comply with the standards and guides described in the Northern Rockies Lynx Management Direction Record of Decision, March 2007.

g. National Historic Preservation Act of 1966, as amended

Due to the nature of the project, National Historic Preservation Act (NHPA) compliance is being achieved through the use of phased consultation (36 CFR 800.4(b)(2)). This process allows the agency to defer final identification and evaluation efforts of historic properties if provided for in a memorandum of agreement (MOA). Indeed a MOA was crafted for the project. Per Appendix A (b) of the 36 CFR 800 regulations the Advisory Council on Historic Preservation in Washington, D.C. declined the opportunity to participate in the development of the MOA. The MOA therefore became a two-party agreement between the United States Forest Service and the Idaho State Historic Preservation Office. That agreement was signed on February 9, 2016. Additionally, the Nez Perce Tribe and both Idaho and Clearwater Counties were each invited to be consulting parties for purposes of NHPA compliance (36 CFR 800.2(c)). Only Idaho County formally accepted the invitation, however, the Nez Perce Tribe will be considered a consulting party by default (36 CFR 800.2(c)(2)(ii)). Cultural surveys to identify potentially eligible historic properties have been completed on approximately two-thirds of the project in the late fall of 2015 prior to snowfall. Per the MOA, the remaining acres will be surveys this spring and early summer prior to implementation.

h. National Forest Management Act

The National Forest Management Act (NFMA) requires that projects and activities be consistent with the governing Forest Plan (16 USC 1604(i)). This document and the project record clearly demonstrate that the Road, Administrative and Recreation Site Maintenance Project is consistent with the Clearwater and Nez Perce Forest Plans, including all standards and guidelines.

The Road, Administrative and Recreation Site Maintenance Project is consistent with the following provisions from NFMA.

Suitability for Timber Production: The Road, Administrative and Recreation Site Maintenance Project proposes removal of hazard trees adjacent to designated roads. An analysis for suitability for resource management was completed for the resource area. This standard is met under all alternatives.

Timber Harvest on National Forest Lands (16 USC 1604(g)(3)(E)): This project would protect the organic matter, soil porosity and topsoil through the use of BMPs and design features. Localized and limited losses would occur on landings, skid trails or where the soil was sterilized by wildfire. BMPs and design features assure that no irreversible damage to the watershed or stream channel considerations would occur. All alternatives provide protection for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvest would otherwise be likely to seriously and adversely affect water conditions or fish habitat. No actions are proposed in these areas. For this project, harvesting systems were selected to appropriately balance treatment efficiency with minimizing resource impacts. This project would address public safety along existing Forest roads by removing hazard trees up to 200 feet of designated roads. This is generally considered an intermediate treatment; however, there is potential for the removal to be considered a clearcut when road segments converge in high mortality areas. This determination would be made with site-specific prescriptions when it is the optimum method for addressing hazard trees. No temporary or permanent roads are proposed with this project.

i. National Environmental Policy Act (NEPA)

National Environmental Policy Act provisions have been followed as required in 40 CFR 1500. . The Environmental Assessment (EA) complies with the intent and requirements of NEPA, analyzes a reasonable range of alternatives, including a No Action Alternative. It also discloses the expected effects of both alternatives and discusses the identified issues and concerns.

j. Tribal Rights and Trust Responsibilities

Trust responsibility arises from the United States' unique legal relationship with Indian tribes. It derives from the Federal Government's consistent promise, in the treaties that it signed, to protect the safety and well-being of the Indian tribes and tribal members. The Federal Indian trust responsibility is now defined as a legally enforceable fiduciary obligation, on the part of the United States, to protect tribal lands, assets, resources, and reserved rights, as well as a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. This responsibility requires that the Federal Government consider the best interests of the Indian tribes in its dealings with them and when taking actions that may affect them. The trust responsibility includes protection of the sovereignty of each tribal government (FSM 1563.8b 2).

The Forest Service best serves the Federal Government’s trust responsibility by:

- Ensuring Forest Service actions never diminish the rights of Indian tribes and tribal members;
- Ensuring Forest Service program benefits reach Indian tribes and tribal communities;
- Observing and enforcing all laws enacted for the protection of tribal cultural interests;
- Observing the principles of consultation whenever our policies, decisions, or other actions have tribal implications; and
- Treating NFS resources as trust resources where tribal legal rights exist.

American Indian tribes are afforded special rights under various federal statutes: National Historic Preservation Act; NFMA; Archaeological Resources Protection Act of 1979; Native American Graves Protection and Repatriation Act of 1990; Religious Freedom Restoration Act of 1993 (PL 103141); and the American Indian Religious Freedom Act of 1978. Federal guidelines direct federal agencies to consult with tribal representatives who may have concerns about federal actions that may affect religious practices, other traditional cultural uses, or cultural resource sites and remains associated with tribal ancestors. Any tribe whose aboriginal territory occurs within a project area is afforded the opportunity to voice concerns for issues governed by National Historic Preservation Act, Native American Graves Protection and Repatriation Act, or American Indian Religious Freedom Act.

Executive Order 13175 “Consultation and Coordination with Indian Tribal Governments;” Executive Memo, April 29, 1994 “Government-to-Government Relationship;” and Executive Memo, September 23, 2004, “Government-to-Government Relationship” recognize the unique legal relationship between the United States and Indian tribal governments and also direct Federal agencies to have a process to ensure meaningful and timely input by tribal officials.

The Road, Administrative and Recreation Site Maintenance project area is located within ceded lands of the Nez Perce Tribe. In Article 3 of the Nez Perce Treaty of 1855, the United States of America and the Nez Perce Tribe mutually agreed that the Nez Perce retain the following rights:

"*…taking fish at all usual and accustomed places in common with citizens of the Territory [of Idaho]; and of creating temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing horses and cattle…"*

The Nez Perce-Clearwater National Forests are committed to fulfilling the Forest Service's trust responsibilities to Native Americans, to honoring rights reserved in the Nez Perce Treaty of 1855, and to strengthening the Forests' government-to-government relationship with the Nez Perce Tribe. The Forest Service manages and provides access to ecosystems that support Tribal traditional practices. This project will maintain and enhance these opportunities over the long term and in the short term by maintaining safe access to areas of the Forest with cultural significance or used by the Tribe.

Chapter 2: Proposed Action and Alternatives

This chapter describes and compares the alternatives considered for the Road, Administrative and Recreation Site Maintenance Project. Chapter 2 describes some of the concerns raised in the comment letters received after the initial (CE) scoping period and provides a basis for choice among options by the decision maker and the public.

2.1 Post Fire Selection Process

Forest Officials and Interdisciplinary Team members used a coarse filter/fine filter approach to narrow down the scope of the post-fire project proposed on the Nez Perce-Clearwater following the 2015 wildfires. All affected areas were originally looked at, but through the coarse filters, the projects were reduced. These coarse filters excluded areas where timber removal is not allowed by rule or law (wilderness areas, certain Idaho Roadless Rule themes, etc.), and areas where impacts to other resources are not acceptable or not allowed in the forest plans (landslide prone areas, riparian areas, etc.). During the fine filter lens, the IDT took a closer look at areas that needed to be modified in order to reduce potential impacts to resources. During this stage the project design criteria were developed to further reduce impacts. Each of these incremental steps narrowing the project towards the current proposed alternative that meets the purpose and need for action and reduces potential impacts represent an alternative that was considered but not analyzed in detail.

On September 10th and 15th, 2015, a team of staff and resource specialists met and initiated a rapid assessment to help guide the Forests' post-fire recovery and restoration efforts. Core members of this team included hydrologists, a soils scientist, silviculturists, foresters, geographic information specialists, and the Forests' environmental coordinator. Two Forest level staff officers attended these meetings and represented the Forests' leadership. The rapid assessment followed two paths, one to identify salvage opportunities and the other to determine post-fire recovery and restoration needs for road maintenance and hazard tree removal along roads and within administrative and recreation sites for the safety of staff and the visiting public. Only the road maintenance and hazard tree removal assessment process is described within this document (the Roadside, Administrative and Recreation Site Maintenance project.

Phase 1 of the rapid assessment for the Road, Administrative and Recreation Site Maintenance project consisted of coarse filter screening process that utilized current GIS layers to determine locations of roads and administrative and recreation sites potentially impacted from fires. Road layers were used to validate maintenance levels for each road segment (levels 1 through 6), roads designated as closed (i.e., gated) or open, and any roads that would receive priority consideration if they were designated as a County Evacuation Route(s). All closed/gated roads were evaluated not only for safety of Forest Service staff and the visiting public, but their need for access for future fire suppression activities were consider as well. All Idaho Roadless Rule areas, with the exception of Back Country Restoration areas were eliminated from consideration. Based upon this initial coarse filter review approximately 238 miles of roads totaling 7,476 acres (acreage is based on a maximum hazard tree corridor of 200 feet on both sides of the road), were identified for field reconnaissance to collect core field data. Field reconnaissance consisted of GPS-ing road segments and administrative and recreation sites, photo documentation of each road segment and site, and collection of the following additional data:

- Roads access was verified as open, closed/gated, or overgrown. Decommissioned roads were not surveyed.
- Type of road surface: native, gravel, or paved.
- Estimated side slope (percentage) for both above the road and below the road.

- Road slope in percentage.
- Identification of any major road failures (slumps/slides).
- Identification of erosion or mass wasting.
- Burn severity (average for each road segment).
- Tree size: average DBH by segment.
- Percent of tree species mix.
- Type of damaged infrastructure.

All field data and photo documentation collected was then given to the NEPA interdisciplinary team assigned to conduct the fine filter assessment and environmental analysis for the Roadside, Administrative and Recreation Site project. All of this data and related photos are part of the administrative record for this project.

The fine filter screening criteria addressed in Phase 2 of the rapid assessment for the Road, Administrative and Recreation Site Maintenance project consisted of the following:

- Field verification of Riparian Habitat Conservation Areas (RHCAs).
- Field verification of burn severity.
- Identification of critical habitat for TES.
- Cultural resource surveys to determine if cultural resources are present in the project area.
- Soils surveys for Landslide Prone (LSP) areas and/or Detrimental Soil Disturbance issues from past management activities.
  - There would be no harvest on soils that are field verified as landslide prone.
  - No harvest on slopes greater than 60 percent.
- Identify fuels loading issues.

Based upon the rapid assessment process (i.e., the coarse/fine filter screening process), this environmental analysis has been prepared by the interdisciplinary team, and considering public input hazard trees will be cut on approximately 133 miles of road totaling 4635 acres. Fuels reduction treatments will be conducted on these cut and leave portions of the project as needed to meet the residual fuels design feature (section 2.4.2.2, Number 10).

2.2 Alternative Development

The Forest Service interdisciplinary team used resource information, field-related surveys, Forest Plan direction, professional knowledge, and public concerns identified during scoping when developing the Proposed Action. Project design features were built into the Proposed Action to resolve issues and concerns raised internally by agency resource specialists and externally by the public. Although some members of the public suggested alternatives or raised concerns during scoping, after considering the comments and conducting the initial project analysis, the IDT felt these concerns were outside the scope or could be mitigated through careful project design. When there are no unresolved conflicts concerning alternative uses of available resources (NEPA, section 102(2)(E)), the EA need only analyze the Proposed Action and No Action alternative, and can proceed without consideration of additional alternatives (36 CFR 220.7(b)(2)(i)). Scoping efforts did not identify a need to analyze an additional alternative for this analysis; therefore, the Proposed Action and No Action alternative constitute the range of alternatives for this analysis. For more discussion of public concerns see Appendix E, *Response to Comments.*

2.3 Alternatives Considered but not Analyzed in Detail

After reviewing the comment letters and concerns, the IDT considered the following alternatives to the proposed action in addition to the multitude of alternatives considered as part of the course filter/ fine filter exercise.

1. *An alternative that reduces the maximum width of the treatments down from 200 feet*. This alternative was eliminated because 200 feet represents the maximum, the average actual width in most cases will be less. The treatment width will be adjusted during implementation according to slope and other factors; for example downslope width areas will often be less than 200 feet. Only dead and dying trees will be cut, and areas that experienced low severity fire contain many live trees. The purpose and need for public safety would not be met in most areas if the treatment width is too narrow. Furthermore, OSHA regulations specify a two tree length area in which "danger" trees are to be identified and mitigated, this 200 feet represents between 1.5 and 2 tree lengths, depending on the area and forest type (29 CFR 1910.266).

2. *An alternative that drops some selected sections of road treatment because of possible effects to soils, wildlife, watershed, or heritage concerns*. This alternative was incorporated into the proposed action because the coarse and fine filter approach used to select treatment areas eliminated most potential problem areas. For example no treatment will occur in Landslide Prone areas, or adjacent to known historic or cultural important sites. Project design features have been designed to avoid impacts to fisheries, watershed and wildlife resources.

3. *An alternative that increases areas of fell and leave timber compared to areas with salvage harvest*. This alternative was eliminated because resource concerns associated with heavy equipment and salvage harvest would be alleviated through the project design features. Areas of high resource concern would either be avoided (as in LSP) or would not be harvested (as in RHCAs).

4. *An alternative that does not fell trees within Idaho Roadless Areas*. Under the proposed action hazard trees would be cut down on roads adjacent to 14 Idaho Roadless Rule Areas. However, only trees identified as posing a hazard to employees or forest visitors using the adjacent road would be felled. Mitigation of hazard trees is not precluded in the Idaho Roadless Rule. This alternative was eliminated from further analysis because it does not respond to the need to mitigate safety hazards to users of forest roads. See Idaho Roadless Areas, chapter 3.

5. *An alternative that does not remove trees felled within the Backcountry Restoration Idaho Roadless Rule Theme, but does drop and leave hazard trees within Idaho Roadless Areas.* This alternative was eliminated because removal of timber incidental to actions not prohibited by the Idaho Roadless Rule is allowable. The primary action of hazard tree mitigation is not prohibited by the rule. Removal of the timber is incidental to this activity. No road construction is proposed as part of this project. Where resource concerns warranted drop and leave treatments, the proposed action is to do such and this includes over half of the proposed activity within Idaho Roadless Areas.

2.4 Alternatives Analyzed in Detail

2.4.1 No Action

The no-action alternative provides a baseline for comparison of environmental consequences of the proposed action to the existing condition and is a management option that could be selected by the

responsible official. The results of taking no-action would be the current condition as it changes over time due to natural forces. Current management plans would continue to guide management of the project area. Under the no-action alternative the hazard tree mitigation component of this project would not occur; and no harvest of dead or dying timber would take place. The road and recreation maintenance portions of the project would also not take place as a result of this analysis and decision but may be implemented through other future decisions.

Fire killed and weakened trees would continue to fall and block Forest roads. Forest visitors and workers will continue to be exposed to hazardous conditions as trees fall, cause resource damage, and block safe ingress and egress to national forest lands. Maintenance actions would not occur and forest infrastructure would be at risk. Lack of maintenance could render infrastructure in less than safe conditions and may result in closure of roads, recreation sites or administrative site in the future.

2.4.2 Proposed Action

This project would provide for public and Forest worker safety by performing maintenance and reducing the hazard from fire-damaged trees along high priority roads, administrative sites, and recreation developments within the boundaries of twenty fires across the Nez Perce-Clearwater National Forests.

Specifically, the maintenance component of this project would include:

- *Drainage Maintenance* – Cleaning and maintaining culverts, drainage dips, open tops, rubber water diverters, ditches, and riprap needs.
- *Blading* – Surface blading performed to keep the roadbed in a condition to allow traffic and provide drainage, including removal of potholes, ruts, and washboards, correcting improper templates, restoring proper surface drainage, repairing minor cracks, and removing minor slumps.
- *Slides and Road Repairs* – Removal of minor slide material from the roadway (less than 10 cubic yards), restoration of travel way, and repairing rutting issues and washboards.
- *Rock and Stump Removal* – Removal of stumps and rocks that rolled into the roadway.
- *Signs and Access Control Maintenance*– Sign, route marker, and mile post markers installation and maintenance; gate installation and repair; and earth and concrete barrier installation, maintenance and repair.
- *Brush Cutting* – Removal of brush, trees and shrubs within the roadway clearing limits. Material would be cut near flush to the ground by hand and within 8 inches with a mechanical brusher.
- *Trail Maintenance*- Restoring damaged trail tread, removing fallen logs and rocks from trails and brushing to ensure safe, travelable trail condition. This action would be confined to the trail tread. Hazard tree mitigation is not part of this trail maintenance.
- *Administrative and Recreation Site Maintenance*- Maintenance and replacement of infrastructure damaged as a result of fire. Any of the above listed maintenance actions would be utilized as necessary in administrative sites and recreation sites.

The hazard tree mitigation component would include:

- *Tree Felling* - Felling of structurally weakened trees, dead trees and those likely to die, as defined in the hazard tree and mortality guidelines in section 2.4.2.1, that have the potential to impact Forest users or employees traveling on the road prism Trees that are determined to have the

ability to negatively impact the road, administrative site or recreation site, or users of those roads/sites would be felled. Generally, hazard trees meeting the mortality guidelines within one tree length of the road or site would be felled. On the downhill side of steeper slopes, the distance would be reduced to only the distance in which trees would likely impact the road. On the uphill side of steep slopes, the extent may be extended to up two tree lengths (maximum extent 200 feet). The majority of the area would be treated to one tree length. Actual width will be based on the likelihood of a tree becoming a hazard to the road, recreation site or administrative site or users of the road/sites and will be determined during layout and implementation. Actual width will be based on the likelihood of a tree becoming a hazard to the road, recreation site or administrative site or users of the road/sites. Hazard trees that are dead or likely to die within the next year would be felled in areas where removal is not occurring. This activity would be repeated annually or semi-annually for the next five years as to reduce the amount of hazardous fuel present on the ground at any given time. Felling activities in these areas where removal of the product would not occur may be implemented annually to ensure safety risks are mitigated.

- *Timber Removal*- Removal of the felled trees may occur and logs would be sold to offset the cost of implementing this project. In areas where tree removal may occur, trees that are dead, likely to die in the next five years or otherwise pose a hazard would be felled and removed. This varies from the drop and leave prescription as the fuel put on the ground from mitigation of hazard trees would be removed (alleviating the hazardous fuels risk). Implementing the full 5 years of mortality in one entry would reduce ecological impacts as a result of ground and aerial based logging systems. Ground based logging systems would be limited to slopes less than 35 percent. Cable based systems would be used in areas with steeper slopes. Removal of trees would not occur in the following areas:
    - Within riparian habitat conservations areas;
    - On ground-verified landslide prone areas;
    - Within stands that have been field verified to have retained old-growth characteristics following the fire;
    - Within Idaho Roadless Rule areas except in areas within a Backcountry Restoration theme; and
    - In areas where cultural resources could be adversely affected.
- *Fuel Reduction* - Where fuel loads pose a hazard activity fuel concentrations generated through this project may be reduced using a variety of treatments, including but not limited to bucking, lopping, scattering, chipping, masticating, hand piling, machine piling, pile/jackpot burning, or broadcast burning, as fuel loadings, slopes and resource concerns allow.
- *Reforestation*-Site preparation for reforestation and reforestation would occur in unstocked areas. Unstocked areas are defined as areas with less than 20 trees per acre of mature timber or less than 125 trees per acre of seedlings or saplings. Up to 400 trees per acre of western larch, ponderosa pine, western white pine and Douglas-fir would be planted where needed to ensure stocking.

A total of 238 miles of road, 140 miles of trails, and 47 recreation and administrative sites were affected by the fires. Ninety-eight miles of roads were removed from the proposed action based on burn severity and road status (closed roads overgrown to the point of not being navigable by a motorized vehicle). The remaining 133 miles will be maintained to protect infrastructure and hazard trees will be mitigated. 102

miles of roadside hazard tree removal will be available for commercial removal of the product. Dead and dying trees along thirty one miles will be felled and left on site due to resource concerns associated with removal of the product. Volume estimates for the timber removal portion of the project are approximately 31 mmbf based on the maximum 200 foot distance; the actual volume will be less. Table 2-1 Shows miles of road in each fire proposed for both drop and leave and removal activities. All roads would be maintained. Haul routes used to facilitate transportation of removed timber to a processing facility (mill) are estimated in several sections of this EA based on shortest feasible haul distances to the closest mill. Appraisals of timber value are also based on these haul routes and distances. However, the purchaser of any timber made available for commercial removal may haul on the route of his or her choosing and the government does not have the ability (nor would it be in the government's best interest) to specify haul routes. Any impacts related to haul routes are based on the estimated most logical and efficient haul routes but would have similar effects if an alternate haul route was chosen by the purchaser.

Table 2-1. Hazard Tree Mitigation Miles by Action and Fire.

Fire	Drop and Leave (Miles)	Removal (Miles)	Grand Total (Miles)
May		0.39	0.39
Baldy	0.83	1.67	2.50
Boulder	4.95	1.86	6.80
Deadwood Mountain	0.64	0.45	1.09
Eldorado 2	0.06	0.49	0.55
Fire Creek	0.64	-	0.64
Fourbit Creek	0.15	3.06	3.21
Frenchman Butte	0.56	0.56	1.12
Higgins Hump	-	2.02	2.02
Jay Point	-	2.61	2.61
Lost Hat	-	0.41	0.41
Musselshell Creek	0.23	3.11	3.34
Noble	0.30	2.77	3.08
Pete Forks	3.29	5.67	8.96
Slide	2.14	-	2.14
Snow	0.09	0.88	0.97
Snow Creek	0.16	2.00	2.16
Snowy Summit	0.21	12.58	12.80
Tepee Springs	7.48	31.46	38.93
Walde - Mystery	0.23	2.27	2.50
Wash	7.02	17.85	24.87
Woodrat	1.26	10.74	12.01
Grand Total	**30.24**	**102.84**	**133.08**

Roads identified in the proposed action include roads in administrative maintenance levels 1 through 5. A portion of the roads included in the proposed action are classified as maintenance level 1, closed roads. Many closed roads were removed from the proposed action as part of the fine filter process. However, roads that could be used for administrative use or roads that were likely to be used for recreation purposes

remain in the proposed action. On these roads, the implementation of the purpose and need for the project is needed to ensure safe access for users of these closed roads. Additionally, these roads remain part of the forest infrastructure and the forest is responsible for maintaining that infrastructure. Timely maintenance actions post-fire will help alleviate potential impacts to that infrastructure and other resources (e.g. sediment delivery, etc.). Timely maintenance actions post-fire will help alleviate potential impacts to that infrastructure and other resources (e.g. sediment delivery, etc.). Without maintenance, over time these roads will either take an increasing amount of time, money, and risk to keep open as trees fall, or will not be travelable due to jackstrawed trees on the roadway. Should the road be needed for fire suppression or other administrative use, a significant delay and significant risk would be placed on those asked to open the road. These roads will begin to contribute additional sediment to nearby waterways as ditches and culverts become plugged, tree root wads fall into the road or take out a section of the road. In the worst case scenario, the plugged culverts, ditches and root wads become a gathering place for water which cause a landslide event. As these roads are still part of the Forest's road system, the obligation to maintain them for both emergency use and to reduce ecological impacts exists.

Trailheads intersecting road segments will be addressed as part of the proposed road work. Snow trails and ATV trails coinciding with road segments were considered road segments for the scope of this project. The 140 miles of trail addressed by this project focus on damaged trail tread and removing fallen logs and rocks to ensure a stable trail prism. Restoration work on trails miles that were identified as having significant resource or structural damage due to severe fire effects were addressed through separate Burned Area Emergency Response efforts.

Recreation/administrative sites include campgrounds, trailheads, bulletin boards, toilets, picnic tables, boat launches and lookouts, or other recreational/administrative structures not including trails or roads. In the 29 fire areas reviewed for this project, 47 recreation sites were identified as being within the fire perimeters. Some of these locations were eliminated through application of the course and fine filters. At other high use sites, immediate hazards were addressed during the fires to ensure firefighter safety, or were addressed quickly thereafter to eliminate imminent hazards at administrative sites, or were captured in the BAER efforts. Nine recreation/administrative sites were chosen for inclusion in this project (Table 2). Work will entail tree felling and/or removal of previously felled trees.

Table 2-2. Recreation/Administrative Sites within Active treatment areas.

Fire Name	Site Type	Site Name	Site Description
Boulder	Trailhead	TR #35	Intersection of Trail #35 w/ Road #595
Snowy Summit	Trailhead	TR#100	Intersection of Trail #100 w/ Road #535
Pete Forks	Wooden Toilet	Pete Forks	Dispersed site
Wash	Fee Campground	Selway Falls CG	Six delineated campsites w/ picnic tables
Wash	Non Fee Campground	Slim's Camp	Semi Developed site with three campsites, concrete toilet, hitch rails and two concrete stock feeders.
Wash	Lookout	Indian Hill LO	Lookout along Rd #290
Noble	Concrete Toilet & Trailhead	TR #585	Intersection of TR#585 w/ Rd #421
Tepee Springs	Campground & Boat Launch	Spring Bar CG & Boat Launch	Eighteen recreation sites with picnic tables, rings, toilets, and asphalt roads.

Fire Name	Site Type	Site Name	Site Description
Tepee Springs	Picnic Area	Allison Creek Picnic Area	Day Use Picnic Area. .

2.4.2.1 Nez Perce-Clearwater National Forests Tree Mortality and Hazard Tree Guidelines

Burned areas selected for hazard tree removal would use the Nez Perce-Clearwater National Forests Tree Mortality and Hazard Tree Guidelines, which incorporate mortality research as outlined in Table 2-3. In these guidelines trees meeting the criteria listed below are considered dead. Trees located near roads, administrative sites, or campgrounds meeting the hazard tree criteria are considered hazard trees and would be felled.

Table 2-3. Nez Perce-Clearwater tree mortality guidelines and hazard tree criteria

Hazard Tree Removal Criteria			
Hazard Factor	**Species**	**Symptoms/Criteria for Hazard Tree Determination**	**Reference**
Primary Cause of Mortality is Fire	Ponderosa Pine Western Larch	50% or more circumference of bole cambium at ground line is burnt.	Clearwater NF Field observations Wendover, 2005
			Scott,et al. 2002
			Toupin et. al. 2008
		50% or more crown scorch	Clearwater NF Field observations Wendover, 2005
			Scott,et al. 2002
			Fowler et. al. 2010
Secondary Mortality	Ponderosa Pine Western Larch	Active bark beetles.	Clearwater NF Field observations Wendover, 2005
			Davis et. al. 2012
			Fowler et. al. 2010
Primary Cause of Mortality is Fire	Douglas-fir	50% or more circumference of bole cambium at ground line is burnt.	Clearwater NF Field observations Wendover, 2005
			Scott,et al. 2002
			Hood et. al. 2007
		25% or more crown scorch.	Clearwater NF Field observations Wendover, 2005
			Scott,et al. 2002
			Hood et. al. 2007
		50% or more of the area under tree crown has had duff removed by fire.	Clearwater NF Field observations Wendover, 2005
			Scott,et al. 2002
Secondary Mortality	Douglas-fir	Active bark beetles	Clearwater NF Field observations
			Wendover, 2005
Primary Cause of Mortality is Fire	Cedar	33% or more circumference of bole cambium at ground line is burnt.	Clearwater NF Field observations Wendover, 2005
		25% or more crown scorch.	
		50% or more of the area under tree crown has had duff removed by fire.	

Hazard Tree Removal Criteria			
Hazard Factor	**Species**	**Symptoms/Criteria for Hazard Tree Determination**	**Reference**
Primary Cause of Mortality is Fire	Lodgepole Pine and all other species	25% or more circumference of bole cambium at ground line is burnt.	Clearwater NF Field observations Wendover, 2005
			Scott,et al. 2002
		25% or more crown scorch	Clearwater NF Field observations Wendover, 2005
			Scott,et al. 2002
		50% or more of the area under tree crown has had duff removed by fire.	Clearwater NF Field observations Wendover, 2005
			Scott,et al. 2002
Secondary Mortality		Active bark beetles.	Clearwater NF Field observations Wendover, 2005

2.4.2.2 Project Design Criteria and Best Management Practices (BMPs)

Design features from past actions, verified by field surveys, will be used to limit possible adverse effects to soils, water quality, fish and wildlife habitat. These include directionally-felling trees and limiting equipment passes wherever possible to reduce the amount of off-road equipment usage; limiting operating periods to avoid saturated soils; locating skid trails, landings and yarding corridors in such a manner as to minimize the area of detrimental soil effects. Hazard trees would be identified using Nez Perce-Clearwater Tree Mortality and Hazard Tree guidelines. No healthy live trees would be removed as part of this project. In areas with high burn severity, trees would be processed on-site and slash (tops and limbs) scattered on site to add organic material and reduce surface erosion. Project Design Criteria anticipated to be used for this project are listed in 2-4.

The interdisciplinary team made a series of field trips to observe the effects of the fire and the post-fire conditions of resources. These observations were used to aid in development in the project design features. Additionally, the team visited post-fire projects implemented within the last five years to determine the effectiveness of the design features used for those projects (October Field Notes, 2015). Where applicable and relevant, those useful design features from past projects were incorporated into this project and where needed, changes to those design features from past projects were made to better ensure the intent of the design feature was met.

Best Management Practices are a set of practices selected by the Forests to protect water quality and promote soil conservation during forestry activities. BMPs and timber sale contract provisions that apply to this project are listed in Table 2-5.

Table 2-4. Project Design Features by Resource Area.

2015 ROADSIDE, ADMINISTRATIVE SITE AND RECREATION SITE MAINTENANCE PROJECT DESIGN FEATURES	
SOIL RESOURCES, WATER QUALITY AND FISH HABITAT	
1.	Directionally fell trees to facilitate efficient removal along pre-designated yarding patterns with the least number of passes and the least amount of disturbed area.
2.	In areas with continuous slopes exceeding 35%, cable/winch end lining would be used to yard the logs up or down to forest roads. Machinery would remain on the roads except where landings currently exist.

3.	Limit operating periods to avoid saturated soils and prevent resource damage (indicators include excessive rutting, soil displacement and erosion). Coordination between the Sale Administrator and Forest Soil Specialists would take place in the event of observed rutting or soil displacement to determine if the damage is excessive or is approaching noncompliance with Regional Soil Quality standards. Typically, rutting deeper than 4 inches indicates the potential excessive damage to the soil resource.
4.	Limit Tractor crossings over ditchlines where possible. As needed, install temporary culverts (or crossing logs) to limit damage to ditchlines at tractor crossings. Post-harvest, reconstruct ditch crossings, cut slopes, and fill slopes to standard. Timber Sale Contract Standard Provisions B6.6.
5.	No removal of trees would occur in default RHCAs, as defined in PACFISH and INFISH (300 feet on either side of fish-bearing streams; 150' on non-fish bearing perennial streams and wetlands > 1 acre; and 100' on intermittent streams, wetlands < 1 acre, landslides, and field verified landslide prone areas). Unit layout would include reference to the USFWS draft wetlands inventory map to ensure potential RHCAs are reviewed and buffered appropriately. Although hazard trees may be felled in RHCAs, they would be left on site. Where accumulations of fine fuels (<=3" in diameter) exist or would result from hazard tree felling, these fuels could be manipulated and removed (through lopping, chipping, and/or hand manipulation) from RHCAs to the extent that RMOs are maintained and transmission of fine sediment to stream channels (see Measure 12) is minimized or prevented; intentional prescription burning would not be used in default RHCAs to reduce fuel loading. In addition, bucking of larger stems to lengths of 15 feet or more could also be performed in RHCAs to the extent that current and future woody debris levels are achieved and maintained. No yarding of material would occur across RHCAs
6.	Contractor shall maintain all equipment operating within the project area in good repair and free of abnormal leakage of lubricants, fuel, coolants, and hydraulic fluid. Contractor shall not service tractors, trucks, or other equipment on National Forest lands where servicing is likely to result in pollution to soil or water. Purchaser shall furnish oil-absorbing mats for use under all stationary equipment or equipment being serviced to prevent leaking or spilled petroleum-based products from contaminating soil and water resources. Contractor shall remove from National Forest lands all contaminated soil, vegetation, debris, vehicle oil filters (drained of free-flowing oil), batteries, oily rags, and waste oil resulting from use, servicing, repair, or abandonment of equipment. Timber Sale Contract Standard Provision B6.34
7.	Locate and design skid trails, landings and yarding corridors prior to harvest activities to minimize the area of detrimental soil effects and effects on aquatic resources. Minimize landing locations in RHCAs. Space tractor skid trails a minimum of 80 feet apart, except where converging on landings, and reuse existing skid trails where practicable, to reduce the area of detrimental soil disturbance. This does not preclude the use of feller bunchers if soil impacts can remain within standards. If forwarder operations are used, a slash mat at least 4" thick would be placed on skid trails.
8.	Recontour excavated skid trails and landings to restore slope hydrology and soil productivity. The use of excavated skid trails and landings will be minimized. Where skid trails and landings are constructed on moderate to severely burned slopes, construction will occur only during a period when soils are not saturated and recontouring and replacement of at least 50% cover will occur immediately after use.
9.	Scarify non-excavated skid trails and landings that are compacted or entrenched 3 inches or more. Scarify to a depth of 6 to 14 inches but avoid bringing up unfavorable subsoil material. Coarse woody debris would be placed on scarified surfaces.
10.	Retain 7-33 tons per acre of coarse woody debris (greater than or equal to 8 inches in diameter) following completion of activities. Drier Sites would retain 7 to 12 tons per acre and moister sites would retain 12-33 tons per acre of coarse woody debris. Reference "Coarse Woody Debris, Snag and Green Tree Retention Guidelines" (USDA Forest Service 2003.
11.	In units with high burn severity, trees would be processed on-site and activity generated slash (tops and limbs) scattered on site to add organic material and reduce surface erosion sufficiently to ensure the coarse woody debris guidelines above are met.

12.	In harvest units adjacent to high fire severity/intensity-affected RHCAs, default RHCA buffer widths would be increased as needed, (based on observations by Forest aquatics/hydrology/soils staff) in order to protect RMOs, minimize sediment and maintain function of the RHCA.
ACCESS MANAGEMENT & PUBLIC SAFETY	
13.	Require timber sale purchaser or stewardship contractor to post warning signs advising of equipment operations or hazards for public safety. (Timber Sale Contract Provision, currently B6.33)
14.	Haul routes would be maintained to BMP standards, including proper drainage. Avoid hauling and other heavy equipment traffic during wet periods, indicated by a vehicle leaving ruts greater than 4 inches in depth for a distance greater than 50 feet, to reduce sediment delivery to streams and damage to roadbeds.
15.	Existing closed gates (consistent with current motor vehicle restrictions) will be kept closed during harvest operations except to allow contractors and employees access to the area.
16.	Consider alternative snowmobile routes and/or access and parking when winter log haul occurs on roads normally used as groomed snowmobile routes. To minimize conflict, coordinate with appropriate recreation staff, contractors, and local grooming boards if winter log hauling is planned on Roads: 101, 103, 104, 284, 421, 464, 468, 500, 535, 547, and 595, all of which are typically used as groomed snowmobile routes.
AIR QUALITY	
17.	Follow procedures outlined in the Northern Idaho Smoke Management Memorandum of Agreement, including restrictions imposed by the smoke management-monitoring unit. (Nez Perce FP, page II-23, Air Quality Standard #1; Clearwater FP, Vol II, Appendix B, VI.B.12, p. B-67)
18.	Road watering for dust abatement purposes could be used on major haul routes to reduce sediment input to streams from log hauling activities. The source location, quantity, and timing of dust abatement would be approved by the Forest Service before sale in order to protect water resources during low flows. Water pumps intakes must be screened according to National Marine Fisheries Service (NMFS) standards for fish-bearing streams.
HERITAGE RESOURCES	
19.	A phased consultation memorandum of understanding (MOU) has been signed with the Idaho State Historic Preservation Office (SHPO). To comply with this MOU cultural surveys must be completed prior to project implementation.
20.	Halt ground-disturbing activities if cultural resources are discovered until an Archaeologist can properly evaluate and document the resources in compliance with 36 CFR 800. (Timber Sale Contract Provision, currently B6.24).

21.	Site-specific cultural resource design features: • Avoid and directionally fell trees away from Site 10IH2422/Lithic Scatter. (Tepee Fire) • Avoid project activities within 50 feet on either side of Site 01050000540/Historic Trail. (Snowy Summit Fire) • Avoid and directionally fell trees away from Site 10CW37/Hemlock Butte Lookout and associated features. (Snowy Summit Fire) • Avoid and directionally fell trees away from Site 10IH159/Lithic Scatter (Snowy Summit Fire) • Only harvest trees that can be reached by equipment from existing road (Lolo Motorway). No ground disturbing activities will occur along the Lolo Motorway (FS Roads #535 and #104) Site 10CW1154 and 10IH3188. (Snowy Summit Fire, Musselshell Fire) • Only harvest trees that can be reached by equipment from existing FS Road #547 (Site 01050001484). No ground disturbing activities will occur along FS Road #547. (Snowy Summit Fire)
NOXIOUS WEEDS	
22.	Use Forest Service approved native plant species or non-native annual species to meet erosion control needs and other management objectives. Require contractors to use certified seed laboratories to test seed against the all state noxious weed list, and provide documentation of the seed inspection test to the contract administrator. Apply only certified weed-free seed and mulch. (Timber Sale Contract Provision, currently C6.601)
23.	Remove all mud, soil, and plant parts from off road equipment and equipment being used for road maintenance before moving into project area to limit the spread of noxious weeds. Conduct cleaning off National Forest lands. (Timber Sale Contract Provision, currently B6.35).
TES PLANTS	
24.	Protect TES plant species and/or potential habitat identified at any point during planning or implementation as recommended by the unit botanist and approved by the appropriate line officer. (Timber Sale Contract Provision, currently B6.24).
WILDLIFE	
25.	Any goshawk nests found before and during implementation would be protected with a 40-acre no-activity buffer, and a 420-acre Post Fledging Area would be seasonally restricted from 4/15 to 8/15.
SILVICULTURE	
26.	Mortality will be determined using the Nez Perce-Clearwater Tree Mortality Guidelines and Hazard Tree Guidelines.
27.	Hazard Trees will be determined using Forest Service Field Guide for Danger Tree Identification and Response (2008).
28.	Hazard trees would be felled, but not removed from mapped old-growth stands that are field verified as retaining old-growth stand characteristics following the fire.
VISUALS	
29.	Within all viewsheds, created openings within treatment units should not be symmetrical in shape. Straight lines and right angles should be avoided. Created openings should resemble the size and shape of those found in the surrounding natural landscape. Treatments should follow natural topographic breaks and changes in vegetation if possible.
30.	Within all viewsheds, where the unit is adjacent to denser forest, the percent of thinning within the transition zone will be progressively reduced toward the outside edge of the unit. In addition, vary the width of the transition zone.
31.	Within all viewsheds where skyline harvest methods are used, minimize the number of skyline corridors in visually sensitive areas.
32.	Within retention viewsheds, stumps should be cut to 8 inches or less in height.

33.	Within retention viewsheds landing areas, slash, root wads, and other debris should be removed, buried, burned, chipped or lopped to a height of 2 feet or less. If slash is buried, locate in previously disturbed areas where possible.
SITE-SPECIFIC AQUATIC DESIGN FEATURES	
34.	Within 1,000 feet of Bull Trout and/or Steelhead Critical Habitat [and within the Plant Creek drainage], ensure at a minimum of 1 cross drain is present and functional between any disturbed cut slope or ditch and the nearest stream crossing, as needed to prevent sediment delivery to a stream.
35.	Snow removal during winter operations should be done in compliance with Timber Sale Contract Provision C5.316, Snow Removal (4/13) to reduce the likelihood of sediment entering a stream channel including adding drainage in snow berms and refraining from disturbing road surface material while plowing by retaining 2 inches of snow on the plowed road.
36.	On native surface road stream crossings within 1,000 feet of Bull Trout and/or Steelhead critical habitat the following erosion control measures will be implemented, as needed to prevent sediment delivery to the stream: • Rocking of stream crossings including 100 feet on either side of the crossing • Placement of sediment filtering devices (wattles, straw bales, filter fences, etc.)
37.	Sediment filtering devices would be used as needed to limit erosion and delivery of sediment from roads into streams and ephemeral drainages where the cut slope and/or ditch line is disturbed.
MONITORING	
1.	Within five years post-implementation, Forests soils/hydrology or aquatics staff would monitor the effectiveness of project design features at a few selected sites. From three to five sites monitoring sites would be selected by Forest staff in 2016 in fell-and-yard activity areas, which are within a 1,000-foot proximity to streams designated as bull trout or steelhead critical habitat. Monitoring sites would also feature high (>35%) gradient slopes, high/moderate burn severity, and/or areas of high modeled erosion potential, and would each include at least 500 feet of road (and the treatment activity area associated with that road). Monitoring would be documented in the form of a consolidated site visit report prepared by Forests aquatic/hydro/soils staff, would be in the form of photography and qualitative descriptions, and would incorporate implementation monitoring information developed by sale administrators. Site visits would be conducted after 2016 tree and road treatments have been completed, either within one month of documented high-intensity rainfall events or in the spring of 2017. Based on the results of the report prepared and presented to the Nez Perce Clearwater National Forests Level 1 Streamlined Consultation Team by September 30; 2017, follow-up monitoring at a subset of the initial monitoring sites may be conducted. To the extent practical, monitoring of these sites would be incorporated into the Forests' existing annual project BMP monitoring program.
2.	If a substantial precipitation event occurs during project implementation, appropriate Forests staff would inspect affected and completed project areas to determine whether modifications to project design features may be warranted for the remaining project areas. If Forests staff observes during project implementation that some design features are substantially less effective in reduction of effects to stream channels or resources than intended (perhaps because of a significant precipitation event), then appropriate monitoring and/or modifications to project design would be implemented at the discretion of the responsible line officer.

Table 2-5. Best Management Practices and Timber Sale Contract Provisions to protect water quality

Maintenance Action	Key BMP to Prevent Sedimentation to Streams	Effectiveness for Protecting Water Quality	Regulatory or Scientific Basis	Enforcement
1. Log Haul: Transport of trees removed via forest roads on log trucks	Hauling shall be postponed during wet periods if necessary to minimize sediment delivery to streams.	HIGH (Avoidance and State BMP Audits)	• Idaho Forest Practices Act Rule 040.04.civ. (*IDAPA 20.02.01*)	Timber Sale Administrator
2. Road Blading: Surface blading performed to keep roadbed in a condition to allow traffic and provide drainage.	During and upon completion of seasonal operations, the road surface shall be crowned, out-sloped, in-sloped or cross-ditched, and berms removed from the outside edge except those intentionally constructed for protection of fills. No sidecasting of materials where these materials may be introduced into a stream, or where the placement of these materials will contribute to destabilization of the slope. No casting of material into ditch. Avoid sidecast in the RHCA.	HIGH (Avoidance and State BMP Audits)	• Clearwater NF 1999 • Idaho Forest Practices Act Rules 040.04.a. and 040.04.cii (*IDAPA 20.02.01*) • Timber Sale Contract Provisions T-101.	Forest Engineers and Timber Sale Administrator
3. Drainage Maintenance. Cleaning and maintaining culverts, drainage dips, open tops, rubber water diverters, ditches, and riprap needs.	Culverts and ditches shall be kept functional and repaired if needed. Clean ditches only when necessary to remove blockage. Roadside cut slopes or berms shall not be undercut. Cleaned materials from culverts and open tops will not be flushed or deposited in stream courses.	HIGH (State BMP Audits and Forest Experience)	• CNF 1999 • Idaho Forest Practices Act Rule 040.04.ci. (*IDAPA 20.02.01*) • Timber Sale Contract Provisions T-101.	Timber Sale Administrator and Forest Engineers
4. Slides and road repair standards	Repair slumps, slides, and other erosion sources causing stream sedimentation to minimize sediment delivery. Disposal of slide debris and material in areas away from streams and riparian areas and in a manner to prevent their entry into waterways. Avoid dumping of road maintenance debris in the RHCA. Any stabilizing materials will be applied in a manner as to prevent their entry into stream.	MODERATE (State BMP Audits, Literature and Forest Experience)	• Idaho Forest Practices Act Rules 040.04.a., 040.04.b, and 040.04.cv. (*IDAPA 20.02.01*) • Timber Sale Contract Provision T-108. • Rashin et al. 2006 • McDade et al. 1990 Anderson and Poage 2014	Timber Sale Administrator. Forest Engineer. Soil/Water/Fish Resource Specialists
5. Fuel storage and refueling equipment	Do not store fuel or other toxicants in RHCAs. Avoid refueling in RHCAs unless there are no other alternatives.		INFISH standard RA-4	

Chapter 3: Environmental Impacts of the Proposed Action and No Action Alternatives

3.1 Safety and Road Access

Introduction

Latent Risk and Risk Transfer

An unavoidable tenet of risk management is that choices made today affect all future options (National Cohesive Wildland Fire Management Strategy 2014). Successful risk management not only minimizes unnecessary exposure, but also depends on how well we can recover from or tolerate the consequences of undesirable outcomes. When applying a "life first" lens of risk management to the Roadside, Administrative, and Recreation Site Maintenance Project, we must recognize how choices we make now will affect the safety of employees, wildland fire responders, forest visitors, and local communities, presently and into future. Accepting marginally increased risk today with a capacity to manage exposure, is preferable to transferring risk into the future and hoping that those who inherit our decisions are adequately equipped to deal with the consequences, whatever they might be.

Latent risk associated with the Roadside, Administrative, and Recreation Site Maintenance Project involves the loss of life and property of individuals and communities exposed to hazard trees, hazardous fuels accumulation, and wildland fire. In this context, risk also involves the loss of options available to land managers for restoring and maintaining fire resilient landscapes and safely and effectively responding to wildland fire events.

Particular attention needs to be given to the transfer of risk that occurs when choosing to utilize strictly hand crews to drop and leave hazard trees, or choosing to contract mechanical equipment to fell and remove hazard trees. Implementing a drop and leave strategy for all of roadside hazard tree abatement will increase the amount of exposure of hand crews directly to falling limbs, broken off tops, and, trees that fall unpredictably.

Utilization of mechanical equipment to accomplish the removal of hazard trees in areas suitable for mechanical equipment will significantly reduce exposure to agency employees and contract crews by greatly reducing the number of personnel needed and the amount of time needed to accomplish the work. Additionally, with mechanical equipment felling, the operator is far less exposed to hazards of felling fire weakened trees because of the additional protection afforded within the cab of the equipment.

It is not unusual for fuel loadings of 75-100 tons per acre to occur after remaining dead trees fall after a wildland fire event on the Nez Perce Clearwater National Forests. In the peak of the Northern Rockies fire season, wildland fires occurring in areas with fuel loadings that exceed 40 tons per acre of dead and down woody material, are generally high in intensity and severity, making them exceedingly difficult to control. Allowing fuel loadings of this magnitude to accumulate along roads may render these roads unsuitable for use as control lines. This unfortunately decreases options fire responders and managers have available in the future to safely manage wildland fire, including fire being managed for resource benefit.

Figure SA-1. Fuel loading after the Johnson Bar Fire. *Photo: Tam White*

Over the past decade, existing roads become increasingly utilized as containment lines for large wildland fires occurring on the Nez Perce Clearwater National Forests. This was especially true during the 2015 season when suppression resources were stretched thin nationally. Additionally, the increase in snag hazards from the affects insects and disease outbreaks has made direct attack of these fires very risky to wildland fire responders.

For the past six years the average number of wildland fire responders "hit by a tree" is 10.5 per year; in addition many people get hit by trees and don't report it. There is an average of one wildland fire responder fatality a year from trees. Some years there are zero, other years three or four. There has never been a year without serious injuries from trees. Fifty percent of “hit by a tree” instances involve no chainsaws (Wildland Fire Lessons Learned Center, Dotson, 2016).

Utilization of existing roads as containment lines is often safer and more effective in increasing the odds that wildland fire responders go home safe at the end of the day. Maintaining roads post fire, including mitigating of hazard trees, and reducing fuel loadings adjacent, is essential to creating opportunities to restore fire resilient landscapes by taking action to minimize risks now. Not doing so is effectively transferring increased risk to future generations of wildland fire responders, managers, agency employees, public visitors and local communities.

A. Effects of Alternative 1 – No Action

When areas adjacent to roads are burned by forest fires, the hazard to those using the roads increases. The hazards come in many forms but can be broken into two categories, hazards from dead and burned timber, and hazards from not maintaining forest roads post fire.

Weakened or dead trees adjacent to roads pose a potential direct hazard to those using the road. In particular, trees immediately adjacent to the road bed may fall onto the road striking a passerby. Often times after fires, the trees adjacent to the road have lost most or all of their foliage. These trees are more exposed in high wind events and can cause massive blow downs to happen which could potentially block

or strike vehicles traveling or parked along forest roads. Trees burned after fire often have burned or weakened root systems which could cause similar downfall events.

Falling snags can have access and safety impacts in recently burnt areas. By assessing and mitigating snag hazards in travel corridors and likely staging areas (campgrounds, trailheads, etc.) we reduce the exposure of individuals. Snags in burned areas pose direct and indirect safety concerns. Vehicles and individuals in high snag density areas stand a higher likelihood of sustaining damage or injury from falling debris if the areas have not been assessed and treated to minimize snag hazard. The risks of unmitigated snag hazards posed by fire weakened trees in or at dispersed campsites, trail heads and administrative sites cannot be overstated. These sites are areas where people congregate and spend significant time exposed to snag hazards, increasing the likelihood of catastrophic injury or damage. The management of snag hazards posed by fire weakened trees at these sites is critical to the safety of forest visitors.

Dead and downed trees and their associated slash can potentially create blockages along a roads drainage system. Blocked culverts and ditches along roads increase the chances of the road bed becoming saturated and washing out. Poorly functioning drainage along roads due to downed trees or sediment from burned areas also increases the risks of shoulder failure which narrows the roadbed and often leads to roads being impassable. The loss of vegetation above roads often causes cut bank slumps and/or rocks to fall onto the road creating a road blockage. Areas with large timber pose snag hazards to the actual road system. A large diameter tree falling onto a roadway can damage the road itself, causing exposure to those that encounter it initially, as well as those that must repair it. Large snags situated on the fill slope (downhill side) of the road can pose hazards as well. If they are dislodged by wind, they can take large root wads with them that may undermine the structural integrity of the roadbed. These can be especially dangerous as the damage may go unseen until the damage results in a cave in. If burnt areas are left untouched for several years, trees may fall into other trees creating exponentially more difficult removal hazards. What may have been easily accomplished with competent sawyers within one year may require machinery or blasting to remove three years or more after the fires are extinguished.

Without road maintenance and addressing hazard trees adjacent to roads after fires, the potential of injury to persons using the roads increases along with the risk of losing the road system. Road closures are possible when conditions are such that public safety is at risk due to lack of road maintenance or lack of hazard tree treatment adjacent to roads. Road maintenance is crucial to keeping the roads open for safe passage.

B. Effects of Alternative 2 – Proposed Action

After implementation of the proposed action, the dangers to the public and forest workers from falling trees and delayed road maintenance would be greatly reduced. Proactive measures accomplished under Alternative 2 would result in a safer work environment for the individuals assessing and mitigating the post fire hazards. Allowing a period of time to pass could allow high winds and snowfall to exacerbate overhead hazards by further weakening trees and creating loose tree tops that could fall onto forest roadways and potentially endanger forest travelers. Completing the work in the first field season following the fires allows for the hazards to be mitigated before long term degeneration of the fire weakened trees occurs.

Post fire road maintenance treatments that would occur under Alternative 2 generally consists of the following:

1. *Ditch Cleaning*: The purpose of cleaning ditches is to remove debris and sediment as a result to fires. Keeping ditches cleaned and fully operational keeps road side drainage out of the road bed and prevents erosion of the road surface or saturation of the road bed which could lead to shoulder failure;

2. *Culvert Cleaning:* Cleaning culvert inlets and outlets is crucial post fire to keep the drainage functional for the road system. Culverts plugged with debris or sediment create the potential for road failures or loss of the road due to massive sliding;

3. *Road Blading:* Keeping the road blading and drivable is essential to maintain a safe road system. Debris or downed timber can damage the road surface causing potholes and shoulder failures to occur. Road blading also removes rocks that fall onto the road surface.

4. *Slide and slump Repair*: Slides and slumps are common after fires. They often form on the cut slope side of the road and block drainage within a ditch or at a culvert inlet. It is essential to remove these slides and slumps to allow for adequate drainage; and

5. *Shoulder Repair work:* Shoulder repair work is often treated by excavating the area of shoulder failure to a competent surface and rebuilding the road surface in compacted layers using large rocks, mechanically stabilized earth walls or other retaining wall structures. Without treating shoulders, passage of vehicles is often impossible and not safe due to the narrowing of the road bed.

In addition, the road hazard assessment efforts conducted under Alternative 2 would most likely uncover otherwise unseen safety concerns that would have gone unnoticed had those efforts not have been pursued, such as slide prone rocks, unstable soils, and fissures that could eventually cause landslides. All of these actions would contribute greatly to reducing the hazards of the post-fire roadside landscape.

3.2 Aquatics

3.2.1 Affected Environment

3.2.1.1 Existing Condition

Because the proposed action is spread over a substantial portion of the entire Forests and is designed to have little to no impact on special-status fish species and essential fish habitat (EFH), this is document will not attempt to describe hydrologic, vegetation, etc. conditions which might be relevant to more-focused projects with greater potential for adverse effects on fish and fish habitat. The primary physical baseline factors which have the potential to be relevant to this effects analysis are the locations of project activities and the presence and location of ESA-relevant fish, which are provided graphically in Figures AQ-1 through AQ-3.

Table AQ-1. Aquatic resources indicators and measures for the existing condition

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Existing Condition
Endangered Species Act Threatened, Endangered, and Proposed Species	Determination Statement	Qualitative Discussion	Described in Text
Forest Service Region 1 Sensitive Aquatic Species	Habitat Trend and Determination Statement	Qualitative Discussion	Described in Text
Magnuson-Stevens Act EFH	Determination Statement	Qualitative Discussion	Described in Text
Aquatic Management Indicator Species	Habitat Trend	Qualitative Discussion	Described in Text

A. ESA-status species

Snake River Basin Steelhead Trout

Background: Steelhead trout in the Snake River basin were listed as threatened under the ESA with an effective listing date of October 17, 1997 (62 FR 43937) and proposed for revision on June 14, 2004, (69 FR 33102). The revised Snake River steelhead ecologically significant unit (ESU) proposed for relisting as the Snake River Basin O. mykiss ecologically significant unit, which includes both resident and anadromous forms within the range of the existing steelhead ecologically significant unit, and also includes the North Fork Clearwater River drainage upstream of Dworshak Dam. The ESA listed status for Snake River Basin steelhead trout was finalized on January 5, 2006 via final rule in the Federal Register (71 FR 834). The final rule was consistent with the initial ruling (August 18, 1997) in that the listed Snake River Basin steelhead ecologically significant unit included all anadromous forms in the Clearwater River subbasin excluding the resident forms upstream of Dworshak Dam in the North Fork Clearwater River subbasin.

On September 2, 2005, critical habitat (CH) for the Snake River Basin steelhead trout was designated via final rule (70 FR 52630). Streams designated for critical habitat designation are identified in the September 2, 2005 Federal Register by their corresponding fifth-field hydrologic unit codes (see Figures AQ-1 through AQ-3 and Appendix D Tables 2-4).

Distribution and Biology: Adult steelhead trout generally arrive at the mouth of the Clearwater and Salmon rivers from September through November, and migrate to tributary streams from January through May. Snake River Basin steelhead trout (steelhead) are summer steelhead, as are most inland steelhead, and comprise two groups, A-run and B-run, based on migration timing, ocean-age, and adult size. Spawning occurs from mid-March through early June, on a rising hydrograph and prior to peak stream flows (Thurow 1987; Columbia River DART 2013). Surviving adults typically move downstream toward the Pacific Ocean shortly after spawning.

After reaching spawning grounds, steelhead typically select spawning gravels at the downstream end of pools, in gravels ranging in size from 0.5 to 4.5 inches in diameter (Pauley et al. 1986). These spawning areas must meet species-specific requirements of flow, water quality, substrate size, and groundwater upwelling. Embryo survival and fry emergence depend on substrate conditions (e.g. gravel size, porosity, permeability, and oxygen concentrations), substrate stability during high flows, and water temperatures of 13°C or less. The eggs hatch in about 35-50 days, dependent upon water temperature. The alevins remain in the gravel 2 to 3 weeks until the yolk sac is absorbed, then emerge as fry in late spring, and begin to actively feed; egg to fry survival is usually near 15 percent. Snake River Basin steelhead trout usually smolt as 2 or 3 year olds and migrate to the ocean.

Productive steelhead trout habitat is characterized by complexity, primarily in the form of large and small wood and/or boulders and rock. Juveniles will take advantage of microhabitats to seek refuge from high water velocity and/or temperatures. Juveniles may move around in a basin to take advantage of favorable habitat. Fry prefer protected and complex edge habitat with low velocity (<0.3 feet/second). They are seldom observed in water over 15 inches deep. Summer rearing takes place primarily in the faster parts of small and deep scour pools with some form of surface cover and wood or medium to large substrate (cobble or boulders). Other important habitat components for juveniles are pools with "bubble curtains," undercut/scoured areas, and pocket water in deep riffles and rapids. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Small tributaries and lakes are probably important winter habitat. As juveniles get older, some tend to move downstream to rear in larger tributaries and mainstem rivers.

Populations of steelhead/redband/rainbow trout (anadromous or resident) require relatively require cold water and relatively low levels of fine sediment to breed and survive, so the presence of individuals of the species, especially juveniles, indicates relatively high water quality. The abundance of wild anadromous steelhead in the project area is also highly affected by migratory conditions in the Snake and Columbia Rivers, and by forage abundance and other rearing conditions in the Pacific Ocean.

Redband trout are sometimes defined as the non-anadromous form of rainbow trout in the Columbia River Basin west of the Cascade Mountains (May et al. 2012) and, but in the project area (except for activities in the North Fork Clearwater River (NF Clearwater River) drainage and in Orofino Creek) all *O. mykiss* are generally considered to be steelhead of the redband trout subspecies (*O. m. gairdneri*) whether spawned by anadromous parents or not. This is because the assumption is that resident and anadromous forms have evolved in sympatry over the long-term (and/or migration tendency may be a component of alternative life histories within a population), even if there are current physical passage barriers for an anadromous population. Resident steelhead trout are morphologically indistinguishable from juvenile steelhead trout, and so, as described below, while portions of the project area may actually be populated by non-anadromous individual *O. mykiss* rather than anadromous steelhead trout, all *O. mykiss* (with exceptions noted above) will be considered to have ESA-Threatened status, and will be referred to as steelhead.

Presence in the Action Area: See Figures AQ-1 through AQ-3.

Fall Chinook salmon

Background: Snake River fall Chinook salmon (fall Chinook) were listed as threatened on April 22, 1992 (57 FR 14653); and the listing was reissued on June 28, 2005 (70 FR 37160). Critical habitat was designated for the ecologically significant unit on December 28, 1993 (58 FR 68543); in the Clearwater River drainage critical habitat extends up the mainstem Clearwater River to the confluence of Lolo Creek, about 20 miles downstream from the confluence of the South Fork Clearwater and the Middle Fork Clearwater rivers. The National Marine Fisheries Service (NMFS) has not described specific critical habitat in the Salmon River, but redd surveys have been performed in the Salmon River mainstem up to the confluence of French Creek (which is slightly above the Tepee Springs fire perimeter); almost all fall Chinook salmon redds detected are well below the project area, however.

Distribution, Biology, and Presence in the Project Area: Fall Chinook salmon historically spawned primarily in the mainstem Snake River from Shoshone Falls in southern Idaho downstream in appropriate habitat to locations downstream of the Clearwater River confluence, and in the lower portions of larger tributaries. Since construction of dams on the Snake River, current distribution is more limited, but includes the lower Clearwater and Salmon rivers. Primarily because of Nez Perce Tribe efforts to expand the spawning habitat of the species through hatchery outplants, spawning has recently been recorded in areas of the Clearwater River basin previously without recorded presence for decades.

Fall Chinook typically spawn in late fall (typically no earlier than late October), and fry emerge in early to mid-spring. Juveniles typically rear for a few weeks or months in proximity to their hatching site, but move downstream during the late spring and summer of their first year of life (as subyearlings) to enter the Pacific Ocean.

Only recently has documentation of fall Chinook spawning or rearing on Forests-relevant streams outside of the mainstem Clearwater and Salmon rivers existed. While the large majority of the fall Chinook spawning in the Clearwater River drainage documented since listing has occurred downstream of the North Fork Clearwater River, recent surveys (Adult Technical Team 2008, 2009, 2010, 2011; Arnsberg, et al. 2012, 2013, 2014, 2015, 2016) show that fall Chinook spawn at least sporadically in the area between the North Fork to the SF Clearwater River confluence, and beyond the critical habitat area in the South Fork Clearwater, Middle Fork Clearwater, and Selway rivers. As noted above, some also spawn in the lower Salmon River.

Based on observations on other local streams and known water temperature condition in the South Fork Clearwater River, juvenile fall Chinook salmon should migrate out of the project area by the end of June (Bill Arnsberg, Nez Perce Tribe, personal communication). Sub-yearling fall Chinook salmon should exhibit similar behavior in the mainstem and Middle Fork Clearwater rivers, as well as the Selway and Salmon rivers. Some juvenile fall Chinook are known to winter in the lower Snake River reservoirs and not enter the ocean until after their first full year of life (as yearlings).

Presence in Action Area. Fall Chinook salmon are mainstem spawners, so adults, redds, and juveniles would not be present directly adjacent to any activity areas. Individuals may be present in proximity to streams along paved haul routes, in particular along the Middle and South Fork Clearwater rivers, Selway River, and Salmon River.

Bull trout and bull trout critical habitat

Background. Bull trout were listed as threatened under the Endangered Species Act on June 10, 1998 by the U.S. Fish and Wildlife Service (USFWS, 63 FR 31693). The USFWS designated critical habitat for Columbia River Basin bull trout on November 17, 2010 (75 FR 63898); this designation includes foraging, migrating, and overwintering (FMO) habitat for mainstem streams such as the Clearwater and Salmon Rivers, their major tributaries, and the lower reaches of several project area tributaries. Spawning

and rearing (SR) critical habitat is usually confined to the upper reaches of the most pristine streams in the project area.

Historically, reproductive success maintained resident, fluvial and adfluvial populations of bull trout throughout its former range. Causes for decline in the range of bull trout include competition with and predation by non-native fish, overfishing, habitat loss and fragmentation, habitat degradation, and loss of productivity associated with depressed populations of other salmonid fishes. Reproductive success has likely been reduced through competition, predation and/or hybridization with non-native, introduced populations of brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), and coastal rainbow trout (*O. m. irideus*). Spawning success is very difficult to confirm in much of the bull trout range because a considerable amount of the best remaining habitat occurs in areas difficult to access, numbers of fish are few, and redds are difficult to locate.

Distribution and Life History. Resident, fluvial, and adfluvial populations of bull trout were historically distributed throughout the Pacific Northwest in the United States and western Canada. Resident and fluvial populations occurred throughout the Snake River basin including tributaries of the mainstem Clearwater River. Bull trout co-evolved with redband trout (*O. m. gairdneri*), westslope cutthroat trout (*O. clarki lewisi*), Chinook salmon (*O. tshawytscha*), and mountain whitefish (*Prosopium williamsoni*). Recent surveys in the known range of bull trout in Idaho have shown metapopulations in widely scattered segments of river basins (Rieman and McIntyre 1993), as well as in isolated catchments.

Mainstem rivers and the lower reaches of most of the tributaries are not considered to be spawning or early (i.e., first/second year) rearing habitat. The mainstem of most or all of these streams are thought to harbor adult and advanced juvenile fluvial (i.e., large-river dwelling) bull trout year-round and are known to serve as migratory corridors for adult and advanced juvenile fluvial and adfluvial (lake-dwelling) bull trout during the spring and fall. In addition, some subadult fluvial and adfluvial bull trout (typically 175-300 mm in length) are known to "wander" into habitat which may not be suitable for spawning or early rearing (as opposed to migration to or from spawning and/or early rearing habitat) and may exist for short or long periods in stream reaches that otherwise would be unoccupied or used only as a migratory corridor (Swanberg 1997). Full-time residents of the tributary streams where fluvial and adfluvial fish spawn and conduct early rearing are the third bull trout life history type known to occur in Idaho.

Spawning usually occurs during late summer and early fall, with young emerging the following spring (Ratliff 1992). Spawning typically begins when water temperatures reach 5 to 9 °C, along with stream flow and photoperiod conditions (Shepard et al. 1984). Suitable water temperatures for spawning range from approximately 2 to 4 °C and should not exceed 8 °C (Weaver and Fraley 1991). Optimal spawning conditions occur in lower gradients, typically in pool tailouts in loose gravels and cobbles, with water depths averaging 12 inches (Fraley and Shepard 1989). Schoby and Keeley (2011) also document that spawning bull trout may quickly return to lower stream reaches by early fall to take advantage of egg deposition from the spawning Chinook salmon. Egg and carcass material are rich in nutrients and lipids, which, are important for overwintering salmonids (Bilby et al. 2001, Wipfli et al. 2010).

Bull trout typically rear in proximity to natal habitat for several years before (if of the fluvial or adfluvial life history type) outmigrating as subadults to advanced rearing habitat (Rieman and McIntyre 1993). Along with cold water temperatures, bull trout require complex habitat with large wood contributing to pool formation. Large wood provides cover, which is very important for bull trout of all different age classes and provides substrate for increased invertebrate production and nutrient inputs to the stream. Large wood can promote floodplain interaction during high spring flows and contribute to bank stability of a stream channel (Bjornn and Reiser 1991). Ideal juvenile rearing occurs throughout a drainage where suitable water temperatures (< 15 °C) and overhead cover are present (Fraley and Shepard 1989, Saffel and Scarnecchia 1995). Bonneau and Scarnecchia (1997) document that juvenile bull trout have a strong affiliation with stream substrate. The interstitial space between substrate was highly utilized by juvenile bull trout particularly during the winter months and primarily during the day. Macroinvertebrate

production and sediment levels (impairment of interstitial space within the substrate) can also dictate available bull trout rearing habitat within a stream.

Presence in Action Area. In relationship to the proposed action, bull trout presently occur in the Clearwater and Salmon River drainages, and spawn in tributaries within the North Fork, South Fork, Selway, and Lochsa core areas, and possibly the Clear Creek in the Mainstem/Middle Fork core areas (USFWS 2002). See Figures AQ-1 through AQ-3.

Snake River Spring/summer Chinook salmon

Native to the Clearwater and Salmon River basins, but extirpated from the former in the 20th Century and re-introduced with non-native (i.e., not ESA-protected) stocks. ESA-listed individuals migrate through and rear in the Salmon River mainstem, which is critical habitat (79 FR 75449). No individuals are likely present in the project area, except perhaps a few individual parr in lower Allison Creek (but which would not have been spawned there) and migrating smolts and adults or juvenile rearing individuals in the Salmon River mainstem. Any spring/summer Chinook salmon parr present in Allison Creek would likely be a mile or more downstream of any ground-disturbing project activities, and would interact with come into proximity with project activities only in the form of log haul on the adjacent graveled 211 road. Along the Salmon River, logs would be hauled on the paved county road to Riggins and eventually on U.S. 95.

Snake River Sockeye salmon

Native to the Salmon River basin, but present on the Forests only as migratory individuals in the mainstem Salmon River, which is also the extent of spawning and rearing sockeye salmon designated critical habitat (58 FR 68543). As with ESA-listed spring/summer Chinook salmon, the proposed project activities in proximity to the Salmon River would be limited to haul on the paved county road and U.S. 95.

B. Essential Fish Habitat

In accordance with applicable requirements of section 305(b) of the Magnuson-Stevens Act and its implementing regulations (50 CFR Part 600.920), the Forests need to evaluate potential effects of the activities proposed in the project area on Essential Fish Habitat.

The NMFS designates the freshwater habitat of Pacific salmon species by subbasin (i.e., HUC 4). Essential Fish Habitat includes all streams and other water bodies occupied or historically accessible to these species (with certain exceptions), but does not otherwise distinguish individual streams within the subbasins. The project would be implemented in the Clearwater and Salmon River basins where both Chinook (spring/summer and fall run types) and coho (*O. kisutch*) salmon have (as of December 2014, 79 FR 75449) Essential Fish Habitat designated habitat. Some streams are historically accessible to both Chinook salmon types and to coho salmon.

Spring Chinook salmon

Spring Chinook salmon in the Snake River are considered an ecologically significant unit (ESU) under the ESA and, as described above, are present in the Salmon River and some tributaries. Spring Chinook salmon in the Clearwater basin, however, are not considered part of this ecologically significant unit because it is believed that indigenous spring Chinook populations were eliminated from the Clearwater River Basin by construction of Lewiston Dam. So, spring Chinook salmon are potentially present in the Lochsa, Selway, North, South, and Middle Fork Clearwater rivers and some of their tributaries) but are not listed as Threatened despite declines in returning adults, but their habitat is still considered to be Essential Fish Habitat. Several hatcheries in the Clearwater River basin raise and release juvenile spring Chinook salmon and operate traps, acclimation ponds, etc. in Clearwater River tributaries. Relevant to

the proposed action, spring Chinook salmon may be present in some streams in the Lochsa, Middle Fork Clearwater, and South Fork Clearwater drainages, and so activities may affect project-relevant habitat within or downstream of the Boulder, Jay Point, Woodrat, Snowy Summit, Baldy, and Wash fire perimeters, in particular. Spring Chinook salmon have been considered as a species of special concern by the State of Idaho and as a sensitive species by Region 1 of the U.S. Forest Service since 1987.

Fall Chinook salmon

Fall Chinook salmon are discussed under ESA-status species, above.

Coho salmon

Historically, coho most likely inhabited tributaries in the lower Clearwater River Basin including some in the lower North Fork, South Fork, and Middle Fork subbasins. Re-introduction of coho salmon has been undertaken by the Nez Perce Tribe in tributaries of the mainstem Clearwater River, including the Lapwai, Clear, and Lolo Creek drainages and some parr releases were made in the SF Clearwater River tributary of Meadow Creek in 2000-2003 (Everett et al. 2006). Natural spawning has also recently been observed in the Potlatch River, Catholic Creek, and in the NF Clearwater River below Dworshak Dam.

Historically, coho salmon most likely inhabited tributaries in the lower Clearwater River Basin including some in the Clearwater River subbasin (Nez Perce Tribe 2006). Re-introduction of coho salmon has been undertaken by the Nez Perce Tribe in tributaries of the mainstem and Middle Fork Clearwater River, and the Tribe is planning to re-introduce the species to South Fork Clearwater River tributaries in the future. For now, however, hatchery coho salmon juveniles have primarily been released into Lapwai Creek, Clear Creek, and Orofino Creek. As adults reared in these streams continue to return in larger numbers, so it is possible that some adults (perhaps especially those spawned or released in Clear Creek) may stray into the Middle Fork Clearwater River upstream of Clear Creek and in the South Fork Clearwater River and successfully spawn there. Similar to spring and fall Chinook salmon, there likely is no suitable coho salmon spawning habitat in project activity area stream segments (with the possible exception of lower Meadow Creek in the Selway River drainage), primarily because of small stream size and gradient barriers, so the impacts of the proposed project on instream and riparian habitat should be similar to those described above for spring Chinook salmon.

C. Sensitive Species

The USFS established direction in FSM 2670 to guide habitat management for proposed, endangered, threatened, and sensitive species. For sensitive species, a biological evaluation (BE, a separate document) is prepared in accordance with FSM 2672.42 and the Code of Federal Regulations (50 CFR 402). The BE meets the objectives set forth in FSM 2672.41, which include: Ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant or animal species; ensure that activities do not cause the status of any species to move toward federal listing; and incorporate concerns for sensitive species throughout the planning process, reducing negative impacts to species and enhancing opportunities for mitigation.

To accomplish these objectives, the BE reviews the proposed action and any alternatives in sufficient detail to determine the level of effect that would occur to each species evaluated. The BE considers the best available scientific literature, a thorough analysis of the potential effects of the project, and the professional judgment of the biologists who completed the evaluation. This document incorporates the effects on terrestrial sensitive species), per direction pertaining to streamlining (USDA FS 1995). The streamlined process for doing biological evaluations for sensitive species focuses on two areas:

1. Incorporating the Effects on Sensitive Species into the NEPA Document

2. Summarizing the Conclusions of Effects of the Biological Evaluations for Sensitive Species (Aquatics Appendix D)

The analysis area for sensitive species is the entire project area because the direct and indirect effects of the project would occur in this area.

Westslope cutthroat trout

Background. Westslope cutthroat trout (westslope cutthroat trout) are native to Snake River tributaries in Idaho from the Salmon River downstream (although likely excluding the Palouse River) and Upper Columbia River tributaries (Behnke 1992) and are often the most abundant (or only) native salmonid inhabitants of the low-order streams in these drainages. The species naturally coexists with anadromous or formerly-anadromous redband rainbow trout in many Idaho streams with varying degrees of hybridization (Weigel et al. 2003).

Cutthroat trout require cold water and relatively low levels of fine sediment to breed and survive (McIntyre and Rieman 1995), so the presence of individuals of the species, especially juveniles, indicates relatively high water quality. Cutthroat trout populations are sometimes extirpated or reduced in low order streams by non-native brook trout (Peterson et al. 2004), and such population effects are most prevalent when accompanied by water quality or stream channel degradation (McIntyre and Rieman 1995).

Westslope cutthroat trout are likely the special status fish with the widest distribution and population abundance in project area streams, particularly in the North Fork Clearwater, Lochsa, and Selway subbasins. Within the Clearwater and Salmon river basins, westslope cutthroat trout are usually the fish species found in the smallest of headwater streams, particularly where non-native brook trout are not present (Kenney, personal observation), so the fish community in fish-bearing streams adjacent project activity areas would most likely include populations of this species. Other than their distribution, westslope cutthroat trout are very similar to steelhead parr in their habitat needs.

Redband (rainbow) trout, and spring Chinook salmon

These species are discussed under ESA-listed species or Essential Fish Habitat, above.

Pacific lamprey

Pacific lamprey adults enter freshwater between July and September and may migrate several hundred kilometers inland. They do not mature until the following March. They spawn in sandy gravel immediately upstream from riffles between April and July and die soon after. Eggs hatch in two to three weeks and the ammocoetes (juvenile lamprey) spend up to the next six years in soft substrate as filter-feeders before emigrating to the ocean. They remain in the ocean for 12 to 20 months before returning to freshwater to spawn.

The total distribution and abundance of lampreys in the SF Clearwater River subbasin is not fully known, but the distribution and abundance are severely reduced from historic conditions. Ammocoetes (one form of juvenile lamprey) have been sampled within the last two decades in the mainstem SF Clearwater River and in the Red River, and in Newsome Creek near its mouth (Cochnauer and Clair 2009). The Nez Perce Tribe translocated adult lampreys into Newsome Creek in 2007-2010 and observed successful spawning and juvenile recruitment in this stream (Ward et al. 2012); this translocation continues to occur each year. Pacific lamprey have been sampled in Lolo Creek into the 21st century, but were thought to have been extirpated by 2009 (Cochnauer and Clair 2009). Recent efforts to translocate adult lampreys into Lolo Creek have produced juvenile lampreys in the mainstem of Lolo Creek, but none were detected in Musselshell Creek (Ward et al. 2012). The current presence of lampreys in the project area is likely limited to Newsome and Lolo creeks and the mainstem of the SF Clearwater River.

Western pearlshell mussel

The western pearlshell mussel is present in many western states and is relatively common in the Pacific Northwest, including in Idaho (Nedeau et al. 2009). It requires fish hosts to complete its lifecycles and brook trout have been documented as hosts (Nedeau et al. 2009). This species is a sedentary filter feeder and so is vulnerable to changes in streambed habitat, especially high levels of fine sediment accumulation (Jepsen et al. undated).

Few of the Forests streams have been formally surveyed for the presence of WPM species, but populations exist in the mainstems of the NF Clearwater, SF Clearwater, and individuals are probably present in other mainstem streams and in low-gradient portions of many Clearwater and Salmon River tributaries within the project area (Lysne and Krouse 2011; Kenney, personal observation).

D. Aquatic MIS Analysis

Management Indicator Species (MIS) were identified in the Forest Plans to allow assessment of the effects of planned management activities on viable populations of fish and wildlife, including those that are socially or economically important, via habitat monitoring. Some of the MIS have specific habitat requirements that allow MIS monitoring to represent impacts on some non-MIS species with similar habitat requirements.

Because most MIS species present likely to occur in the project area are also either ESA, essential fish habitat, or Sensitive species, information on these animals (westslope cutthroat trout, steelhead, and spring Chinook salmon) are presented in sections above. The one MIS which is not discussed above (kokanee) will not be carried over to effects analysis below. Kokanee are MIS for only the mainstem of the North Fork Clearwater River above Dworshak Reservoir. Kokanee are seasonally present in the North Fork and some tributaries, but no activity areas are adjacent to the North Fork or any of the kokanee-bearing streams. The Snow Creek activity area would produce log haul which would be adjacent to kokanee habitat in the North Fork and Skull Creek, but the potential for effect to this species is very low.

3.2.2 Environmental Consequences

3.2.2.1 Alternative 1 – No Action

The proposed project would not be implemented under Alternative 1 and roadside vegetation and fuel would not be treated except for the areas of overlap between road-adjacent activity areas and planned/future salvage harvest. The road maintenance and tree planting aspects of the project activities would also be completed to some extent under the planned/future salvage harvest, and would not be precluded from future implementation separate from tree harvest and fuel treatment.

Effects of the baseline wildfire, fuel load, and road existence/use/maintenance on individuals of special status aquatic species and their habitat would continue in predictable and speculative manners. Wildfire and fuel accumulation are a natural components/contributors to aquatic habitat, and provides the potential for both negative and positive effects, although long-term effects are generally beneficial. The baseline existence and use of road prisms in proximity to stream channels is a uniformly negative characteristic for aquatic organisms and habitat, but proper and timely maintenance can often reduce adverse effects. Regeneration of trees in areas of wildfire would occur with or without localized tree planting, although possibly at a slower pace than in Alternative 2.

Table AQ-2. Resource indicators and measures for Alternative 1

Resource Element	Resource Indicator	Measure	(Alternative 1)
Endangered Species Act Threatened, Endangered, and Proposed Species	Determination Statement	Qualitative Discussion	No effect
Forest Service Region 1 Sensitive Aquatic Species	Habitat Trend and Determination Statement	Qualitative Discussion	Same as above.
Magnuson-Stevens Act EFH	Determination Statement	Qualitative Discussion	Same as above.
Aquatic Management Indicator Species	Habitat Trend	Qualitative Discussion	Same as above.

3.2.2.2 Alternative 2 – Proposed Action

A. Direct and Indirect Effects - Alternative 2

Direct and Indirect Effects Analysis Structure

Because of the large spatial breadth of the proposed activities, this document will focus its attention primarily on potential effects to the special status aquatic resource which would have the greatest regulatory impact if affected: ESA-listed fish species and designated aquatic habitat. **As a practical matter, this discussion is focused on the presence of steelhead and bull trout and their critical habitat.** Analyses of potential effects to Region 1 Sensitive aquatic species, essential fish habitat, and MIS aquatic species would follow the analysis of potential ESA effects, and would generally either reference ESA-related effects or note the potential differences from ESA-related effects.

ESA Effects Analysis Structure

As described above there are a substantial number of project sites and haul routes scattered over five ranger districts and 49 subwatersheds (Figures AQ-1 through AQ-3 and Appendix D Tables 2-4), and many of these sites are spatially distant from individuals of ESA-listed species and/or designated critical habitat and so would have little potential for adverse effects. In addition, many of the proposed activities which actually would be in proximity to the individuals/critical habitat (especially cut-and-leave tree treatments, fuels treatments, tree planting, and log haul on paved and well-maintained gravel roads) would, because of the nature (including project design features associated with the activity) or scale of the activity, also have little to no potential for adverse effects. To facilitate the review of this document, therefore, the proposed activities have been grouped into four subwatershed categories, based on the presence of critical habitat or ESA-listed fish within the subwatershed and the potential for effects on critical habitat or to ESA-listed fish in that subwatershed.

Category 1 subwatersheds would not include any designated critical habitat or known presence of ESA-listed fish and where there would be no plausible mechanism for transmitting effects on individuals/critical habitat to other subwatersheds. Category 2 subwatersheds are those for which the proposed project activities would be so spatially distant from designated critical habitat or individual ESA-listed fish that effects would be discountable or not measurable. Category 3 subwatersheds are those in which the only project activities proposed in proximity (roughly 1,000 feet or less) to designated critical habitat or ESA-listed individual fish would be the haul of project-felled trees on log trucks (or the return trip of such trucks to activity areas) on well-maintained paved or gravel roads (subwatersheds with haul just on paved roads outside of Forests boundaries are not included in this category because no effects are expected to occur from such haul). Category 4 subwatersheds would be those where proposed tree-felling activities or log haul on native surface roads would occur within proximity (roughly 1,000 feet or

less) of mapped stream channels. Of the eight Category 4 subwatersheds, only five would include activities which would disturb soil through yarding of timber.

Figures AQ 1 through AQ-3 and Appendix D Tables 2-4 show the current presence of ESA-listed species or designated critical habitat by subwatershed and by direct proximity to hazard tree activity areas which shows the potential amount and type of hazard tree activities and log haul that allows a segregation of subwatersheds and activity areas by potential effects on ESA-listed fish species. For the most part, designated critical habitat includes all (or more than all) of the stream channel in which ESA-listed species are known to or likely to occur The presence of ESA-listed individuals outside of critical habitat is noted where documented or suspected.

The subwatersheds proposed for project activities have been divided into four categories to facilitate the analysis of project effects. Category 1 subwatersheds would not include any designated critical habitat or known presence of ESA-listed fish and where there would be no plausible mechanism for transmitting effects on individuals/critical habitat to other subwatersheds. Category 2 subwatersheds are those for which the proposed project activities would be so spatially distant from designated critical habitat or individual ESA-listed fish that effects would be discountable or not measurable. Category 3 subwatersheds are those in which the only project activities proposed in proximity (roughly 1,000 feet or less) to designated critical habitat or ESA-listed individual fish would be the haul of project-felled trees on log trucks (or the return trip of such trucks to activity areas) on well-maintained paved or gravel roads (subwatersheds with haul just on paved roads outside of Forests boundaries are not included in this category because no effects are expected to occur from such haul). Category 4 subwatersheds would be those where proposed tree-felling activities or log haul on native surface roads would occur within proximity (roughly 1,000 feet or less) of mapped stream channels.

Category 1. Fish species and critical habitat not present in the subwatershed: Big Mallard Creek, Horse Creek, Upper Orofino Creek, French Creek, Hemlock Creek, and Middle Creek. Appendix D, Table 2 shows the approximate air and stream channel distances between the closest activity areas and critical habitat stream channels for each of these subwatersheds. Activities within RHCA buffers widths would have little to no potential for transmitting any beneficial or harmful activities to the adjacent stream channels. Further, default RHCA buffer widths would be adjusted at project layout to account for any fire damage to RHCAs which would lessen the normal ability of the buffers to filter potential sediment transmission to stream channels (see Project Design Feature (PDF) #12).

RHCA activities would be limited to hand felling and bucking of tree hazards and hand lopping, bucking, collection of activity-generated fine-fuels, and site preparation for tree planting. Trees would not be felled into stream channels, streambanks would not be disturbed or destabilized, and the amount or recruitment of riparian large woody debris (LWD) or of stream channel shading would not be reduced. Because tree felling and fine fuels treatments would have little to no potential for soil disturbance, and tree planting site preps would involve tiny areas, activities within RHCAs should not increase fine sediment transmission to stream channels. Only small amounts of chainsaw fuel (that within the saws and in 2-gallon or smaller refueling cans) would be allowed within RHCAs and spills would be both infrequent and promptly cleaned-up, so there would be essentially no potential for biologically significant contaminant transmission into stream channels.

For all proposed activity areas within Category 1 subwatersheds and outside of default and adjusted RHCA buffers, the characteristics of the RHCAs and normal and routine road maintenance should prevent or minimize the transmission of effects to stream channels. Any small amount of fine sediment transmitted to stream channels in proximity to activity areas or haul roads would not be transported in measurable or biologically significant amounts the several-to-many kilometers downstream where ESA-listed individuals, designated critical habitat or essential fish habitat might be present. -

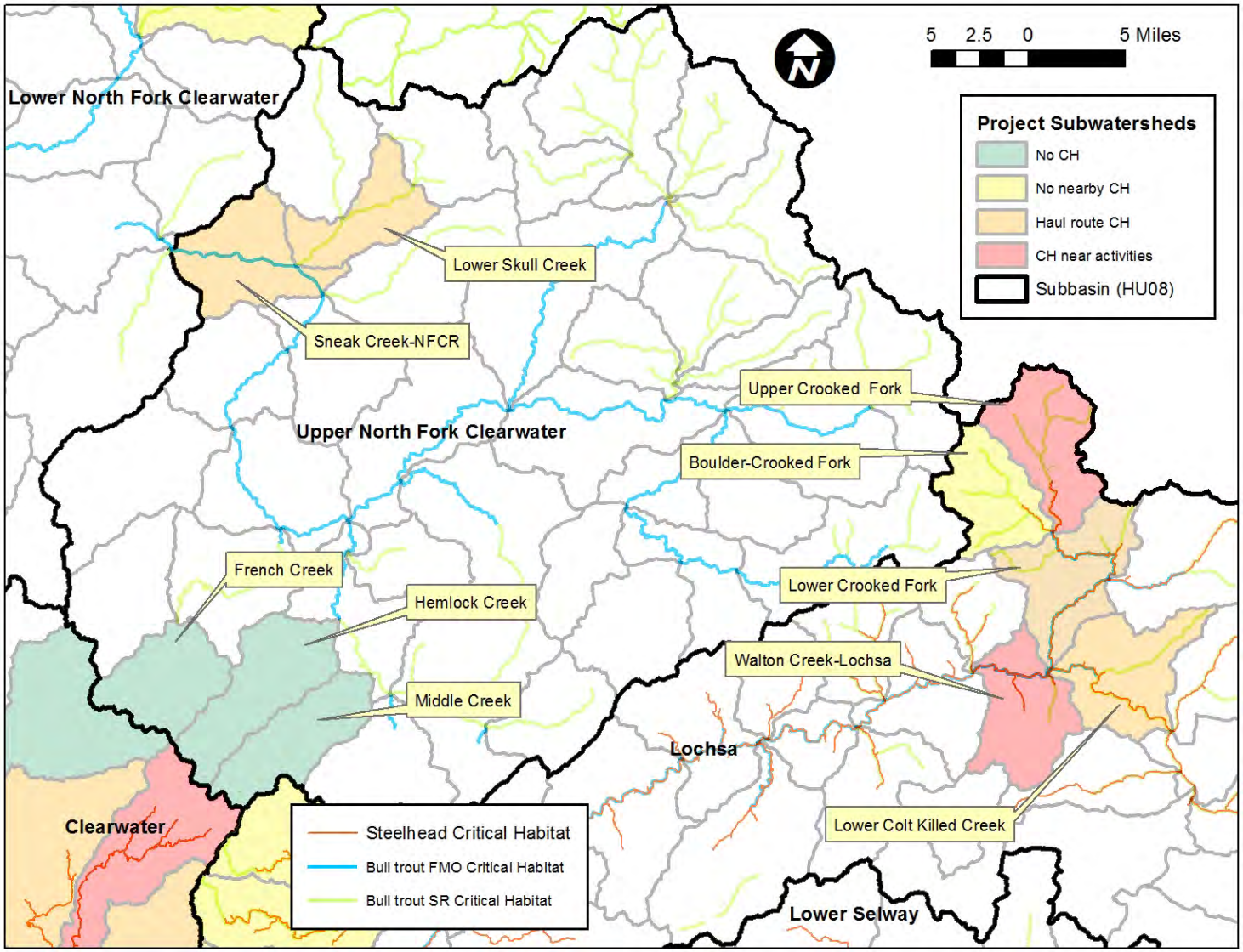

Figure AQ -1. Project subwatersheds, with color-coding describing project activities related to steelhead and bull trout designated Critical Habitat; northern portion.

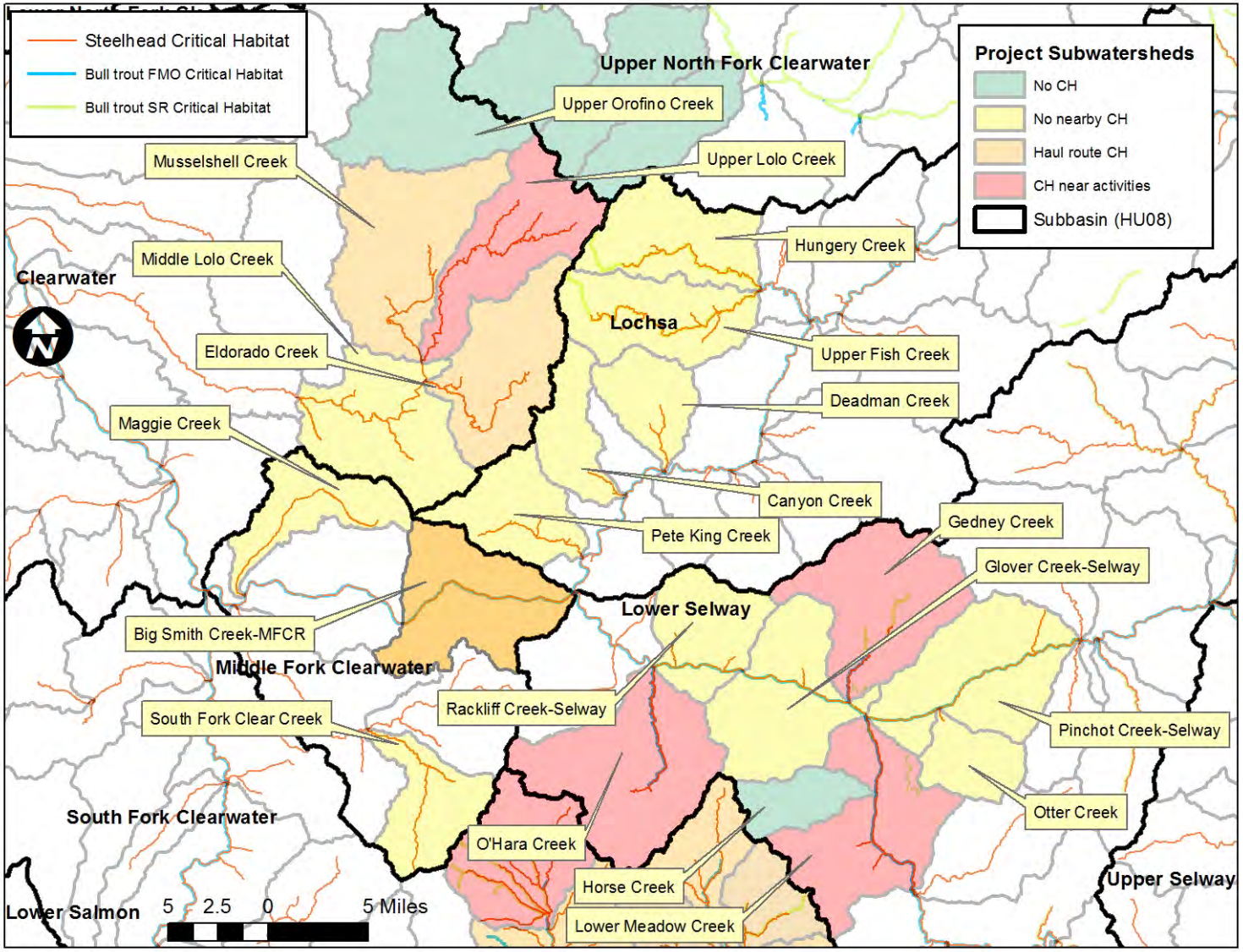

Figure AQ-2. Project subwatersheds, with color-coding describing project activities related to steelhead and bull trout designated Critical Habitat; central portion.

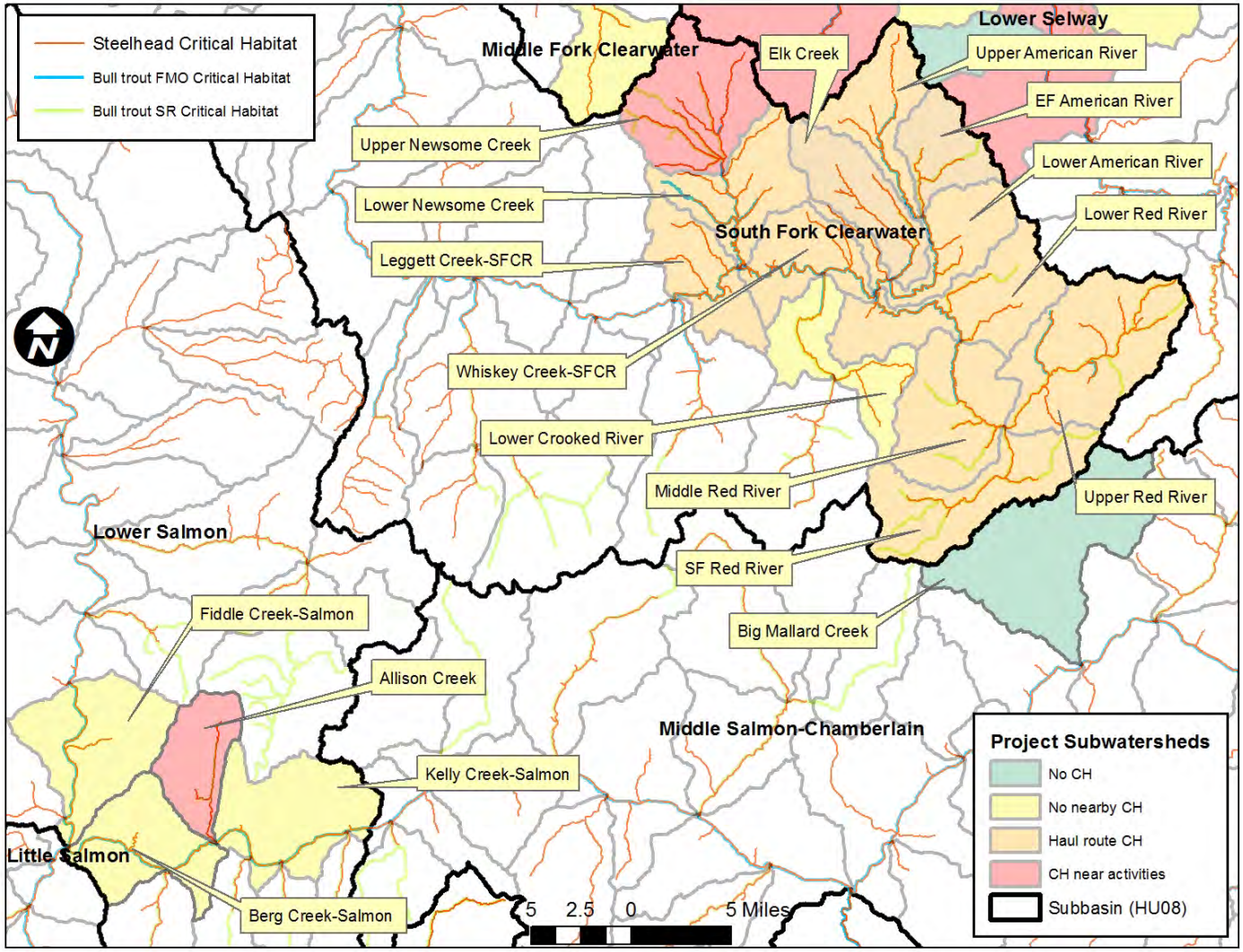

Figure AQ-3. Project subwatersheds, with color-coding describing project activities related to steelhead and bull trout designated Critical Habitat; southern portion.

Category 2. Fish species or critical habitat present in the subwatershed, but not in proximity to hazard tree activity areas or haul routes: Berg Creek-Salmon River, Fiddle Creek-Salmon River, Kelly Creek-Salmon River, Lower Crooked River, Otter Creek, Pinchot Creek-Selway River, Rackliff Creek-Selway River, Maggie Creek, South Fork Clear Creek, Boulder Creek-Crooked Fork Creek, Deadman Creek, Hungery Creek, Canyon Creek, Pete King Creek, Upper Fish Creek, Middle Lolo Creek.

Headwater tributaries within these subwatersheds may flow through project activity areas and then drain into stream systems which support ESA-listed species or critical habitat, but substantial stream channel distance separates these activity areas from ESA-relevant stream channels. However, further Section 7 analysis is necessary and provided below. For reasons identical to those described above for Category 1 subwatersheds, there should be little potential for direct or indirect transmission of adverse effects to ESA-related or essential fish habitat-relevant stream reaches, even though the distance between the activity areas or haul routes might be slight shorter.

Category 3. Fish species or Critical Habitat present in the subwatershed, and in proximity to haul routes, but only those "downstream" of hazard tree activity areas: Whiskey Creek-SF Clearwater River, Lower Red River, Middle Red River, Upper Red River, SF Red River, Elk Creek, Leggett Creek-SF Clearwater River, Lower American River, Upper American River, East Fork American River, Lower Newsome Creek, Big Smith Creek-MF Clearwater River, Lower Colt Killed Creek, Lower Crooked Fork Creek, Eldorado Creek, Musselshell Creek, Lower Skull Creek, and Sneak Creek-NF Clearwater River.

Individual descriptions of the relevant activity areas and species for these subwatersheds. Appendix D, Table 3 includes several subwatersheds through which logs may be hauled or other project-related vehicles driven on paved roads within Forest boundaries. These are not included in the Category 3 subwatershed descriptions, below, because any effects to ESA- or essential fish habitat-relevant stream reaches are speculative and discountable.

Category 4. Fish species or Critical Habitat present in the subwatershed, and in proximity to hazard tree activity areas: Allison Creek, Upper Newsome Creek, Gedney Creek, Lower Meadow Creek, O'Hara Creek, Upper Lolo Creek, Walton Creek-Lochsa River, and Upper Crooked Fork Creek.

Most Category 4 subwatersheds also include some haul road mileage, and some "Category 2" project areas. Individual analyses will be provided for the relevant activity areas and species for these subwatersheds.

ESA Effects Analysis Category 3 Specific Project Area Identification and Effects Discussions.

This category *excludes* subwatersheds where tree felling/yarding would also be implemented in areas in proximity to occupied habitat or critical habitat, but potentially does include activities associated with Category 2 activities. Proposed log haul "downstream" of project activity areas is proposed for about 64 miles of road in proximity to streams where ESA-listed fish are likely to exist or where designated critical habitat occurs. About 59 miles of this total is associated with gravel-surfaced and regularly maintained road segments. See Figures AQ-1 through AQ-3 and Appendix D Tables 2-4. South Fork Clearwater River subbasin

Whiskey Creek-SF Clearwater River. Haul for the Baldy project area would likely head down the gravel-surfaced FR 1858 through this HUC6 for a bit before hitting Idaho 14. The bit is in proximity to both the Newsome Creek and SF Clearwater River, but without any real chance of interacting with either.

Lower Newsome. Haul for the Baldy project area would likely head down the gravel-surfaced FR 1858 through this HUC6 for the better part of 6 miles before crossing into the Whiskey Creek-SF Clearwater River HUC6. The full distance is in proximity to Newsome Creek, and there are crossings of several critical habitat tributaries of that stream.

Leggett- SF Clearwater River. Haul for the Deadwood project area would likely head down the gravel-surfaced FR 492 through this HUC6 mostly along Santiam Creek for a bit before crossing the bridge over the South Fork and hitting Idaho 14. The lower 1.7 miles is either in proximity of the portion of Santiam Creek which is steelhead critical habitat, or of the mainstem South Fork, which is both steelhead and bull trout foraging, migrating, and overwintering critical habitat. Several crossings of Santiam Creek or its tributaries along the haul route, but only one that feeds into the critical habitat portion of the creek.

Upper American. Haul for the Wash project area would likely head south down the gravel-surfaced FR 443 through this HUC6 before crossing into the Lower American HUC6 within the Elk City township. Most of the road in the HUC6 is on or near a ridgetop, with only the southern-most ~four miles in proximity to the American River (and steelhead and bull trout foraging, migrating, and overwintering critical habitat). The 443 road crosses the "river" near the township boundary, and there is another crossing of an unnamed tributary in proximity to the river along the haul route in this HUC.

Lower American. After leaving the Upper American HUC6, haul for the Wash project area would likely head down the gravel-surfaced FR 443 through this subwatershed for a bit before the 443 switches to asphalt near Elk City. Only the last mile or so is in proximity to the Upper American River, with most of the haul route in this HUC on or near a ridgetop.

SF Red River. Haul for the Noble project area would likely head down the gravel-surfaced FR 1190 through this HUC6, eventually getting close to, crossing, and then paralleling Trapper Creek, which is both steelhead and bull trout spawning and rearing critical habitat, for about 1.4 miles of proximity. The haul route for this part of the project then finds its junction with the paved FR 222.

Middle Fork Clearwater River subbasin

Big Smith-MF Clearwater River. Haul for the Woodrat and several other project areas would likely head down the gravel-surfaced FR 101 through this HUC6 for a bit before hitting U.S. 12. There would also be some haul from Woodrat down the gravel-surfaced FR 5503 to Highway 12. About 1.2 and 0.6 miles of these roads, respectively would be in proximity to the MF Clearwater River (steelhead and bull trout foraging, migrating, and overwintering critical habitat), but without any real chance of interacting with the river, which would be on the far side of the highway from the haul roads. A total of three crossings of unnamed tributaries to the Middle Fork would also cross the 101 and 5503 roads in the 1,000-foot proximity to the river.

Clearwater River subbasin

Eldorado Creek. Haul for the Fourbit and several other project area would likely be funneled down the gravel-surfaced FR 500 through this HUC6, after being fed from several other gravel-surfaced roads, to get to the paved arterial FR100. The haul along the Eldorado Creek-paralleling 500 road would account for about 10 miles of steelhead critical habitat proximity, three steelhead critical habitat-stream crossings, and six crossings of critical habitat-proximity non-critical habitat tributaries, while the feeder road segments add a few more miles/crossings to each metric.

Musselshell Creek. Haul for the Musselshell Creek project area would likely be funneled down the gravel-surfaced FR 535 for about 2.7 miles through this HUC6 to get to the paved arterial FR100. The haul would parallel Gold and then Musselshell creeks (both steelhead critical habitat) along most of its length, crossing Musselshell Creek once and a critical habitat-proximity non-critical habitat tributary once.

Lochsa River Subbasin

Lower Colt Killed Creek. Haul for the eastern portion of the Jay Point project area would likely head down the gravel-surfaced FR 111 through the lower end of this HUC6 before crossing the bridge over Colt Killed Creek and then entering the Lower Crooked Fork subwatershed. The lower 0.7 miles of the

111 road in this HUC is either in proximity of the portion of Walton Creek or of Colt Killed Creek, both of which are steelhead and bull trout critical habitat. This section of FR 111 is also partly within 1,000 feet of Crooked Fork Creek and the Lochsa River. The last 0.2 miles of the gravel-surfaced 362 road (which would carry the haul from the western portion of the Jay Point project area) is also within 1, 000 feet of the streams mentioned above.

North Fork Clearwater River Subbasin:

Lower Skull and Sneak Creek-North Fork Clearwater River--Haul for the Snow Creek project area would likely proceed down the gravel-surfaced FR 252 for about 5.3 miles through the Lower Skull HUC6 to get to the FR 247 arterial (which is in the Sneak Creek-NF Clearwater River subwatershed). The 247 road is then paved starting about a mile toward the mill. The haul would parallel the bull trout spawning and rearing critical habitat Skull Creek along most of its length (and cross once), while the 247 road parallels the mainstem North Fork, which is bull trout foraging, migrating, and overwintering critical habitat. Between the 252 and the 247, the haul would cross 13 critical habitat-proximity non-critical habitat tributaries.

ESA Effects Category 4 Specific Project Area Identification and Effects Discussions.

Proposed project activities are proposed for a few sites through which streams where ESA-listed fish are likely to exist or where designated critical habitat occurs. See Figures AQ-1 through AQ-3 and Appendix D Tables 2-4.

Lower Salmon River subbasin

Allison Creek. The Allison Creek subwatershed (Figure AQ-3) is a discrete drainage into the main Salmon River and includes Allison Creek and West Fork Allison Creek as known fishbearing streams. The subwatershed (especially the Ranch, Plant, and western side of the West Fork drainages and the top of Van Keating ridge) was extensively and severely burned during the Tepee Springs wildfire of 2015, with a total of about 32 percent of the subwatershed (including some of the activity areas) burned at moderate or high severity.

Cut-and-leave (C&L) activities would be performed along approximately four miles of the steelhead critical habitat-reaches of Allison Creek and West Fork Allison Creek. Some cut and remove activity areas are also currently identified in GIS layers just outside of cut and leave areas along critical habitat reaches, just outside of the 300-foot RHCA buffers for these streams, but several of these areas could not be yarded without crossing default RHCAs and will be dropped as harvest areas. There are also cut and remove (C&R) activities areas identified outside of default RHCAs of Allison Creek tributaries, but relatively close to the Allison Creek mainstem; some of these cut and remove areas may revert to cut and leave, depending on on-site stream categorization and implementation of PDF #12. Log haul would occur along the 221 road, which parallels and crosses Allison Creek steelhead critical habitat.

The Nez Perce NF GIS fish presence layer shows steelhead (and designated steelhead critical habitat) in the mainstem of Allison Creek for about 6.9 miles upstream from its mouth, while the lower ~1.3 mile of the West Fork is also displayed as occupied by steelhead and as steelhead critical habitat. The lower ~2.7 miles of Allison Creek is also shown in the Nez Perce National Forest GIS layer as "spawning and rearing" habitat for ESA-listed spring Chinook salmon up to the West Fork confluence, but this status is based on a 20-year old "professional judgment" which seems overly optimistic. It does seem possible that the lower few hundred meters of the stream may provide occasional rearing habitat for Chinook salmon parr seeking refuge from conditions in the mainstem Salmon River. The Nez Perce National Forest GIS layer denies the presence of westslope cutthroat trout in the steelhead-bearing streams of the subwatershed, but is agnostic regarding this species in many of the smaller Allison Creek tributaries. Bull trout presence and critical habitat are absent from the subwatershed.

Within the Allison Creek subwatershed the well-maintained and gravel-surfaced Forest Road 221 closely parallels (typically within 50-200 feet) steelhead habitat along the mainstem of Allison Creek for about six miles (and crosses the stream four times). Felling areas are proposed along about 3.5 miles of this corridor, with the remainder a part of the haul route. The 263 road also crosses and runs roughly parallel to steelhead habitat in the lower West Fork for about a mile, and is also a haul route. The GIS representation of activity areas associated with Forest Roads 221 and 263 and adjacent to steelhead habitat are almost entirely within default RHCAs and are therefore cut and leave areas where any fuel reduction and reforestation work would be conducted by hand.

About 700 acres of soil-disturbing cut and remove and fuel reduction/reforestation activities would be performed in the Allison Creek subwatershed outside of close proximity (>500 feet) to steelhead habitat. As discussed more generally above, though, the delineation of default RHCAs (and expanded buffer widths where RHCAs are compromised by wildfire severity), should reduce or eliminate the potential for fine sediment transmission from soil disturbance to enter project area streams.

Specifically for the Allison Creek subwatershed, Jensen (2016) determined using the NEZSED model that project activities (not counting road prism maintenance) would increase sediment yield in three "prescription watersheds" (collectively accounting for the totality of the subwatershed) over the baseline sediment yield, including that caused by the 2015 Tepee Springs wildfire (Table AQ-3).

The proposed activity would cause minimal increases in modeled sediment yield for the two prescription watersheds that compose 98 percent of the area of the Allison Creek subwatershed. The modelled increase from the Plant Creek prescription watershed under the proposed action would be somewhat higher than under the baseline condition, but this drainage is only 360 acres and the stream that drains it does not appear to be fishbearing.

Table AQ-3. Teepee Springs Fire: NEZSED Modeled % Sediment Yield Increases for Prescription Watersheds

				Percent Over Typical Year Base Erosion Rate		Allowed
	Typical Year	2016		2016	2016	Appendix A
Prescription Watershed	**Average Annual Base Erosion Rate (Tons/yr)**	**Estimated Current Erosion from Roads and Past Harvest Activities (Tons/yr)**	**Estimated Erosion from Proposed Hazard Tree Removal (Tons/yr)**	Percent Over Base from Past Activities	Percent Over Base from Erosion from Hazard Tree Removal on Burned Soils	Percent Over Base threshold in Appendix A of Forest Plan
ALLISON CREEK (TRUE WATERSHED)	1199	29	53	2%	4%	45%
BERG CREEK	356	20	43	6%	12%	70%
GUS CREEK	86	4	31	4%	36%	70%
KELLY CREEK	310	22	35	7%	11%	60%
PLANT CREEK	13	4	35	29%	267%	70%
SALMON FIVER FACE 0209-03	661	3	33	0%	5%	NA
UPPER LITTLE SLATE CREEK	230	34	35	15%	15%	30%
VAN CREEK	274	4	47	1%	17%	60%
WEST FORK ALLISON CREEK	358	6	56	2%	16%	45%

Furthermore, this modeled increase in sediment yield for the Allison Creek subwatershed is not the same as the increase in fine sediment reaching stream channels, because the latter would depend on the interception properties of RHCAs and the sediment routing properties of road drainage systems. Because RHCA widths would be adjusted outward where compromised and because project and road prism maintenance (including upgraded drainage features (PDF #34, 35, and 36)) and extra-project BAER drainage upgrades, the amount of fine sediment entering steelhead habitat in the Allison Creek mainstem as a result of the proposed activities should be indistinguishable from baseline values.

South Fork Clearwater River Subbasin

Upper Newsome Creek. The Upper Newsome Creek subwatershed (Figure AQ-3) includes the headwaters of Newsome Creek, which joins the South Fork of the Clearwater River about 12 miles downstream. While there are numerous named and fishbearing streams in the subwatershed, except for log haul and road prism maintenance, the project activities in the subwatershed would be confined to the headwaters of a Newsome Creek tributary, Baldy Creek. Only about 2 percent of the subwatershed (and only an acre or two within activity areas) burned at a moderate or high severity during the Baldy wildfire of 2015.

Cut and leave activities would be performed along approximately 500 feet of a bull trout spawning and rearing critical habitat reach of Baldy Creek. There are cut and remove activities areas identified outside of default RHCAs of Baldy Creek and tributaries relatively close to the Baldy Creek mainstem; some of these cut and remove areas may revert to cut and leave depending on on-site stream categorization and implementation of PDF #12. Log haul would occur along the 1858 road, which parallels Baldy and Newsome Creek steelhead/bull trout critical habitat.

The Nez Perce National Forest GIS fish presence layer shows bull trout (and bull trout spawning and rearing critical habitat) in most of upper Baldy Creek, and in one Baldy Creek unnamed tributary (UT). This unnamed tributary (and several other Baldy Creek headwater channels) is crossed by the project activity areas (which parallel Forest Road 464) only about 1,200 horizontal feet below the ridgeline. This position in the drainage makes it likely that the designation of this stream as bull trout habitat is an artifact of the GIS layer, as opposed to the (and the other Baldy Creek headwater tributaries) actually being fishbearing at their FR 464 crossings. The Nez Perce National Forest database shows that steelhead presence (and designated steelhead critical habitat) in Baldy Creek ends about two miles downstream of the proposed activity area. Spawning and rearing habitat for (non-ESA) spring Chinook salmon is also considered present in several streams in the subwatershed, including Baldy Creek upstream to the steelhead critical habitat upper limit. Baldy Creek and many other named streams (and many of their tributaries) in the Upper Newsome subwatershed support westslope cutthroat trout.

As noted above, the primary project-relevant road within the Upper Newsome Creek subwatershed is the gravel-surfaced Forest Road 464, which crosses several (4-6, based on the NHD GIS layer) Baldy Creek headwater channels (including the channel identified as bull trout critical habitat) perpendicularly for about 1.1 miles. As a haul route, the 464 road then ascends to and achieves the ridgeline between the Upper Newsome Creek and South Fork Clear Creek subwatersheds for about 2 miles before encountering FR 1858, the primary gravel-surfaced haul route down Newsome Creek to spawning and rearing 14.

Felling areas are proposed along about 1.1 miles of the 464 corridor in proximity (<1,000 feet) to the Baldy Creek headwater channels. While the Forests GIS standard RHCA widths are for fishbearing channels (300 feet), the project GIS layout for activity area only uses 150-foot buffers. While a total activity area of about 50 acres has been delineated it is not clear how much of the Baldy activity area would actually have the cut and remove prescription attached; the 378 acres shown in Appendix D Table 2, or about half that if all of the RHCAs are delineated as fishbearing channels (where any fuel reduction and reforestation work would be conducted by hand). As discussed more generally above however, the delineation of default RHCAs (and expanded buffer widths where RHCAs are compromised by wildfire

severity), should reduce or eliminate the potential for fine sediment transmission from soil disturbance to enter project area streams.

Specifically for the Upper Newsome Creek subwatershed, Jensen (2016) did not have an estimate of the amount that the Baldy wildfire would increase sediment yield, but determined (through the use of the NEZSED model) that the scale of project activities (not counting road prism maintenance) was so slight that cutting-and-yarding activities did "not show any increase in sediment yield" at the prescription watershed scale. Any estimated increase in sediment yield is not the same as the increase in fine sediment reaching stream channels, because the latter would depend on the interception properties of RHCAs and the sediment routing properties of road drainage systems.

Selway River Subbasin:

Gedney Creek. Cut and leave activities would not be performed directly along a bull trout and steelhead critical habitat reach of the mainstem of Gedney Creek, but within about 300 feet of this stream. There are cut and leave activities areas identified outside of default RHCAs of a Gedney Creek unnamed tributary relatively close to the Gedney Creek mainstem; some of these cut and leave areas may be depending on on-site stream categorization and implementation of PDF #12.

Lower Meadow Creek. The Lower Meadow Creek subwatershed (Figure AQ-2) includes the lower mainstem of Meadow Creek (a major tributary of the Selway River with a drainage area of ~155,000 acres), and several face drainages into that mainstem. The subwatershed includes several named and/or fishbearing streams, but lower Meadow Creek is the only stream both with ESA-listed fish and adjacent to project treatments. Less than 1 percent of the subwatershed (although some within activity areas) burned at a moderate or high severity during the Wash wildfire of 2015.

Cut and leave would be performed along approximately 4,000 feet of an foraging, migrating, and overwintering bull trout and steelhead critical habitat reach of Meadow Creek. There are cut and remove activities areas identified outside of default RHCAs of Meadow Creek and tributaries relatively close to the Meadow Creek mainstem; some of these cut and remove areas may revert to cut and leave depending on on-site stream categorization and implementation of PDF #12. Log haul would occur along the 443 road, which parallels and crosses Meadow Creek steelhead/bull trout critical habitat.

The Nez Perce NF GIS fish presence layer shows steelhead (and designated steelhead critical habitat) and bull trout (and foraging, migrating, and overwintering critical habitat) in the mainstem of Meadow Creek through the entire subwatershed; this section of stream is also considered (non-ESA) spring Chinook salmon spawning and rearing habitat. The Meadow Creek tributaries of Squirrel, Rabbit, and Little creeks have proposed project activity areas in their headwaters, but these streams likely support only westslope cutthroat trout. Several other named/fishbearing tributaries are present in the subwatershed, but are remote from Forests roads.

The primary project-relevant road within the Lower Meadow Creek subwatershed is the native-surfaced Forest Road 443, which closely parallels (typically within 100-200 feet) the mainstem of Meadow Creek for about 0.6 miles. The 443 road then ascends out of the Meadow Creek canyon, eventually gaining the ridge between the Lower Meadow Creek and Glover Creek-Selway subwatersheds. The other main project-relevant road in the subwatershed is Forest Road 290, which also parallels Meadow Creek within 100-400 feet for about 0.5 miles (and crosses the stream at a bridge). One short spur (290F) is close to Meadow Creek near the 290 bridge, while another (443D) is on the opposite side of the 443 road, but still within the Meadow Creek RHCA; these latter two activity areas are entirely cut and leave.

Felling areas are proposed along about 1.1 miles of the 443 and 290 corridors in relatively close proximity to Meadow Creek, with the remainder a part of the haul route. The 290 road also crosses Meadow Creek hauling logs from a 4-acre cut and remove area on the east side of the creek, with the haul route switching to the 443 in the climb out of the canyon, picking up logs from about 15 acres of cut and remove activity

areas just outside of the Meadow Creek RHCA along the way. The GIS representation of activity areas associated with Forest Roads 443 and 290 in the Meadow Creek canyon and adjacent to steelhead/bull trout critical habitat are almost entirely within default RHCAs where any fuel reduction and reforestation work would be conducted by hand.

About 150 acres of soil-disturbing cut and remove and fuel reduction/reforestation activities would be performed in the Lower Meadow Creek subwatershed outside of proximity (>1,000 feet) to steelhead/bull trout habitat. As discussed more generally above, though, the delineation of default RHCAs (and expanded buffer widths where RHCAs are compromised by wildfire severity, should reduce or eliminate the potential for fine sediment transmission from soil disturbance to enter project area streams.

Specifically for the Lower Meadow Creek subwatershed, Jensen (2016) determined using the NEZSED model that project activities (not counting road prism maintenance) would increase sediment yield in two "prescription watersheds" over the baseline sediment yield (including that caused by the 2015 Wash wildfire) by 0 and 0.11 percent.

This slight modeled increase in sediment yield is not the same as the increase in fine sediment reaching stream channels, because the latter would depend on the interception properties of RHCAs and the sediment routing properties of road drainage systems. Because RHCA widths would be adjusted outward where compromised and because project and road prism maintenance (including upgraded drainage features (PDF #34, 35, and 36), the amount of fine sediment entering steelhead/bull trout habitat in the Meadow Creek mainstem as a result of the proposed activities should be indistinguishable from baseline values.

O'Hara Creek. Cut and leave activities would be performed along approximately 400 feet of a bull trout and steelhead critical habitat reach of the mainstem of O'Hara Creek. There is also about an acre of additional cut and leave activity area identified within the default RHCA of O'Hara Creek and an unnamed tributary close to the O'Hara Creek mainstem; this cut and leave area may be dependent somewhat on on-site stream categorization.

Clearwater River Subbasin:

Upper Lolo Creek. cut and remove or cut and leave activities would not be performed directly along a steelhead critical habitat reach of the Yoosa Creek, but within about 600 feet of this stream and on the opposite side of the 103 road; these areas are associated with about 0.4 miles of the gravel-surfaced FR5031 which would be within the integrated activity area and also within about 1,000 feet of Yoosa Creek. The GIS analysis also identifies about 0.4 miles of the 500 road which is within about 1,000 feet of the bull trout spawning and rearing critical habitat of upper Hungery Creek, but within the Upper Lolo subwatershed. Some cut and remove activity would also be performed on the Upper Lolo side of this road/ridge. There would be minimal or no hydrologic continuity between this segment of FR500 or the cut and remove activity and upper Hungery Creek.

In addition to the activity areas within the Upper Lolo subwatershed, haul for the Pete Forks and a portion of the Snowy Summit project areas would likely be funneled down the gravel-surfaced FR 103 through this HUC6. The haul route, mostly paralleling and within 1,000 feet of Yoosa and Lolo creeks after being fed from several other gravel-surfaced roads, leads to the paved arterial FR100 after about 12 miles. Within the HUC would also be 2 steelhead critical habitat-stream crossings, and 5 crossings of critical habitat-proximity non-critical habitat tributaries, with the feeder road segments adding another 0.4 miles of critical habitat-proximity road.

Lochsa River Subbasin

Upper Crooked Fork Creek. The Upper Crooked Fork Creek subwatershed (Figure AQ-1) includes the headwaters of Crooked Fork Creek, which joins Colt Killed Creek about 15 miles downstream to form the mainstem of the Lochsa River. The subwatershed includes only one other named or known fishbearing

stream, Hopeful Creek, which joins Crooked Fork Creek within a project activity area. About 8.5 percent of the subwatershed, some within activity areas, burned at a moderate or high severity during the Boulder wildfire of 2015.

Cut and leave would be performed along approximately 1,400 feet of Crooked Fork Creek and about 300 feet of Hopeful Creek, both bull trout spawning and rearing critical habitat. There are cut and remove activities areas identified outside of default RHCAs of Crooked Fork Creek and an unnamed tributary relatively close to the Crooked Fork mainstem; some of these cut and remove areas may revert to cut and leave depending on on-site stream categorization and implementation of PDF #12.

The Clearwater NF GIS fish survey layer shows bull trout (and designated bull trout spawning/rearing critical habitat) in the mainstem of Crooked Fork Creek and in Hopeful Creek through and upstream of the project activity areas (which parallel Forest Road 595). The mainstem of Crooked Fork Creek is designated steelhead critical habitat up to about 1.4 miles below the FR 595 crossing, but CNF records show the presence of juvenile steelhead/redband trout in the Crooked Fork to just above the road crossing; non-ESA spring Chinook salmon (presumably juveniles) were also detected at this sampling site. Both named streams and many of their tributaries support westslope cutthroat trout.

As noted above, the primary project-relevant road within the Upper Crooked Fork Creek subwatershed is the gravel-surfaced Forest Road 595, which closely parallels (within ~200') the mainstem of Crooked Fork Creek for about 0.1 miles (with about 1.9 miles within 1,000 feet of the creek), and also crosses this stream (the crossing is just below the Hopeful Creek confluence). As a haul route, the 595 road then ascends out of the Crooked Fork Creek canyon, eventually gaining and staying near the ridge between Idaho and Montana until joining U.S. 12 at Lolo Pass. The other project-relevant road in the subwatershed is about 0.1 mile of FR 75521, which isn't near any mapped stream.

Felling areas are proposed along about 0.5 miles of the 595 corridor in proximity (<1,000 feet) to the Crooked Fork, with the remainder a part of the haul route. Within proximity of the Crooked Fork, all but about seven acres would be fell-and-leave, while the fell-and-haul activity areas overlap with area salvage of a few more additional acres. The GIS representation of activity areas associated with Forest Roads 595 and 75521 in the Meadow Creek canyon and adjacent to steelhead/bull trout critical habitat are almost entirely within default RHCAs or other areas where any fuel reduction and reforestation work would be conducted by hand.

About two acres of soil-disturbing cut and remove and fuel reduction/reforestation activities would be performed in the Upper Crooked Fork Creek subwatershed outside of proximity to steelhead/bull trout habitat. As discussed more generally above, though, the delineation of default RHCAs (and expanded buffer widths where RHCAs are compromised by wildfire severity, should reduce or eliminate the potential for fine sediment transmission from soil disturbance to enter project area streams.

Specifically for the Upper Crooked Fork Creek subwatershed, Jensen (2016) determined that the Boulder wildfire would increase sediment yield only a "minor" amount and the scale of project activities (not counting road prism maintenance) was so slight that cutting-and-yarding activities would not cause "measurable sedimentation at the subwatershed scale." Any estimated increase in sediment yield is not the same as the increase in fine sediment reaching stream channels, because the latter would depend on the interception properties of RHCAs and the sediment routing properties of road drainage systems.

Walton Creek-Lochsa. Cut and remove activities would be performed within about 400 feet from a short reach of the bull trout spawning and rearing critical habitat reach of Walton Creek in the eastern portion of the Jay Point project area. This activity area is associated with about 0.2 miles of native-surface FR 111A which is both within 1,000 feet of the Walton Creek critical habitat and within the integrated activity area.

The haul route for the eastern portion of the Jay Point project areas would likely be down the native-surfaced 111A through this HUC6 for about 1.5 miles, paralleling, but >400 feet from Walton Creek. The haul route would then turn to the gravel-surfaced 111 road for another 1.9 miles until reaching the Colt Killed Creek subwatershed, again within 1,000 feet of Walton Creek, but mostly near the outer edge of this area. The last 0.8 miles of this route parallels steelhead critical habitat in Walton Creek. The 111 road also has 4 crossings of critical habitat-proximity non-critical habitat tributaries.

For the western portion of the Jay Point project area, the haul route descends on the gravel-surfaced FR 362 into proximity of Walton Creek for only the last 0.7 miles, and crosses that stream, which is both steelhead and bull trout spawning and rearing critical habitat, in this road segment. A the very lowest portion of the 362 is also within 1,000 feet of the steelhead and bull trout foraging, migrating, and overwintering critical habitat of Colt Killed and Crooked Fork creeks and the Lochsa River.

Activity comparisons to green tree and salvage harvest projects

Tree Felling. The primary activity which most of the project subwatersheds have in common is the felling of trees within proximity to existing roads. Trees would be felled in all of the Category 1, 2, and 4 subwatersheds, and in four of the Category 3 subwatersheds. Tree felling is something that the proposed project has in common with salvage and green timber sales, but the spatial distribution and concentration of tree felling is quite different.

In the proposed project, trees would only be felled in close proximity (~200 feet) to existing roads which are within (uneven) fire perimeters, meaning that trees would be felled on only about 24 acres per mile of road (~49 acres per mile if activity areas are on both sides of the road) and that most of the activity areas are much shorter than 1 mile long. This contrasts with most salvage and green tree harvest projects, where the harvest units are typically polygons much wider than 200 feet, and often in relatively compact areas where the effects of hundreds of acres of treatment are concentrated in specific stream drainages.

On the other hand, tree felling within default (and expanded) RHCAs is a feature which is usually absent in conventional salvage and green tree projects, but would occur in a few acres within most project subwatersheds

Tree yarding. Trees would be yarded in most of the Category 1, 2, and 4 subwatersheds, and in four of the Category 3 subwatersheds. Tree yarding is also something that the proposed project has in common with salvage and green timber sales, but, again, the spatial distribution and concentration of tree yarding is quite different. In particular, the skid trails and cable-yarding corridors in typical salvage and green tree sales would accommodate many iterations of log retrieval, while the narrow activity areas proposed for this project would generally mean that yarding corridors would be each be shorter and used fewer times and so would each cause less vegetation and soil disturbance. On the other hand, there may be more yarding corridor segments than would be the case with salvage and green-tree yarding operations.

Fuel treatments and reforestation. Treatment of fuels in vegetation treatment areas is a common activity on the Forests, both in association with timber harvest and as a stand-alone activity. In the tree felling/yarding subwatersheds for the proposed action, slash which could be potential fuel for wildfire from trees that have been felled, lopped, or bucked as a part of other project activities would be piled and/or burned, chipped, or masticated. This would potentially occur in most of the Category 1, 2, and 4 subwatersheds, and in four of the Category 3 subwatersheds. Activities similar to fuel treatments would be implemented to prepare sites for establishment and growth of planted seedlings. The differences between fuel treatments and tree planting (aside from the literal planting of seedling conifers) would be that the site preparation treatments for the latter would include scraping small areas to mineral soil, potentially removing more project-generated fuel than would be necessary for fuel treatments, and the use of broadcast burns.

The principal differences between fuels treatments in this project and in typical salvage and green tree projects are that the shapes and distribution of the activity areas vs. harvest units, and that the proposed fuels activities would target only those fuels generated by the proposed projects (as opposed to existing fuels).

Road-related activities. Road construction (both permanent and temporary), road reconstruction, and stream culvert replacement or removal are common with green and salvage sales, and often include in-stream work that has the potential to directly or indirectly harm fish and fish habitat, at least in the short term. The road work in this proposed action, however, would chiefly be routine maintenance, and upgrades and repair of non-stream drainage structures (ditches and cross-drains); no road-related activity which would rise to the "likely to adversely affect" level is proposed.

ESA Effects Category 1, 2, 3, and 4 General Effects Discussion

Proposed project activities within each category of watershed have some common features for which a common discussion would be useful. Also, while the proposed project would have some features in common with salvage or green-tree harvest projects, it is also important to keep in mind the substantial differences between the proposed projects and the more-common types of timber harvest projects.

The potential effects on ESA-listed individuals and critical habitat of activities in all subwatersheds would be related to potential project-related changes in stream channel and riparian habitat, but, other than some aspects of log haul and other road use, the effects should be substantially reduced or eliminated with the delineation of PACFISH/INFISH default RHCAs and the project design features applied to them.

Additionally, there are PDFs which would apply outside of default RHCAs and which are intended to ensure that adverse effects are not transmitted to and through RHCAs and stream channels. Because RHCAs are present and relevant to all of the project subwatersheds, a discussion of the role of RHCAs in mitigation potential project effects is first provided below. Following the RHCA discussion are sections devoted to potential ESA-relevant direct and indirect effects, with indirect effects discussion further divided into activity-type effects and those effects associated with specific habitat indicators.

PACFISH/INFISH and RHCAs. For the proposed action, tree felling, tree yarding, fuels treatment, and tree planting activities would be implemented in varying proximity to streams channels, whether those channels are occupied by TE species are critical habitat, or whether the individual fish or critical habitat is some distance downstream. All streams and stream riparian areas on the Forests are protected under the INFISH/PACFISH-amended Forest Plans with RHCAs. The default dimensions of these RHCAs vary with stream type, with fishbearing (FB) perennial streams afforded 300-foot buffers, non-fishbearing perennial streams 150-foot buffers, and non-fish bearing intermittent streams with 50- to 100-foot buffers. 100-foot default RHCA buffers are also afforded to wetlands and field-verified landslide-prone areas.

It should be noted that the presence and linear extent of streams in the figures and table calculations in this report are based on the "NHD" dataset and are approximate and preliminary. The presence of fish in the lower reaches of streams/RHCAs depicted as non-fish bearing or intermittent and some of the fish bearing stream reaches likely varies on a seasonal or periodic basis. Also, there are small (and mostly non-fish bearing) perennial or intermittent streams which are not depicted in the GIS layers used for preliminary delineation of treatment activities and in the figures of this report. Discrepancies between the GIS layer and actual stream location would be resolved when/if project activity units are delineated and marked "on the ground," and RHCA buffers would be added or adjusted accordingly.

As TE species are present in portions of the Category 2, 3, and 4 subwatersheds in the project area, the streams they inhabit as well as their tributaries and the riparian areas of both would be largely protected from potential direct and indirect adverse effects through application of the RHCA buffers because most project activities (with the exceptions of use and maintenance of roads already within RHCAS, hazard tree felling, some hand-implemented fuels treatments, and tree planting) would be prohibited in the buffer

areas. In addition to greatly limiting direct effects to individuals of TE species, limits to activities in RHCAs should reduce or eliminate potential effects to large woody debris recruitment and fine sediment transmission. This is because RHCAs are intended to protect vegetation, soil, microclimate, and other components of riparian habitat, both for the sake of the riparian areas and their flora and fauna, but also to protect waterbodies and their biota.

In addition to protecting habitat within the RHCAs, PACFISH/INFISH (USDA FS 1995, and USDA FS and USDI BLM 1995) notes that the vegetation and debris within riparian buffers act as "filter strips" that are generally effective in protecting streams from sediment carried by non-channelized flow. Project activities (primarily tree yarding, some fuels treatments, and tree planting) would disturb soil at the activity sites. Some of this soil would then have the potential to be transmitted downhill until stabilized by vegetation growth, but because of PACFISH/INFISH buffers, most of the soil disturbed by the proposed activities would be hundreds of feet or more from stream channels. Vegetation, downed woody material, duff, or topographical features should intercept and stabilize any mobilized soil before reaching a stream. Because the wildfires of 2015 modified the soil and vegetation characteristics of some of the cut and leave and cut and remove activity areas, several of the project PDFs were developed to ensure that sufficient "filter strip" capacity will be maintained.

Forests monitoring has shown that RHCA buffers are very effective in eliminating impacts on stream channels (Smith 2014). The default buffer widths can also be modified (made greater) based on site conditions. The boundaries of the proposed activity areas may not fully reflect RHCA modifications that would be made during project activity preparations.

Direct Effects

No project activities are proposed to occur in stream channels, but tree felling (but not removal), fuels treatment, and tree planting would occur within default RHCAs. Trees would not be deliberately felled into stream channels nor would materials manipulated in fuels treatments be placed into or removed from stream channels. It is possible, however, that a few proposed RHCA hazard trees may not be able to be safely felled without portions of the tree straddling or entering a stream channel. Within Category 1, 2 and many portions of Category 3 and 4 subwatersheds, such an occurrence could not directly affect ESA-listed individuals because the animals would not be present. Where it is determined that that a tree hazard must be mitigated for road use safety, but that normal safe tree-felling practices would necessitate that tree be felled into the wetted perimeter of a stream reach which is known to support individual ESA-listed fish, the Forests would implement special techniques (such as partial trimming or use of guide cables) to ensure that no take would occur.

Another potential, but unlikely, mechanism for the potential direct injury or mortality to ESA-listed species would be the transmission of toxic substances (gasoline, oil, grease, etc.) into streams from fuel spills or leaky or dirty equipment, or the generation and downstream transmission of very high levels of fine sediment from exacerbation of erosion of intensely burned areas by timber yarding and other project activities (Muck 2010). TE individuals within or downstream of Category 1 and 2 subwatersheds would almost certainly not be affected by introduction of contaminants because of PDFs which would keep substantial amounts of contaminants out of RHCAs (and, therefore, stream channels; in particular, #6). In addition, the dilution effect of the flow volume of downstream tributaries (see Appendix D Table 3) should reduce the potential for any contaminants and fine sediment introduced to streams come in contact with ESA-listed fish at concentrations that would be harmful to the individual fish in those streams.

In Category 3 and 4 subwatersheds, where proximity of proposed activities to TE individuals is greater, the potential for direct adverse effect to TE individuals from activity-caused toxic contamination would be somewhat heightened compared to Category 1 and 2 subwatersheds. Tree yarding and fire/machine fuels treatments activities, however, would not occur within RHCAs, and fuel storage would be constrained, while the amount of fuel and lubricants associated with chainsaw use in RHCA activity areas

should be innocuous. As described in more detail under Indirect Effects, the amount of project-caused fine sediment introduction should be minimal because of project PDFs, in particular the expansion of RHCA widths in areas where the filtering function of default RHCA buffers may be inadequate (PDF #12).

Because of the locations of existing roads, however, truck-hauling of harvested trees and any other transportation of people or equipment outside of activity areas (see Tables in Appendix D and Figures AQ-1 through AQ-3) however, would occur in Category 3 and 4 subwatersheds within relatively close proximity to some stream reaches with ESA-listed individuals (and would cross directly over some streams at bridges and culverts). Vehicle accidents could occur with ensuing spills of substantial quantities of fuel, etc. but such vehicle accidents are very infrequent and unpredictable, with ensuing substantial spills of contaminants into stream channels even less likely to occur. The timber sales contracts associated with the hauling of timber from the activity areas include measures that would reduce the potential for spills and introduction of spills into streams further and to the extent practical (See PDF #6, Timber Sale Contract Standard Provision B6.34).

On the whole, the nature of the proposed project and the associated PDFs should diminish the potential for interaction with stream channels (in the form of tree felling into stream channels and biologically significant transmission of contaminants) to a level or probability that is consistent with discountable direct effects on ESA-listed individuals.

Indirect Effects

General. Tree felling, timber yarding, fuel/reforestation treatments, road maintenance, and timber hauling can all have indirect effects on critical habitat and other stream habitat primarily through changes in water yield, sediment production, and modification of riparian vegetation. However, the proposed activities are not those of a normal timber harvest, and the PDFs would further mitigate

Activity: Tree felling. Dead and dying trees would be felled within all four subwatershed categories (but not in every subwatershed). Whether the trees in cut and leave activity areas are left standing or would be felled, there would be (or would soon be) little to no change in the ability of these trees to transpire water or to provide soil stability or shade. Large woody debris recruitment to stream channels and riparian areas would not be substantially affected because felled tree boles (minimum 15-foot length) would be left in place. Felling of some dead or dying hazard trees in RHCAs with fire-compromised soil/vegetation characteristics may reduce fine sediment transmission to streams or enhance vegetation growth in some situations, because the tree boles and limbs would reach the ground more quickly than naturally. Because no machinery (beyond chain saws) or heavy equipment would be used, cut and leave activities should cause no to minimal soil disturbance when trees are felled, while soil disturbance from future "windfall" for those trees would be foregone.

In addition to the use of chainsaws for hand-felling, feller-buncher or similar machinery may be used for tree felling outside of RHCAs, but this activity is considered under Tree Yarding, below. For all of the reasons described above for tree felling within RHCAs, as well as the addition of substantial distance from stream channels, felling of trees outside of RHCAs should have no measurable effect on any fish habitat indicators.

Tree felling would have minimal to no effect on water yield, sediment production, or riparian vegetation conditions in every project subwatershed.

Activity: Tree yarding. Dead and dying hazard trees would be yarded within all four subwatershed categories (but not in every subwatershed). Within these subwatersheds, however, no trees would be yarded from within delineated RHCAs, and no trees would be yarded through or across RHCAs, so tree yarding would have no potential to directly disturb riparian soil, riparian vegetation, or other riparian habitat characteristics.

Trees yarding outside of RHCAs would often disturb upland soil and vegetation characteristics, which could theoretically be transmitted into RHCAs or stream channels. Specifically, yarding activities (all outside of RHCAs) would include the use of cables and ground-based heavy equipment to move some of the felled trees out of the activity areas to the activity road segments and to log landings and "high bank" areas directly adjacent to roads. New log landings may be constructed outside of RHCAs. Ground-based equipment (including feller-bunchers, which would both fell and yard trees) would carry or drag felled trees to activity roads or adjacent log landings, where logs would be limbed and loaded onto trucks. Some skid trails would be excavated, but most would be created on the existing ground level. This short-term soil and vegetation disturbance inherent in yarding would be limited and mitigated through PDFs, however, and the existence of RHCAs would further "insulate" fish habitat indicators in stream channels from transmitted effects.

Nevertheless, tree yarding has some potential to affect water yield, sediment production, or riparian vegetation conditions in every project subwatershed. The potential for effects to fish habitat indicators are discussed below.

Activity: Fuels treatment. Within all four subwatershed categories (but not in every subwatershed), the Forests proposes to manipulate/burn wood from trees that would be felled as part of the proposed project. The purpose of these treatments is to reduce the hazard activity fuel concentrations generated through this project. Some treatment of fuels would be implemented to facilitate reforestation (described below). Within RHCAs, fuels treatments would be limited to hand bucking of project-felled tree boles, hand lopping and scattering of project-generated tree limbs (<=3" in diameter), and hand gathering of project-generated woody debris (i.e., slash) to be carried out of RHCAs, where the materials would be piled and burned or chipped. It is possible that some existing fallen limbs, etc. would be mixed with project slash and would inadvertently treated, but existing woody debris would not be targeted. Felled tree boles would sometimes be bucked into pieces, but the minimum 15-foot lengths of these boles should allow full functionality in project activity area RHCAs. It would not be practical or necessary to remove all RHCA slash, so some of this material would remain on the ground and would the augment the function of similar natural material. For reasons similar to RHCA tree-felling, described above, the proposed RHCA fuels treatment activities have little to no potential for adverse effects to ESA-listed fish habitat.

The types of fuels treatments outside of RHCAs would include those described above, but would also include activities which would be likely to disturb upland soil and residual vegetation. Specifically, upland fuels treatment activities would include the use of wheeled or tracked machinery to gather and pile, and to chip or masticate project-generated slash, and would also include pile, jackpot, and broadcast burning. Where prescription burning would have significant potential to spread into RHCAs, firelines would be hand-dug parallel to (but outside of) RHCA boundaries. Pile and jackpot burning would normally not require fire lines to prevent the spread of fire into RHCAs, and broadcast burning during spring and fall would not be ignited within, but would be allowed to creep into the outer portions of RHCAs.

As for upland yarding activities, the short-term soil and vegetation disturbance inherent in fuels treatments would be limited and mitigated through PDFs, however, and the existence of RHCAs would further "insulate" fish habitat indicators in stream channels from transmitted effects.

Activity: Reforestation. This activity would potentially occur within all four subwatershed categories (but not in every subwatershed), but only in activity areas where a large proportion of trees have been killed by wildfire (and so where restocking for future timber harvest is desirable) or in activity area RHCAs where soil stabilization is needed. Site preparation for tree planting would likely include fuels reduction and a "scrape" of 2 by 2-foot areas to mineral soil on an 11 to 15-foot spacing. Within RHCAs, any fuels treatment to allow tree planting (of an appropriate conifer species for the site) would be performed by hand. Outside of RHCAs, the fuels treatment could also be any of those described for

upland areas, above, including broadcast burns. Soil "scrapes" in upland areas could also potentially be machine-prepared.

The proposed reforestation activities within RHCAs would have minimal to no effect on soil disturbance or riparian vegetation and so no adverse effects would be transmitted to ESA-listed fish habitat, while long-term effects of reforestation in RHCAs (soil stabilization, shade, and large woody debris recruitment) should be beneficial. The effects of reforestation in upland areas (primarily short-term soil and vegetation disturbance) would be similar to fuels treatments and so would also be limited and mitigated through PDFs, while fish habitat indicators in stream channels would be "insulated" from transmitted effects.

Activity: Road use and road prism/drainage system maintenance. The proposed action is based on activities necessary for safe use of roads by Forests staff and visitors, and elimination of tree hazards that could cause road prism or drainage system failure. In addition, road use would potentially occur in all four subwatershed categories (and in every subwatershed), while road prism/drainage maintenance would be nearly as ubiquitous. Project roads exist mostly in upland areas, but cross or closely parallel many stream channels (and their associated RHCAs), so use and maintenance of many road segments have some potential to affect ESA-listed fish habitat.

The primary road-related activities occurring in RHCAs would be the use of the stream crossing/adjacent road segments by Forests staff vehicles, contractor vehicles and equipment, and by log-hauling trucks. The use of these road segments during dry weather periods should generally have no effect on ESA-listed fish habitat except for transmission of a small amount of dust introduction to stream channels and on riparian vegetation. Even frequent thick dust clouds, however, are unlikely to cause more than very localized and temporary stream channel or accumulations/turbidity or photosynthetic inhibition in trees. It is possible that there could be leakage of vehicle or equipment fluids onto road segments through normal use, or that there would be spill associated with vehicle or equipment accidents, but the adverse effects of contaminant transmission would tend to be direct and acute effects, and are discussed in that section. Both dust and biologically significant amounts of liquid contaminants are likely to enter stream channels only where project roads are very close (within ~50 feet).

The use of these road segments during wet weather periods could have a potentially greater effect on ESA-listed fish habitat compared to dry periods, because of the potential for fine sediment or contaminant transmission, or peak runoff to streams from the road prism or drainage system. Of course, it is the existence of the roads and their pre-project condition (which are not subjects of this consultation) which would provide the conditions necessary for <u>any</u> sediment, water, or contaminants to flow from road prisms into stream channels. It is not obvious that any particular level or type of road use under wet conditions would cause a biologically significant increase in potentially deleterious conditions in fish habitat. In particular, the use of well-maintained paved and gravel-surfaced roads (the large majority of road miles associated with the proposed project) should cause little or no measurable effect on ESA-listed fish habitat.

The Forests also will conduct inspections and maintenance on project-area roads. The inspections and maintenance of road prisms and drainage features on most of the road segments are part of normal Forests operations and would be conducted whether or not the proposed project is implemented. Nevertheless, the types and limitations of project road maintenance associated with this project are described above. The maintenance proposed as part of this project, whether in proximity to or distant from ESA-listed species or critical habitat, would be designed and implemented in a manner which would avoid adverse effects.

Finally, some aspects of proposed timber yarding activities would have the potential to affect road prism/drainage condition. In particular, the yarding of timber with cable equipment from roads has the potential to disturb soil on cut slopes (for yarding of upslope timber) and fill slopes (for yarding

downslope timber). Additionally, both cable and ground-based yarding has the potential to block, fill, or otherwise modify road drainage features, in particular ditches that would be crossed by heavy equipment. PDFs 4, 32, 34, and 35 directly address the potential and remedies of such effects.

Habitat Indicator: Sediment. Jensen (2016, and in this document) determined that on the Clearwater side of the Forests, no subwatersheds have cut and remove activities at levels that exceed 1 percent of the subwatershed; she concluded that cut and remove effects at a watershed-scale will be small and difficult to quantify, and given the PDFs increased sedimentation resulting from project activities beyond the effects of wildfire would be below the ability of measurement at the watershed-scale.

On the Nez Perce NF portion of the Forests, Jensen (2016, and in this document) used the NEZSED model to estimate maximum sediment yield percent over base (i.e., natural) conditions resulting from project activities. This modeling shows that the wildfires (part of the base conditions) would cause substantial amounts of soil to be eroded in some stream drainages because of loss of vegetation, modification of soil properties, etc. The modeling predicts that implementation of the proposed action (particularly yarding of felled trees) would sometimes increase sediment yield to streams over the predicted baseline level, but these increases would typically be small and within the amount allowed under the Nez Perce Forest Plan.

Only in the tiny Plant Creek "prescription" watershed would the predicted sediment yield increase associated with project activities cause exceedance of the Forest Plan standard. Plant Creek, however, is a small, likely non-fishbearing stream which is only about 2% of the area of the Allison Creek subwatershed, so the fish-relevant effects in the mainstem of Allison Creek would be better-characterized by the subwatershed-level effects, which are predicted to be minor.

Road prism (including drainage feature) maintenance and use of project area roads for equipment movement, log landings, and log haul has the potential to disturb road surfaces, fill, slough, etc., and route water toward stream channels, thereby facilitating transmission of fine sediment into those channels. On the other hand, assuming the baseline presence of the road, properly conducted road maintenance should preserve or re-establish the road surface and prism as designed and to route water in a manner which minimizes erosion and transmission of fine sediment into channels. The proposed road prism inspection and maintenance, mitigated with PDFs, should greatly reduce (to the level of biological insignificance) the potential for the existence and use of the project area roads to adversely affect individual fish and critical habitat.

Habitat Indicator: Water Yield. Jensen (2016) determined that any effect of tree treatments on water yield would be overwhelmed by the effects of the 2015 wildfires and so would be insignificant. Based on current non-site specific fuels treatment prescription assumptions, Jensen (2016) could not determine the degree of effect of the treatments on water yield. Proposed road prism activities (primarily in the form of ditch and cross-drain maintenance and road surface shaping) should allow the water routing associated with original construction of each road segment to be maintained, re-established, or improved such that no increase in peak streamflows would be manifested.

Habitat Indicator: Water Temperature. Water temperature can potentially be affected by fine sediment input (which can change stream channel morphology to reduce groundwater input and increase solar radiation) and by vegetative shading (reductions in which can increase solar radiation). Road prisms (which determine the location of the activity areas) mostly would cross RHCAs and stream channels relatively perpendicularly, so the area of impact to habitat would be relatively small compared to that of the full amount of RHCAs and stream channels in the project area. Further, most of the tree-felling would be that of dead trees, which would provide little shade. Brushing associated with road maintenance in project activity areas and along haul routes would be implemented in a manner which should have a minimal effect on wetted stream channel shading.

Because the degree of impact on the subwatershed scale should be relatively small, the reduction in shade associated with stream crossings of roads should be minor and biologically undetectable at the subwatershed scale. The effects of RHCA buffers and proposed RHCA and non-RHCA treatments described above demonstrate that the action alternative would minimize effects on sediment transmission and stream shading so that effects on existing stream water temperature should not be measurable.

Habitat Indicator: LWD Recruitment. As noted above, because the degree of impact on the subwatershed scale should also be relatively small, the reduction in large woody debris recruitment associated with stream crossings or parallel courses of roads should be minor and biologically undetectable at the subwatershed scale. At the activity area scale, many dead or moribund trees within RHCAs would fall in the next few years on their own and so project felling would approximate the natural rate of LWD recruitment to RHCAs and streams in the short term. At least a few riparian trees at these sites, however, would be felled years or decades sooner than they would otherwise fall for natural reasons, but the felled trees would remain on site, so the biological significance of any altered timing and distribution (i.e., recruitment) is speculative, and likely overwhelmed by input of LWD from upstream/upslope sources.

Indirect Effects Summary. Jensen (2015) judged that some sediment input to project area streams would occur from project treatments, however, it does not appear that such input would be significantly different in terms of aquatic habitat quality than the base condition which includes wildfire effects. Project activities would increase water yields over the baseline, but the increases would not be detectable as a practical matter and so would not result in adverse effects on stream channels and should not alter stream habitat quality to a measurable or biologically significant degree. Minimal or no adverse effects are expected for water temperature and other habitat indicators.

Effects Summary

Adverse effects of the proposed action alternative on ESA-listed species in the Category 1, 2, 3, and four of the eight Category 4 subwatersheds should be limited to possible temporary and site-specific impacts primarily related to log yarding and fuels treatments. The activities would occur primarily in headwater areas, and in limited acreages in proximity to existing roads and these effects would generally be combined with sediment, water yield, temperature, conditions etc. from downstream non-project streams. Log haul "downstream" of project activity areas would occur predominantly on well-maintained gravel and paved roads where routine activities would be performed to minimize watershed impacts whether the proposed project is implemented or not. Road use and maintenance of native-surface roads would be designed or implemented in a manner which should make any fine sediment transmission indistinguishable from background levels.

In conclusion, all potential effects on ESA-listed fish habitat in Category 2, 4 and most portions of Category 4 subwatersheds have been eliminated or minimized to biological insignificance through project location, magnitude, and PDFs. No in-water activities would occur in occupied habitat and because the risk of the transmission of substantial amounts of contaminants to occupied habitat should be very low, the risk of direct adverse effects on individual ESA-listed fish as a result of the proposed activity should be considered to be very low to nil.

ESA Designated Critical Habitat Primary Constituent Element Discussion

Steelhead Critical Habitat. The designation of portions of the project area as critical steelhead trout habitat requires the Forests to consult with the NMFS on any agency action which is likely to result in a may affect determination. Figures AQ-1 through AQ-3 show the locations of steelhead critical habitat in the project area. Of the six primary constituent elements listed in the proposed rule, three elements pertain to the project area (freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors). The potential impacts for the project activities on these three elements are summarized below:

•"*Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning; incubation and larval development.*" As noted in the indirect effects analysis above, the proposed activities should not cause measurable or biologically significant effects in stream habitat upstream of steelhead habitat or within designated steelhead critical habitat. The various mitigation measures, (i.e. PACFISH riparian buffers, other mitigation measures related to project activity areas and roads), no direct impacts to steelhead redds or potentially suitable spawning areas are expected.

"Freshwater rearing sites with: i. Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; ii. Water quality and forage supporting juvenile development; and iii. Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. As noted in the indirect effects analysis above, the degree of change in water yield and water quality associated with project activities should be minimal, within the range of natural variability, and/or completely overshadowed by baseline effects of wildfires. Because of PACFISH standards and general project design, no changes in floodplain connectivity or instream forage or habitat are proposed or expected in designated steelhead critical habitat. No activities would occur within stream channels, and only localized and minimal changes to riparian characteristics (such as felling of tree hazards and collection of activity-generated finer woody debris) should occur at in-channel activity sites, whether upstream or adjacent to designated steelhead critical habitat.

"Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival." As discussed above, the degree of change in water yield and water quality associated with project activities should be minimal in project area tributaries and essentially nonexistent in the mainstem migration corridors. No activities are proposed within stream channels or which would affect stream banks, and little or no effects to riparian habitat indicators would be manifested.

***Bull Trout Critical Habitat*:** The designation of the several streams within the project area as critical habitat for bull trout requires the Forests to consult with the USFWS on any agency action that is likely to result in a may affect determination. See Figures AQ-1 through AQ-3 for which watersheds include designated "spawning and rearing" (SR) critical habitat or "foraging, migrating, and overwintering" (FMO) critical habitat.

1. *Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.* Implementation of the proposed action would tend to maintain or slightly restore the natural hydrologic functioning of the project area. The primary activities should have little to no effect on existing subsurface connectivity (as demonstrated, in part through an ECA analysis). Maintenance and cross-drain culvert installation may eliminate flow diversion onto some of the roads that would be maintained. On the whole, the proposed activities should neutrally or slightly positively affect, at a relatively small scale, the quantity and quality of subsurface flows, springs and seeps.

2. *Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including, but not limited to, permanent, partial, intermittent, or seasonal barriers*. The project design and mitigation measures are expected to avoid or minimize any adverse impacts to spawning, rearing and migratory bull trout because no instream activities would be completed. No biologically significant effects from erosion associated with yarding, fuels treatments, or road maintenance should be transmitted to project streams, as demonstrated by sediment modelling analysis.

3. *An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish*. The project activities are expected to have no adverse

impacts to this element because no biologically significant adverse effects would be promulgated because no biologically significant adverse effects would be promulgated. .

4. *Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure*. Because of project design and mitigation measures, the proposed activities are expected to have no adverse impacts to this element.

5. *Water temperatures ranging from 2 to 15 °C (36 to 59 °F) with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence*. Because of project design and mitigation measures, in particular, essentially no effect on stream shading, the proposed activities are expected to have no adverse impacts to this element.

6. *In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system*. As noted above, sediment impacts from the proposed project activities will be negligible to nonexistent regarding direct effects to bull trout and direct and indirect effects to existing and potential habitats.

7. *A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departures from a natural hydrograph. The hydrographs of the project area streams are relatively un-regulated and natural, except for the effects of roads, timber harvest, and wildfire on water yield and routing*. The project activities are not expected to move hydrologic function of the project area away from existing conditions.

8. *Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited*. As noted in the effects analysis above, the hydrologist's report shows that water yield in the project area subwatersheds should not be substantially changed by the proposed project.

9. *Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.* With the exception of a few brook trout, smallmouth bass, and kokanee no non-native fish species are known to occur in the project area. The proposed activities would not promote the survival or increased distribution of these fish.

Fall Chinook salmon. As described above, Snake River fall Chinook salmon (fall Chinook) have recently been known to spawn in portions of the mainstem Clearwater and Salmon rivers, in the lower South Fork Clearwater and Selway Rivers, and in the Middle Fork Clearwater River. Critical habitat extends only the Lolo Creek confluence on the mainstem Clearwater, while specific critical habitat in the Salmon River has not been defined.

Fall Chinook salmon are mainstem spawners, so adults, redds, and juveniles would not be present directly adjacent to any activity areas. Individuals may be present in proximity to streams along paved haul routes, in particular along the Middle and South Fork Clearwater rivers, Selway River, and the Salmon River.

The proposed action should have only discountable effects on fall Chinook salmon. Because no individual fall Chinook should be present in streams passing through project activity areas, the minor and temporary effects to stream habitat (as described above for steelhead and bull trout) that would be diluted and attenuated on its path to mainstem habitat should have essentially no effect on individual fall Chinook salmon or critical habitat. It is possible that log haul on roads (especially in Lolo Creek, Middle Fork and South Fork Clearwater River, and Selway and Salmon River subwatersheds) may lead to contaminant spills in streams tributary to the mainstem rivers and critical habitat, but this circumstance would be very rare, speculative, and discountable.

Snake River Spring/summer Chinook Salmon. ESA-listed individuals of this run type would be present in the project area only in the Salmon River basin, where critical habitat exists in the mainstem Salmon River and indistinctly in Salmon River tributaries. A few individual parr in lower Allison Creek would be present along a gravel-road haul route, but activity areas would be a mile or more upstream, and so no biologically significant effects on Chinook salmon habitat in this stream should be transmitted from activity areas or from the haul route. Any parr present in lower Allison Creek would be affected by upstream activities in essentially the same low-risk manner as for juvenile steelhead, while harm to individual salmon from spills of contaminants into Allison Creek would be speculative and discountable. Individuals of this ecologically significant unit migrating through or rearing in the Salmon River mainstem have the theoretical potential to be affected by contaminant spills, but the large dilution effect of the river would make the potential for harm to these individuals an even more discountable risk.

Snake River Sockeye Salmon. Native to the Salmon River basin, but present on the Forests only as migratory individuals in the mainstem Salmon River, which is also the extent of spawning and rearing sockeye salmon designated critical habitat (58 FR 68543). See Chinook salmon discussions above for the discountable nature of the risk of project activities on salmon individuals or habitat in the Salmon River.

Essential Fish Habitat Effects Analysis

Spring Chinook salmon, fall Chinook salmon, Coho salmon. Essential fish habitat for these species would include streams within the project area accessible to salmon in the Clearwater and Salmon River basins. Potential effects of the project alternatives on the essential fish habitat of these species are discussed under ESA effects, above. For the same reasons as described above, there should be limited to no effects on essential fish habitat in the project area for these species under either alternative.

Sensitive Species Analysis

The period for this analysis includes temporary effects (e.g., those occurring during the one-month dredging season of any one year), the short-term (one to ten years), and the long-term (>10 years). The direct and indirect effects of the project would potentially occur for all Sensitive species discussed in this section. Effects on aquatic species of Alternative 1, the No Action Alternative, should be essentially non-existent, assuming enforcement of Forest Service and EPA regulations. Effects on Sensitive species of Alternative 2, the Proposed Action, are described below.

Westslope cutthroat trout and redband (rainbow) trout. As noted above, the habitat requirements of westslope cutthroat trout and redband trout are quite similar to those of juvenile steelhead, although in large-scale sympatry redband trout seem to prefer higher-order streams than do westslope cutthroat trout, or perhaps westslope cutthroat trout are competitively excluding redband trout from low-order streams. In any event, potential effects on westslope cutthroat trout and westslope cutthroat trout habitat in project areas in all project subbasins and the effects on redband trout and redband trout habitat in the North Fork Clearwater project area would be similar to those on juvenile steelhead and juvenile steelhead habitat.

Western pearlshell mussel, Pacific lamprey. As noted above, western pearlshell mussels (WPM) are present in some abundance in project area subwatersheds, but there are no tree felling activity areas which would be in close proximity to known WPM presence. Log haul along the North Fork Clearwater River,

Lolo Creek and tributaries (including Musselshell Creek), and the South Fork Clearwater River would be in proximity to populations of this species, and log haul along other WPM-bearing streams is likely. Pacific lamprey are present in Lolo Creek and Newsome Creek, and likely in the South Fork Clearwater River, where these populations would be adjacent to log haul routes, but no project activity areas would be in any proximity to known or suspected lamprey-supporting streams.

Direct effects to WPM and Pacific lamprey in the project areas, if present, should be confined to spill off contaminants into stream channel and so should be rare or speculative, while indirect adverse effects, as for steelhead parr and other fish, should be eliminated or minimized by observance of RHCA buffers and PDFs.

Aquatic MIS Analysis

The period for this analysis includes temporary effects (e.g., those occurring during the one-month dredging season of any one year), the short-term (one to ten years), and the long-term (>10 years). The direct and indirect effects of the project would potentially occur for all species discussed in this section. Effects on MIS aquatic species of Alternative 1, the No Action Alternative, should be non-existent, assuming enforcement of Forest Service and EPA regulations. Effects on MIS aquatic species of Alternative 2, the Proposed Action, are described below.

As discussed above, because most MIS species present likely to occur in the project area are also either ESA, essential fish habitat, or Sensitive species, information on these animals (westslope cutthroat trout, steelhead, and spring Chinook salmon) are presented in sections above. Kokanee are seasonally present in the North Fork Clearwater River and some tributaries, but no activity areas are adjacent to the North Fork or any of the kokanee-bearing streams. The Snow Creek activity area would produce log haul which would be adjacent to kokanee habitat in the North Fork and Skull Creek, but the potential for effect to this species is very low, for the same reasons describe above for other aquatic organisms.

Table AQ-4. Aquatic resources indicators and measures for Alternative 2 direct/indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 2 Direct/Indirect Effects
Endangered Species Act Threatened, Endangered, and Proposed Species	Determination Statement	Qualitative Discussion	Adverse effects on TES species should be unlikely and/or biologically insignificant. Beneficial effects should be localized and small or result of otherwise routine/necessary road prism maintenance.
Forest Service Region 1 Sensitive Aquatic Species	Habitat Trend and Determination Statement	Qualitative Discussion	Same as above.
Magnuson-Stevens Act EFH	Determination Statement	Qualitative Discussion	Same as above.
Aquatic Management Indicator Species	Habitat Trend	Qualitative Discussion	Same as above.

B. Cumulative Effects – Alternative 2

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects

Analysis

Because of the broad reach of the proposed activities across the Forests, any attempt to describe cumulative effects-relevant activities would be both voluminous and of questionable value. The primary past activities which are most relevant to the proposed action are the existence of project roads and the occurrence of the 2015 wildfires. The primary present and future activities of note are the use and maintenance of project subwatershed roads which would not be used in project activities, and any future subwatershed timber salvage projects, some of which could literally overlap with project activity areas and haul roads. Taking into account these activities, the discussion below concentrates on plausible cumulative effects on ESA-listed fish species.

All Special Status Aquatic Species

Alternative 1 would have no cumulative effects on special status species because there would be no direct or indirect effects to these species from this alternative. Local or regional populations would not be affected. The area considered for cumulative effects of Alternative 2 are the 49 project-relevant subwatersheds shown in Figures 1a-c, and described in Appendix B Tables 1-3.

As shown in Appendix D, Table 3, 14 of the 49 project subwatersheds would have no activities other than normal maintenance and use of existing roads, while an additional 22 project subwatersheds would have no proposed activities (beyond maintenance or use of existing roads) within proximity of ESA-listed fish presence or critical habitat and would have less than 1 percent of their areas within project activity areas. For reasons described previously in this document, and the minimal effect on soil, vegetation, etc., activities within these 36 subwatersheds should have essentially no potential to affect ESA-listed fish or designated critical habitat and so could not contribute to cumulative effects.

A further five project subwatersheds would each have less than 1 percent of their areas within project activity areas, but some of these activity areas would occur within proximity of ESA-listed fish presence or designated critical habitat. However, as described previously in this document, the project design features should ensure that adverse effects individuals or critical habitat would not occur in these five subwatersheds. The remaining eight project subwatersheds and their potential for contributing to project cumulative effects are described below individually. The proposed project would have minimal to no direct or indirect effects on these watersheds or ESA values, and so should have no effect on cumulative subwatershed effects.

Big Smith Creek-MF Clearwater River. Only slightly more than 1 percent (296 acres) of the subwatershed would be proposed for cut-and-yard activities, and no ESA-listed individuals or critical habitat would be in proximity to these activity areas. However, the Forests proposes in 2016 to conduct 273 acres of salvage harvest in the subwatershed (the Woodrat Salvage Project), along with 0.9 miles of temporary road construction, 18.2 miles of road reconstruction, and 7.5 miles of road reconditioning. Some Burned Area Emergency Rehabilitation (BAER) projects (replacement of undersized culverts and drivable dips) also expected to be implemented in 2016. In addition, Idaho Department of Lands (IDL) conducted fire salvage harvest on a total of 270 acres in the Swan Creek and Little Smith Creek drainages of the subwatershed in 2015.

The direct and indirect effects analyses for aquatics in the Woodrat Salvage Project EA concludes that the project would cause no measurable short-term changes in sediment yield or other aquatics-relevant indicators for the subwatershed. The Woodrat EA also concludes that the project, when added to past activities on Forests lands and the recent IDL salvage activities (inspected in May 2016 by Forests staff), would cause no cumulative aquatics effects would occur, except that road work performed should reduce sediment transmission to streams in the long term. As a result, the cumulative effects of the proposed project should be minimal to slightly beneficial.

Horse Creek. Only slightly more than 1 percent (118 acres) of the subwatershed would be proposed for cut-and-yard activities, and no ESA-listed individuals or critical habitat would be in proximity to these activity areas (or even within the subwatershed). The Forests does not propose any salvage harvest or BAER projects in the subwatershed, and there should be no private or state activities.

Berg Creek-Salmon River. Only slightly more than 1 percent (242 acres) of the subwatershed would be proposed for cut-and-yard activities, and no ESA-listed individuals or critical habitat would be in proximity to these activity areas, the Forests does not propose salvage harvest and no BAER projects or other roadwork, and there should be no private or state activities.

Kelly Creek-Salmon River. Only about 1.5 percent (366 acres) of the subwatershed would be proposed for cut-and-yard activities, and no ESA-listed individuals or critical habitat would be in proximity to these activity areas, the Forests does not propose salvage harvest and no BAER projects or other roadwork, and there should be no private or state activities.

Glover Creek-Selway River. Only about 1.5 percent (445 acres) of the subwatershed would be proposed for cut-and-yard activities, and no ESA-listed individuals or critical habitat would be in proximity to these activity areas. The Forests does not propose any salvage harvest or BAER projects in the subwatershed, and there should be no private or state activities.

Lower Meadow. Only about 0.5 percent (159 acres) of the subwatershed would be proposed for cut-and-yard activities, but an additional 284 acres may be treated as cut-and-leave, for a total of about 1.4% of the subwatershed. ESA-listed individuals and critical habitat would be in proximity to some of these activity areas in lower Meadow Creek. The Forests does not propose any salvage harvest or BAER projects in the subwatershed, and there should be no private or state activities.

Upper Lolo Creek. Only about 1.5 percent (407 acres) of the subwatershed would be proposed for cut-and-yard activities, and no ESA-listed individuals or CH would be in proximity to these activity areas. However, the Forests proposes in 2016 to conduct 132 acres of salvage harvest in the subwatershed, along with about 4 miles of road reconstruction, and about 10 miles of road reconditioning. Private and IDL-conducted fire salvage harvest has and will occur in the Lolo Creek drainage, but not in the Upper Lolo subwatershed. The Biological Assessment for the proposed Forests salvage in the Lolo Creek watershed concludes that no long term changes would result from that project.

Allison Creek. The project proposal is to cut-and-yard in activity areas totaling 707 acres (5.5 percent) of this subwatershed and to cut-and-leave in another 210 acres (1.6 percent). As with all of the activity areas, there would be the potential for fuels treatments and reforestation activities. In addition, normal road maintenance would occur, and there may be additional road maintenance activities (in the form of installation of additional cross-drain culverts) within the Plant Creek drainage.

BAER work in the subwatershed associated with the Tepee Fire are also expected to be implemented in 2016 would include replacement of existing culverts on streams with culverts large enough to accommodate the post-fire stream flow increases, and road stabilization (installation of armored drivable dips, waterbars, and culvert removal) to minimize runoff from roads. No private or state activities are proposed for the subwatershed.

All Special Status Aquatic Species

Alternative 1 would have no cumulative effects on special status species because there would be no direct or indirect effects to these species from this alternative. Local or regional populations would not be affected.

The area considered for cumulative effects of Alternative 2 are the 49 project-relevant subwatersheds shown in Figures AQ-1 through AQ-3, and described in Appendix D Tables 2-4.

Past, on-going, and foreseeable activities have or would continue to adversely affect aquatic species in the cumulative effects areas and the populations of all of these species and their habitats have been and likely will continue to be compromised, although current and future adverse effects are likely much reduced from that in the past. However, the likely minimal to non-existent effects on habitat in and downstream of the project area subwatersheds (see above) lead to a "not likely to adversely affect" or "no effect" determinations for ESA-relevant species and critical habitat, so no cumulative effects to these species or habitat are anticipated with the action alternative. Cumulative effects on the other special-status species should be just as minimal or non-existent.

Table AQ-5. Resource indicators and measures for Alternative 2 cumulative effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 2 Cumulative Effects
Endangered Species Act Threatened, Endangered, and Proposed Species	Determination Statement	Qualitative Discussion	Adverse effects on TES species should be unlikely and/or biologically insignificant. Beneficial effects should be localized and small or result of otherwise routine/necessary road prism maintenance.
Forest Service Region 1 Sensitive Aquatic Species	Habitat Trend and Determination Statement	Qualitative Discussion	Same as above.
Magnuson-Stevens Act EFH	Determination Statement	Qualitative Discussion	Same as above.
Aquatic Management Indicator Species	Habitat Trend	Qualitative Discussion	Same as above.

Table AQ-6. Summary comparison of how the alternatives address the key issues

Issue	Indicator/Measure	Alt 1	Alt 2
Endangered Species Act Threatened, Endangered, and Proposed Species	Determination Statement/ Qualitative Discussion	No effect, unless riparian tree planting and road prism maintenance otherwise not performed	Adverse effects on TES species should be unlikely and/or biologically insignificant. Beneficial effects should be localized and small or result of otherwise routine/necessary road prism maintenance.
Forest Service Region 1 Sensitive Aquatic Species	Habitat Trend and Determination Statement/ Qualitative Discussion	Same as above.	Same as above.
Magnuson-Stevens Act EFH	Determination Statement/ Qualitative Discussion	Same as above.	Same as above.
Aquatic Management Indicator Species	Habitat Trend/ Qualitative Discussion	Same as above.	Same as above.

3.2.2.3 Summary of Environmental Effects

Table AQ-7. Summary comparison of environmental effects to aquatic resources

Resource Element	Indicator/Measure	Alt 1	Alt 2
Direct effects to aquatic organisms	Likelihood of injury/mortality	No effect.	No activities would occur in wetted channels (including tree felling) and machinery exclusion from activity areas and PDFs should keep contaminants from entering streams. Log trucks would haul on existing roads in RHCAs, but spills would be speculative and rare.
Effects to aquatic habitat	Increases in terrestrial sediment input to stream	Wildfire effects to soil/hydrology and existence, use, and maintenance of roads would continue to add fine sediment to some stream channels	General project design and specific PDFs are intended to eliminate or reduce project-caused erosion, and RHCAs should prevent transmission to stream channels. Hydro and soils reports document generally unmeasurable effects of proposed activities on stream channel sedimentation.
Effects to aquatic habitat	Decreases in streambank stability	Death of trees and other vegetation from wildfire would reduce bank stability in short term	Project would potentially fell a few hazard trees providing streambank stability, but most of these trees would be dead or moribund and so root-based stability would be unaffected except very locally.
Effects to aquatic habitat	Decreases in large woody debris (LWD) recruitment to floodplain/stream channel	Trees killed by wildfire would increase LWD recruitment in short and long term, but would tend to retard growth of replacement trees	Project would fell trees in RHCA, but not directly into stream channel, so instream LWD (but not overall recruitment) possibly affected at some sites. Little felling likely at no/low fire severity sites, while mod/high severity sites probably with LWD surfeit. Local effects only.
Effects to aquatic habitat	Changes in water quantity/quality	Trees killed by wildfire would increase water yield in short and long term and would reduce stream shading in the short to long term depending on site	Most trees felled in project dead or moribund, so little to no effect on transpiration or interception. Little likelihood of substantial transmission of fine sediment or contaminants because of PDFs and RHCAs.

3.3 Fuels

3.3.1 Affected Environment

3.3.1.1 Existing Condition

Historically, fire played a very large role in vegetation dynamics in the area and is considered the primary agent of change (Forest Fire History Maps, 2015; Smith and Fischer, 1997). Although wind and mortality from insect and disease pathogens played important ecological roles, fire was considered the primary agent of change across most of this landscape (Habeck and Mutch, 1973; Smith and Fischer, 1997; Quigley and others, 1996). During the 2015 fire season on the Nez Perce-Clearwater National Forests, approximately 300 fires burned over 184,000 acres. A high proportion of the fires burned in lower elevation front country, where much of the Forests' infrastructure is located. Many trees were killed directly as a result of wildfire, and many more were intolerably stressed and will likely die over a period of several years. Secondary effects of these fires, including increases in insect and disease activity within the burnt stands of timber will continue to increase, resulting in ongoing threats to human safety and safe access (Project Scoping Letter, 2015).

Previous fires along travel corridors provide examples of the ongoing threats to human safety and safe access brought up by this project's Scoping Letter (2015). One such fire, the Slim's Fire in 2003 on the Moose Creek Ranger District, burned over a large portion of the Indian Hill Road, FR290, with stand replacement severity fire. In a 2008 project proposal to address human safety and road maintenance concerns, it was stated that:

> "Natural decay, snow loading and windstorms are contributing to large numbers of downed trees that continue to fall and impact significant portions of the roadway in the form of overhanging tree tops and limbs ("jill-pokes".) This presents a low clearance safety hazard and is difficult to routinely maintain due to steep slopes and the top of the cut bank being 10-15 feet or more above the road surface. Blowdown on the roadway also causes routine blockages that can temporarily close the road and can trap forest visitors. Erosion of the cut bank portion of the road is also increasing as the trees fall and uproot, resulting in a loss of soil anchoring. A slide in the winter of 2008 forced a road closure until late August. In some areas drainage from the road surface is poor causing water to be channeled down the roadbed leading to increased erosion and mud holes that further restrict vehicle passage. Current annual road maintenance does not address the overhanging hazard created by the trees or minimize future erosion of the cut bank" (Indian Hill Road Repair and Brushing Project Proposal, Nez Perce National Forest, 11/26/2008).

While "heavy use by firewood cutters and routine patrolling by the District fire crew" were able to keep portions of the road clear, other portions needed to be more specifically addressed (Ibid, 2008), and the Indian Hill project was implemented (Graves, 2016) over the course of several years.

Based on site visits and survey data gathered by BAER analysis and other field crews to the 2015 fire areas, the areas proposed for treatment with this current project have numerous dead and dying trees including fire mortality/damaged trees, or trees weakened by other insect and disease factors exacerbated by fire effects. Fire intensity and resulting severity varied within and among fire perimeters, with low severity burns experienced on approximately 35 percent of the proposed activities, moderate severity burns on approximately 20 percent of the proposed activities, and high severity burns on approximately 12 percent of the proposed activities. Safe access on Forest Service roads is crucial to our public as well as to management personnel.

Safe infrastructure provides safe travel conditions for all users. Hazard trees and dead trees should be removed along the roadside to maintain a clear and safe road through the Forest. Roads are critical for fire management work to be accomplished. When access to fires is limited, additional safety concerns arise and must be evaluated, eliminated, or mitigated. The risk of fighting fires with large numbers of snags or working in areas of limited accessibility where escape routes are compromised would require mitigating or eliminating those concerns or possibly not engaging firefighters. As we saw at the Woodrat

Fire on the Lochsa District this summer, the successful protection of the community of Syringa, Idaho hinged on firefighters ability to safely use the Smith Creek Road as an anchor point because of its favorable fuel characteristics achieved through a pre-fire fuel reduction project (Lewiston Tribune, 10/12/15). Preparedness activities in advance of fire occurrence can help ensure effective suppression action (Graham, and others 2009).

Table F-1. Resource indicators and measures for the existing condition

Resource Element	Resource Indicator	Measure	Existing Condition
Safe Roads	Roads Maintained	Miles of Roads Maintained	Limited access to all affected road miles within the project- 266 miles

Resource Indicator and Measure 1

There are approximately 266 affected road miles within this project area. The existing condition across those miles indicates numerous dead and dying trees including fire mortality/damaged trees, or trees weakened by other insect and disease factors exacerbated by fire effects. This condition does not lend itself to continued safe ingress and egress along these routes.

3.3.2 Environmental Consequences

3.3.2.1 Alternative 1 – No Action

Table F-2. Resource indicators and measures for Alternative 1- No Action

Resource Element	Resource Indicator	Measure	Alternative 1- No Action
Safe Roads	Roads Maintained	Miles of Roads Maintained	Zero (0) miles of maintenance would occur

When wildland fires occur, the road system often serves as a focal point for fire management activities, whether as ingress/egress routes or tactical and/or strategical action points like anchor points, an advantageous location from which to start constructing a fireline or fuel break. Road systems can function as a barrier to fire spread that is used to minimize the chance of being flanked by the fire while fireline is being constructed. Roads can also be used as firebreaks or to burn out from so as to create a defensible space by consuming flammable fuels. Fuel characteristics, such as loading, continuity, and arrangement along the road system can affect the safe use of the road for any management activity because of the direct affect those characteristics have on potential fire behavior. Narayanaraj and Wimberly encourage road treatment because of the link to fuelbreaks and fire suppression, but also because of the broader landscape scale implications of roads for fire management (2011). By strategically treating fuel concentrations, fire risk can be reduced because treatments can change the probability of fire movement by increasing the relative frequency of milder, less intense fire behavior (Finney and Cohen, 2003).

Left untreated, many of these roadside areas would change dramatically over time. Section 3.1 of this Environmental Analysis (p. 19, Safety and Road Access) describes personnel and roadbed hazards from dead and burned timber and from not maintaining forest roads post-fire. Especially in the moderately- and severely-burned areas, most of the dead trees can be expected to fall down within 15 years (Mitchell and Preisler, 1998) which would increase large downed woody (1000-hour) fuel loads. This large woody debris hampers access and slows fireline production, which often limits initial attack success. Additionally, heavy loadings of 1000-hr fuels allows for long residence times, the total length of time that

the flaming front occupies one point. Long residence times with high intensities limit personnel capabilities and the success of direct attack strategies (Brown, and others 2003). Additionally, long residence times promote smoldering of duff and litter which creates high smoke emissions and exposes mineral soil. Exposed mineral soil creates a suitable site for noxious weed establishment and potential for soil erosion. Fire suppression costs generally increase when extended mop-up is needed.

3.3.2.2 Alternative 2 – Proposed Action

Table F-3. Resource indicators and measures for Alternative 2- Proposed Action

Resource Element	Resource Indicator	Measure	Alternative 2- Proposed Action
Safe Roads	Roads Maintained	Miles of Roads Maintained	~133 miles of maintenance would occur

Implementation of the proposed action would have favorable consequences for the fuels resource because of the removal of the overhead hazard adjacent to and within falling distance of the road systems being addressed. Additionally, potential fire behavior would be reduced post-treatment as the fuel characteristics would be favorably modified as recommended (Brown, and others 2003; Graham, and others 2004; Peterson, and others 2015; Dunn and Bailey 2015; Coppoletta, and others, pre-print, 2015). Roadside fuel characteristics would be addressed post-felling operations, based on predicted fire behavior given those particular loadings. Design criteria identified through this project apply to fuel treatments. The design criteria are worded in such a way that they adequately allow land managers to address both fuel characteristics of concern and safety concerns on ingress/egress routes as well as other resource concerns.

When wildland fires occur, the road system often serves as a focal point for fire management activities, whether as ingress/egress routes or tactical and/or strategical action points like anchor points, an advantageous location from which to start constructing a fireline. Road systems can function as a barrier to fire spread that is used to minimize the chance of being flanked by the fire while the fireline is being constructed. Roads can also be used as firebreaks or to burn out from so as to create a defensible space by consuming flammable fuels. Fuel characteristics, such as loading, continuity, and arrangement along the road system can affect the safe use of the road for any management activity because of the direct affect those characteristics have on potential fire behavior. Narayanaraj and Wimberly encourage road treatment because of the link to fuelbreaks and fire suppression, but also because of the broader landscape scale implications of roads for fire management (2011). By strategically treating fuel concentrations, fire risk can be reduced because treatments can change the probability of fire movement by increasing the relative frequency of milder, less intense fire behavior (Finney and Cohen, 2003).

When access to fires is limited, additional safety concerns arise and must be evaluated, eliminated, or mitigated. The risk of fighting fires with large numbers of snags or working in areas of limited accessibility where escape routes are compromised would require mitigating or eliminating those concerns or possibly not engaging firefighters. Preparedness activities in advance of fire occurrence can help ensure effective suppression action (Graham, and others 2009). During the summer of 2015 on the Nez Perce-Clearwater National Forest, the successful protection of a local community hinged on firefighter ability to safely use a forest road as an anchor point because of its favorable fuel characteristics achieved through a pre-fire fuel reduction project (Lewiston Tribune, 10/12/15).

The 2003 Slim's Fire provides an example not only of some of the recurring damage that would be expected to be seen on road systems affected by 2015 wildfires, but also of the recurrent risk to people of routine patrolling, firewood cutting, and recreating in places where known hazards exist (Indian Hill Road

Repair and Brushing Project Proposal, Nez Perce National Forest, 11/26/2008), risk that this 2015 Post-Fire Roadside Project seeks to address (Project Scoping Letter, 2015).

Fuel loads along the roadside should be kept to a minimum to allow safe ingress and egress during wildfire situations. Proposed fuel treatments would focus primarily on decreasing surface fuels following other vegetative treatments, harvest or drop and leave. Surface fuel treatment is particularly important in affecting potential fire behavior (Graham, and others 2004) because it seeks to reduce that potential fire behavior, and influences potential fire intensity and subsequent severity. Such fuel management also changes the probability that potential fires would move across the landscape, threaten ingress and egress, and encroach on other values-at-risk because they would change potential fire behavior which can result in decreased fire size and severity (Finney and Cohen, 2003). Fuel continuity would be disrupted through these treatments, minimizing the risk of large growth of a fast moving wildfire. Treatments would also minimize potential for surface fires to transition into crown fires.

Any mechanical treatment would be restricted to 35 percent slope or less where otherwise unrestricted by design criteria, such as in riparian areas, where mechanical treatments off the road are not allowed. Fuel treatment would also be used to prepare areas for hand-planting of seral conifer species where that is being proposed. Some fuel treatments, particularly those involving jackpot or broadcast burning, can also rejuvenate browse for wildlife. Where otherwise unrestricted, mechanical treatments may be selected as an alternative to more conventional jackpot or underburning on machine-suitable slopes where such burning might damage the residual overstory, or where smoke emissions are of particular concern. Precise timing of burning (spring or fall) would be determined by on-site evaluations of vegetative conditions and fuel moisture, along with current and expected weather conditions. Piles are typically burned in late fall after a substantial amount of moisture has been received. This tends to minimize air quality impacts through better dispersion and reduces risk of escape to adjacent lands to minimize risk of escape. All prescribed burning would be done in accordance with guidelines laid out by the Idaho/Montana State Airshed Group. Prescribed fire burning windows are unpredictable, and smoke emission concerns can further limit that window. This mix of treatments for post-regeneration harvest fuels provides managers with alternatives to accommodate burn windows.

Post-harvest fuels are expected to vary significantly depending on species, aspect, elevation, and volume coming off, however, past experience indicates that fuel loadings can be significant from 35-80 tons per acre. Where trees are being dropped and left, again, loads can be expected to vary with similar criteria, and activity fuel loads may vary from 20-60 tons per acre. Proposed treatments would seek to address that situation. Per the design criteria of this project, treatments would retain 7-33 tons per acre of coarse woody debris (greater than or equal to 8 inches in diameter) following completion of activities. Drier sites would retain 7 to 12 tons per acre and moister sites would retain 12-33 tons per acre of coarse woody debris (Graham and others, 1994). Wetter sites would be on the upper end of the spectrum, while the drier sites would retain less fuel. Surface fuels may be treated either in their entirety or on strategically located portions of the affected areas using a combination of treatments to achieve objectives.

Machine piling on slopes less than 35 percent, or jackpot burning, or broadcast burning would primarily be used where removal of trees is occurring, and fuel concentrations are on the higher side of those estimated ranges, and where site preparation is required. A range of supporting treatments may also be utilized here, including but not limited to biomass utilization, lopping, chipping. Hand surface fuel reduction may be done at the base of some seral species as needed to better protect them from anticipated fire intensity where jackpot or broadcast burning is planned. The effects of jackpot burning would be patchy in nature, cleaning up areas where fuel concentrations exist and not burning in areas where fuels are minimal. Broadcast burning is more continuous in nature due to the continuity of the fuel, and would only be utilized where site preparation for hand planting is being prescribed.

Where surface fuels generated through activities are even less continuous than even a jackpot burn warrants, or where jackpot burning has been determined to be unacceptable due to resource concerns

(high severity burns, RHCAs, etc.), other fuel treatments would be utilized to address concerns over fuel concentrations and impacts to safe road utilization. These treatments may include, but are not limited to bucking, lopping, scattering, chipping, masticating, hand piling, machine piling, pile burning, biomass utilization, leave tree protection, pruning.

Proposed treatments are summarized in Table F-4, below. Activity fuels would be treated where trees are cut for this project regardless of which cutting prescription (Harvest Removal or Drop and Leave) they fall under, based on actual fuel loads generated. Treatments would be fairly adaptive in implementation by necessity, in order to account for the condition of the trees affecting the safety of the road, trail, recreation or administrative site, and whether harvest is occurring or whether trees are being dropped and left to reduce the overhead hazard, as well as the actual fuel loads left following the cutting activity. Should the prescription change from Harvest Removal as currently identified in the proposed action, either during layout or for another reason, the area being treated would then be treated as described under the Drop and Leave description category, and vice versa. Burn severity data below was estimated from survey data and would be verified at implementation. Some areas did not have burn severity identified; those areas would be identified at implementation.

Table F-4. Summary of proposed fuel treatments for the post-fire roadside project. All treatments would adhere to design feature specifications.

Prescription	Severity	Treatment associated with Harvest	Other Possible Treatments
1&4: Harvest Removal ~103 miles treatment area • Severity information was estimated in acres from survey data and may need to be adjusted at implementation • ~12% did not have severity data but would be identified at implementation • ***If dropped from harvest, would move to associated treatment in Drop and Leave Rx2***	**Very Low** ~21% and **Low** ~33%	-Whole-tree yard or yard tops and limbs(**YTL**) -Yard un-merchantable material in excess of CWD requirement(**YUM**) -Purchaser landing piles(**PLP**) -FS burn landing piles(**BLP**) -Jackpot/Broadcast Burn 25%(**JP**) -Fuel Inventory(**FI**) -Biomass utilization(**BU**) -Leave Tree protection (**LTP**)	-Machine pile/pile burn 25% (**MP/PB**) -Hand pile/pile burn 25% (**HP/PB**) -Masticate/Mulch 25% (**M**) -Chip 10% (**C**) -Buck at 10'-25' 50% (**B**) -Lop and/or scatter 50% (**L**) -Fireline construction (**FL**)* -Jackpot/Broadcast burn 25% (**JP**) -Biomass utilization(**BU**) -Leave Tree protection (**LTP**) **Up to 2300 chains of fireline cumulative in these areas*
	Moderate ~22%		
	High ~12%	-Whole-tree yard or yard tops and limbs (**YTL**) -YUM yard in excess of CWD requirement (**YUM**) -Purchaser landing piles(**PLP**) -FS burn landing piles (**BLP**) -Fuel Inventory (**FI**) -Biomass utilization (**FI**)	-Hand pile/pile burn 25% (**HP/PB**) -Chip 25%(**C**) -Buck at 10'-25' 75%(**B**) -Lop and/or scatter 75% (**L**)
Prescription	**Severity**	**Treatments in Drop and Leave Prescription 2**	
2: Drop and Leave ~30 miles treatment area • Severity information was estimated in acres from survey data and may need to be adjusted at implementation	**Very Low** ~15%	-Fuel Inventory 100%(**FI**) -Hand pile/pile burn 25%(**HP/PB****) -Fireline construction (**FL***) -Jackpot burn 25%(**JP***) -Leave Tree protection (**LTP**) -Buck at 10'-25' (15' minimum in RHCA) 75%(**B**) -Chip 25%(**C**)*** -Lop and/or scatter 75% (**L**) **FL and JP would not take place in RHCA and up to 560 chains of fireline cumulative in these areas*	
	Low ~39%		
	Moderate		

• ~50% is in RHCA • ~10% did not have severity data but would be identified at implementation	~23%	***Piles would need to be built outside of RHCA* **** No machinery would leave the road in RHCA*
	High ~14%	-Fuel Inventory 100% (**FI**) -Buck at 15'-25 75%'(**B**) -Chip and scatter 25% (**C*****) -Lop and/or scatter 75%(**L**) **** No machinery would leave the road in RHCA*

A. Direct and Indirect Effects - Alternative 2

Fuel treatments will be most effective when they concentrate on the following five components: decreasing surface fuels, decreasing ladder fuels, decreasing crown bulk density, increasing crown base height, and increasing the percentage and vigor of fire-resilient seral species. These five components have an effect on surface fire to crown fire transition (Graham, and others 2004; Graham, and others 2009). Fire behavior changes when those components are altered, which influences fire intensity and its subsequent severity. Additionally, fuel treatments will be most effective when they are accomplished in concert with landscape restoration objectives such as restoring species composition and stand structure to historical norms (Martinson and Omi, 2003).

Fire behavior modeling results indicate that potential fire behavior increases as fuel loading increases and that potential fire behavior decreases as fuel loading decreases. Where predicted fire behavior would result in high rates of spread, or would result in flame lengths that exceed capability to work with hand crews (four feet)(Wildland Fire Incident Management Field Guide, 2014), fuels would be reduced using a variety of methods to reduce predicted rates of spread and flame lengths such that the road system could be safely used by the public and management personnel for ingress/egress purposes in the event of large fire activity.

Fuel Models 10, 11, and 12 (Anderson, 1982) were used to represent the fuel condition post-felling and pre-fuel treatment. Fire behavior predictions for pre-treatment fuel conditions indicate that ROS could be up to 1/3 mile per hour in FM 11 areas, and up to 3/4 mile per hour in FM10 and 12. FL would exceed handcrew capability all of the time across all models, and would exceed direct attack capability over 95 percent of the time. Potential for large fire growth based on fire behavior characteristics of ROS and FL exists, should activity fuels go untreated.

By implementing fuel treatments and altering the fuel strata, predicted fire behavior would be reduced so that Fuel Models 8 (Anderson, 1982), 184, or 185 (Scott and Burgan, 2005) would better represent the fuel conditions within the project area in the areas treated. Post-treatment predictions of fire behavior indicate that treatments should be effective at reducing ROS to a minimum and FL to where fires could be attacked, by hand, using direct attack strategy and tactics under the modelled inputs.

Again, there are approximately 266 affected road miles within the project area. About half of those miles dropped out of the proposed action due to resource concerns. Direct and indirect effects would occur on the approximately 133 miles of roads where activities are proposed. Direct and indirect effects where fuel characteristics are effectively moderated through treatment include:

- Reduction in potential fire behavior adjacent to these roads through fuel bed modification;
- Ingress/egress routes benefit due to reduced long-term maintenance by removing hazards at once rather than through repetitive maintenance; and
- Pre-emptive and proactive improvement to fire fighter safety during fire management activities by removing overhead hazards and potential fire behavior adjacent to roads.

Across the portions of the affected roads that are not treated, the other approximately 133 miles within the project area, those direct effects would not be noted. Reductions in potential fire behavior may be noted

as these areas may be indirectly affected by the disruption of fuel continuity initially, but over time, as concentrations in those areas increase, the indirect benefits would likely be reduced. Some of the benefits of the direct effects on the areas treated may also be compromised over time especially where untreated areas are intermingled with treated areas, and the overall ingress/egress is not established or maintained.

Fuel reduction treatments are labor-intensive to implement, and as a result, costs are often high. Past project costs for similar fuels reduction work on other projects range from $250-$400/acre for machine piling, to $450-$1000/acre for mastication, to $200/acre for simple hand slashing work, to $600-$1500/acre for moderate-complex slashing and hand piling work around specific values at risk (NCF Contracts, 2000-2015; Clearwater-Nez Perce Fuel Treatment Allowance Collection Guide, 2010). Implementation costs may be off-set where cut trees are harvested. Please see Table TE-3 of this document for Timber Sales Appraised Value and present net value, by Alternative. Where trees are felled and left on site and no cost offset would be coming from timber receipts so other funding sources would need to be obtained in order to implement.

Pre-treatment Condition BEHAVE Outputs

Given the following inputs to the model shown in Table F-5 (conditions of a typical summer day):

Table F-5. Inputs to BEHAVE Fire Behavior Model prior to fuel treatment occurring.

1-Hr Fuel Moisture	6.0 %
10-Hr Fuel Moisture	7.0 %
100-Hr Fuel Moisture	8.0 %
Live Herbaceous and Woody Moisture	100
Midflame Windspeed, Mi/Hr	5,10,15,20
Terrain Slope %	10,20,30,40,50,60

The following fire behavior would be expected, represented by the following outputs in Table F-6.

Table F-6. Rate of spread, flame length, from Behave Model prior to treatment occurring (FM 12, 10, 11)

	FM 12				**FM 10**				**FM 11**			
Rate of Spread (Ch/Hr)	Midflame Wind	Terrain Slope %			Midflame Wind	Terrain Slope %			Midflame Wind	Terrain Slope %		
		10%	30%	60%		10%	30%	60%		10%	30%	60%
	5.0 mph	13.5	15.4	21.5	5.0 mph	8.6	9.8	13.6	5.0 mph	6.2	7.0	9.8
	10.0 mph.	27.8	29.6	35.8	10.0 mph.	21.7	22.8	26.6	10.0 mph	13.0	13.8	16.6
	20.0 mph	59.0	60.8	67.0	20.0 mph	56.9	58.0	61.8	20.0 mph	28.1	28.9	31.7
Flame Length (Ft.)	Midflame Wind	Terrain Slope %			Midflame Wind	Terrain Slope %			Midflame Wind	Terrain Slope %		
		10%	30%	60%		10%	30%	60%		10%	30%	60%
	5.0 mph	8.2	8.7	10.1	5.0 mph	5.2	5.5	6.4	5.0 mph	3.5	3.7	4.3
	10.0 mph.	11.4	11.7	12.8	10.0 mph.	7.9	8.1	8.7	10.0 mph	4.9	5.1	5.5
	20.0 mph	16.1	16.3	17.1	20.0 mph	12.3	12.4	12.8	20.0 mph	7.0	7.1	7.4

Post-treatment BEHAVE Outputs:

Given the same inputs to the model, shown in Table F-7 (conditions of a typical summer day):

Table F-7. Inputs to BEHAVE Fire Behavior Model following fuel treatment.

1-Hr Fuel Moisture	6.0 %
10-Hr Fuel Moisture	7.0 %
100-Hr Fuel Moisture	8.0 %-FM8
Live Herbaceous and Woody Moisture	100%
Midflame Windspeed, Mi/Hr	5,10,15,20
Terrain Slope %	10,20,30,40,50,60

The following fire behavior would be expected, represented by the following outputs in Table F-8.

Table F-8. Rate of Spread, Flame Length from Behave Model following fuel treatment (FM 8, 184, 185)

	FM 8				FM 184				FM 185			
Rate of Spread (Ch/Hr)	Midflame Wind	Terrain Slope %			Midflame Wind	Terrain Slope %			Midflame Wind	Terrain Slope %		
		10%	30%	60%		10%	30%	60%		10%	30%	60%
	5.0 mph	2.1	2.3	3.2	5.0 mph	2.5	2.9	4.0	5.0 mph	4.6	5.2	7.2
	10.0 mph.	4.9	4.9	4.9	10.0 mph.	5.9	5.9	5.9	10.0 mph	11.3	11.9	14.0
	20.0 mph	4.9	4.9	4.9	20.0 mph	5.9	5.9	5.9	20.0 mph	21.2	21.2	21.2
Flame Length (Ft.)	Midflame Wind	Terrain Slope %			Midflame Wind	Terrain Slope %			Midflame Wind	Terrain Slope %		
		10%	30%	60%		10%	30%	60%		10%	30%	60%
	5.0 mph	1.1	1.2	1.4	5.0 mph	1.4	1.4	1.7	5.0 mph	2.1	2.3	2.6
	10.0 mph.	1.6	1.6	1.6	10.0 mph.	2.0	2.0	2.0	10.0 mph	3.2	3.3	3.5
	20.0 mph	1.6	1.6	1.6	20.0 mph	2.0	2.0	2.0	20.0 mph	4.3	4.3	4.3

Resource Indicator and Measure 1

Fire behavior modeling results indicate that potential fire behavior increases as fuel loading increases (See Table F-6) and that potential fire behavior decreases as fuel loading decreases (See Table F-8). Where predicted fire behavior would result in high rates of spread, or would result in flame lengths that exceed capability to work with hand crews (four feet), fuels would be reduced using the variety of methods described in this document to reduce predicted rates of spread and flame lengths such that the road system could be safely used by the public and management personnel for ingress/egress purposes in the event of large fire activity.

By implementing fuel treatments and altering the fuel strata, predicted fire behavior (Rate of Spread and Flame Length) would be reduced so that Fuel Models 8, 184, or 185 would better represent the fuel conditions within the project area. Rates of spread would be expected to drop from 28-67 chains per hour in stands modelled for pre-treatment slash loads to 5-21 chains/hour post-treatment. Flame lengths show a similar decrease post treatment, from highs of 7-17 feet pre-treatment down to 1.5-4.3 feet. Post-treatment predictions of fire behavior indicate that treatments should be effective at reducing ROS to a minimum and FL to where all fires can be attacked by hand using direct attack tactics.

Again, there are approximately 266 affected road miles within the project area. About half of those miles dropped out of the proposed action due to a variety of resource concerns. Direct and indirect effects would occur on the approximately 133 miles of roads where activities are proposed. Direct and indirect effects where fuel characteristics are effectively moderated through treatment include:

- Reduction in potential fire behavior adjacent to these roads through fuel bed modification;
- Ingress/egress routes benefit due to reduced long-term maintenance by removing hazards at once rather than through repetitive maintenance; and
- Pre-emptive improvement in fire fighter safety during fire management activities by removing overhead hazards and potential fire behavior adjacent to roads;

B. Cumulative Effects – Alternative 2

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects

Analysis

Past, present and foreseeable activities that have affected or could affect fuels, fuel treatment, or fire suppression capabilities within the analysis area include:

- Fire suppression activities: Suppression activities over the past century in the project area across all ownerships may have had an effect on the existing fuel profile. Fire suppression may change the way the ecosystem responds to fire in the future (Zack and Morgan, 1994). Ecological implications of such subtle changes in structure is unknown (Smith and Fischer, 1997), and because suppression is likely to continue in this area, further structural changes from suppression may continue to occur.

- Wildfires: Wildfires played an influential role in existing condition of the vegetation. Over 300,000 acres burned across the Grangeville Interagency Dispatch area in 2015, with approximately one third of those acres on State or private lands. Approximately 184,000 acres on Forest Service lands burned as stand replacement or mixed-severity burns in 2015. A similar number of acres have burned within the past 10 years in other fires on different areas of the Forests.

- Other vegetation management activities across all ownerships within the project area: These activities include a variety of management practices and silvicultural treatments, ranging from timber harvest with intermediate salvage harvest, to regeneration harvest, to pre-commercial thinning, to fuel reduction. Outside of wildfires, vegetation management activities across the project area have been the dominant change factor in the forest. Vegetation management projects have had an influence in the species composition, size and age class distributions, ecosystem function, fuel loadings, and other system dynamics factors.

    - Timber harvest: The 1987 Forest Plans provide standards and guidelines for balancing the various resource values across the Forest. Additional research and publications in the subsequent decades provide the basis for current harvest practices designed to beneficially manage multiple forest resources. Stand structure from past regeneration harvest units are different than what would be expected after a natural disturbance such as wildfire. Harvesting removes the majority of trees in a regeneration harvest system. Typical post fire-disturbance conditions would be large amounts of standing live and dead trees, the majority of which would eventually fall down. Regeneration would slowly capture the site under the partial shade of the standing trees while the dead trees that fall down would also damage some of the seedling/sapling trees, effectively thinning some of the trees in the stand. A harvested stand may have far fewer standing trees, may re-forest faster than naturally due to planting trees, and may need to be thinned to prevent stagnation and favor seral species. With regeneration harvest, “edges” are created between harvested and non-harvested areas with a hard transition from forested to non-forested. This edge may be more obvious than what may occur naturally.

        - Past intermediate or salvage harvest generally reduced stand density to effectively thin the stand to allow more growing space for the leave trees while also favoring seral species. These actions can resemble a mixed severity fire by removing much of the small to medium size vegetation while favoring the overstory. Effects to various size classes were to maintain the stands progression towards maturity. Standing structure of dead trees would be less than with a wildfire since woody material was/is removed. Beginning in the late 1970s and early 1980s, emphasis was given to promoting seral species as understanding of forested ecosystems expanded.

        - Proposed salvage harvest on 2015 fire areas (See Appendix C of the EA) would address fuel loadings, species composition, size class distribution, ecosystem function and stand resiliency as well, adding to the overall positive effects on forest resiliency and fire suppression success.

    - Fuel reduction treatments: Fuel reduction treatments have been applied across the project area, primarily in areas in or near lands designated through County Wildfire Mitigation Plans as "wildland-urban interface" or their proximity to infrastructure and other values at risk. These fuel treatments have all sought to reduce potential fire behavior by reducing surface and ladder fuels, increasing canopy base height, decreasing stand density, and focusing on retention of early seral, fire-resilient species across the landscape. Several of these fuel treatments were tested by fire in the recent past and served as useful for fire managers because of the way fire behavior in those areas was reduced, or by providing access points for engagement. Unlike fuel breaks that were established as fire was actually encroaching within hours or days, these advance treatments provide fire managers time to plan and prepare for containment or control, rather than strictly react to emerging incidents.

    - Timber stand improvement activities: Pre-commercial thinning and tree pruning results in short-term increases to fuel loads and to fire hazard that last between 2-5 years. This length of time varies with how slash is treated in those units. However, long-term benefits include ensuring persistence of desired early-seral species on the site, and increase in growth and vigor of the residual stand. Long-term benefits last throughout the length of the stand rotation. The plantations begin to transition from Fuel Model 5 (Anderson 1983) to a Fuel Model 8 (Anderson 1982) as the saplings grow into pole-sized timber, and these activities hasten that growth and transition. The long-term effect of these activities is beneficial because overall fire-resilience of residual stands is increased. Potential fire behavior with regard to rate of spread, flame length, and associated severity would also decrease as those stands transition back to Fuel Model 8.

- Access: Administrative access, or roads administratively available for use, would not be changed by this project.

    - Effect of the road system on fuels management: An adequate road system allows reasonable access to fuel treatment areas, allows for a range of fuel treatment methods, and allows fuel treatments to be done at a lower cost than would be possible without a road system. Actual costs experienced on other similar fuel reduction projects show that costs can double, or even triple when road access has been removed because of the additional time and/or personnel needed to safely and effectively implement activities and meet objectives. When roads are absent or severely limited, options for economical fuel treatments are limited. In fact, some treatment options would be eliminated altogether because of the high economic costs and increased risk to personnel. If prescribed fire is the preferred method of fuel treatment, the possibility of escape of the prescribed fire can be higher when access is limited.

    - Effect of the road system on wildfire suppression: An adequate road system allows for fast, efficient and economical suppression of wildfires. When there is reasonable road access near a fire, initial attack of the fire can most often be done more quickly, engines and water tenders can be utilized to supply water instead of more expensive aerial resources, and firefighter safety is not compromised due to more difficult escape routes or need for medical evacuations that may occur in more inaccessible places. In general, fires can be put out faster, more cheaply, and more safely when there is reasonable road access.

- Effect of the road system on risk to firefighters and to public safety: Firefighters are at a higher risk when fighting fires in places without adequate road access. Escape routes may be more limited and evacuation when an injury occurs can be more difficult, dangerous, and time consuming than when there is ready road access. Also, fires with road access can most often be put out quickly, keeping the fires small. There is therefore a lower risk of more intense, dangerous crown fires that are more likely to develop the longer a fire remains uncontrolled.
- Intense, uncontrolled fires can also compromise public safety, such as when the public is recreating in the forest near where a fire is burning or when a fire is threatening private property. Open roads within the project area are suitable for high volume of emergency vehicles. However, traffic and parking can become congested, increasing the risk of collision or rollover. Heavy traffic on roads can also lead to poor visibility conditions from traffic-generated dust. Limited visibility due to smoke or dust results in more hazardous driving conditions; furthermore, increasing risks for firefighters.
- Contribution of the road system to airborne dust emissions: The amount of dust produced by road use is variable. The moisture content of the surface material, amount and type of vehicle use, the amount of silt and strength of the surface material (resistance to breaking down to smaller particle sizes) are contributing factors. Visibility problems and heavy concentrations of airborne particulates are generally short term due to wind dispersion. Typically, during logging operations Forest Service sales, watering of roads is a safety requirement if operations are to occur during dry weather.

Resource Indicator and Measure 1

The existing condition is a result of past activities and natural processes. While this project addresses roadside, administrative sites, and recreation sites, other projects will address the areas outside of the designated 200-foot average perimeter. Many trees were killed directly as a result of wildfire, and many more were intolerably stressed and will likely die over a period of several years. Secondary effects of these fires, including increases in insect and disease activity within the burnt stands of timber will continue to increase, resulting in ongoing threats to human safety and safe access (Project Scoping Letter, 2015).

Because of the small scale of this project relative to the cumulative effects analysis area, the proposed action is likely to have localized impact across the cumulative effects analysis area, but because it focuses on reducing risk on our road network, it could have the effect of saving time during the risk management process for wildland fire managers and decision-makers because of the known pre-treated fuels in those areas. Additionally, there may be some incremental effect on encouraging composition changes to more fire resilient species, which may increase the area's overall resiliency. Forests are in a constant state of flux, and succession is continually moving vegetative conditions either toward or away from the range of desired conditions. This would be true for portions of the project area that are not being treated under the proposed action. There would not be any additional effects to the treatment of fuels or to air quality because of present or reasonably foreseeable Forest Service actions beyond what was discussed above.

C. Fuels Summary

Implementation of the proposed action would have favorable consequences for the fuels resource because of the removal of the overhead hazard adjacent to and within falling distance of the road systems being addressed. Additionally, potential fire behavior would be reduced post-treatment as the fuel characteristics would be favorably modified as recommended (Brown, and others 2003; Graham, and others 2004; Peterson, and others 2015; Dunn and Bailey, 2015; Coppoletta, and others pre-print, 2015). Roadside fuel characteristics would be addressed post-felling operations, based on predicted fire behavior

given those particular loadings. Design criteria identified through this project apply to fuel treatments. The design criteria are worded in such a way that they adequately allow land managers to address both fuel characteristics of concern and safety concerns on ingress/egress routes as well as other resource concerns.

Table F-9. Summary comparison of how the alternatives address the purpose and need.

Resource Element	Resource Indicator	Measure	Existing Condition	Alternative 1 No Action	Alternative 2 Proposed Action
Safe Roads	Roads Maintained	Miles of Roads Maintained	~266 affected miles within the project area	Zero (0) miles of maintenance would occur	~133 miles of maintenance would occur

3.4 Recreation

3.4.1 Affected Environment

3.4.1.1 Existing Conditions

A. Roads

A majority of the proposed work for this project will be along mid-slope roads in coniferous habitat between 2000ft -5500ft elevation, with a few exceptions for ridgetop or valley bottom locations. While each of the locations identified in this project was affected by the 2015 fires, fire severity ranged from low, to high, in different locations. Areas designated for hazard tree mitigation and/or commercial removal include approximately 133 miles of road, most if it along secondary roads systems which are gravel or native surface roads. These roads, in conjunction with the larger system of roads on Forest system lands, comprise a valued recreational asset, as they serve both as entertainment for those who enjoy scenic driving, and as access routes connecting visitors to valued recreation locations.

Off Highway Vehicle (OHV) use, on both the road and trails systems is a popular recreation activity across both Forests. Motorized access on roads and trails is managed according to travel management direction developed by each Forest, per the 2005 Off Highway Vehicle Rule, listing the locations, use types and seasons that specific roads and trails are open for motorized use. Snowpack and aspect also play a role in roaded access, as most roads are not plowed in the winter months, but become accessible by non-snow going machines, as snowmelt occurs.

B. Trails

Approximately 140 miles of trail in the project areas were affected by the fires in 2015. In the context of this project, summary trail mileage data included all potential trail miles on NFS lands within the twenty two fire perimeters. The mix of fire severity across the project areas means that damage to trails from burned drainage features, roots and trailside vegetation also varies significantly. These trails service an array of different recreationists, ranging from: single track, non-motorized trails, used by hikers and stockmen, to motorized, two-track trails used by OHV riders pursuing a variety of recreational activities.

C. Non-Motorized Recreation

The Forests offer a full range of non-motorized recreation opportunities including opportunities to pick berries and mushrooms, collect firewood, hunt for shed antlers and live animals, fish, swim, hike, ride horses, float the rivers and enjoy the scenery. While the 2015 fires will have an admitted effect on where some of these activities take place into the future, they did not eliminate any of the opportunities listed above.

D. Camping and Recreation Facilities

As camping frequently coincides with an array of other recreational activities on the Forests, it is most popular during the temperate months in Idaho, between Memorial and Labor Day weekends. During this period, fee campsites are at a premium on holiday weekends and a variety of recreationists compete throughout the summer and fall for dispersed sites, primarily along roaded, river corridors.

Although the exact number of affected dispersed campsites in the project area is unknown, across the Forests, dispersed sites far outnumber developed, fee sites. These locations range from small roadside turnouts, large enough for only one vehicle, to large pull out /landing areas with only natural landforms or vegetative patterns to guide or limit parking configurations. Some of these locations provide an occasional fire ring or toilet, but most do not. Dispersed site collection data from inventories conducted

between 2009 and 2011 across the Forests indicate that of the inventoried dispersed sites, 629 were located less than 300ft from live water sources. While inventory efforts were not completed for every dispersed site on the Forests, they do provide a snapshot showing the popularity of these locations and their frequency along roaded, river corridors. Anecdotal evidence suggests that local residents have a tendency to use dispersed sites more frequently than fee sites, because dispersed sites more easily accommodate the combination of camper trailers and OHV equipment that local visitors are increasingly likely bring with them. National Visitor Use Monitoring (NVUM) Data from 2010 shows that 43 percent of overnight visitors camped in an undeveloped site and 35 percent stayed at developed campgrounds on the Nez Perce National Forest. On the Clearwater National Forest, 21 percent of visitors stayed at undeveloped campsites versus 52 percent that stayed at developed campgrounds. Many visitors across the Forest also exhibit a strong sense of place, returning annually to camp at and visit favorite locations. After Labor Day, the number of camping visitors drops off somewhat, as children return to school and use shifts more toward activities associated with hunting and fishing.

Spring use is largely dependent on water and snow levels. Challenging river conditions and Class 4 and 5 rapids draw in a mix of boating enthusiasts who camp at fee and dispersed, roadside sites starting in March along the lower elevation, river corridors. The Salmon River, Selway River, and Lochsa are the most popular whitewater rivers, drawing early spring use to the Forests. Lingering snowpack on north aspects can limit access and visitation across road and trail corridors in many locations well into June or early July, focusing visitors into a smaller selection of campsites at lower elevations.

Including trailheads, trails, bulletin boards, picnic areas, toilets, and developed campgrounds, over 47 administrative/recreation sites were affected by fires assessed in this project. However, most hazard trees in and around fee sites and other high use recreation sites that experienced fire effects in 2015, were either felled during fire operations or immediately thereafter to mitigate imminent risks to visitors. Of the 47 impacted sites, the nine sites identified for potential treatment in this project are summarized in Table Rec-2. These are sites outside of special area designations, where initial mitigation actions were not taken, where there was concern about indirect mortality from stressed and fire damaged trees, or where an accumulation of previously felled hazard trees were left blocking recreational access. Administrative/Recreation sites that fell within special area designations, including those in wilderness areas, wild and scenic river corridors, or historic trail corridors were considered outside the scope of this project.

E. Hunting and Outfitters

Hunting, with and without outfitter and guide services, is a popular activity, bringing an influx of local and out-of-state hunters to the Forests. Big game availability varies significantly by hunting units across the Forests and as a result, hunting pressure on different animals and at different seasons is inconsistent across the project areas. Although a majority of the outfitters permitted to operate on the Nez Perce-Clearwater National Forests offer big game hunting services, most have diversified their offerings to incorporate a percentage of non-hunting/fishing activities, and a few exist solely on non-hunting related services.

Idaho's distinctly separate approach toward granting outfitter license areas means that each outfitter operates in a specific operating area without competition from other outfitters; this does not exclude private hunters from outfitted areas. Fourteen different outfitters were affected by fires in the project areas, including both land and water based business operations. Most of these businesses experienced fire in only a portion of their overall operating area, but a few were impacted across a broader acreage. Even those whose areas were not directly affected by fire, did experience effects to their businesses from the fire as smoke, burned acres, and the Forests closure period. .

F. Winter Recreation

Both motorized and non-motorized winter recreation opportunities are available in the project areas, but snowmobiling is the most popular winter use on the Forests. Active snowmobile groups on all of the recreation zones assist or partake in the groomed snowmobile systems which pass though road segments in the following nine fire perimeters included in this project; Boulder, Snowy Summit, Pete Forks, Musselshell, Fourbit Cr., Walde-Mystery, Snow, Baldy, and Noble. A groomed route also passes immediately adjacent to the Mex fire area on Road #468. Road #362 in the Jay Point area another favorite and frequently used ungroomed route. With the exception of the Noble, Woodrat and Jay Point fires, the project areas are relatively removed from residential settings, making access solely by non-motorized means an unlikely prospect during the winter months. While grooming efforts are dependent upon adequate snow accumulation, the grooming season typically runs from late November or early December through March, across the Forests. Localized use of ungroomed areas in higher elevations may continue for another few months.

G. Special Land Designations

Wild and Scenic River Corridors:

In the analysis area, both the Salmon and Selway Rivers, on the Nez Perce Forest are designated within the Wild and Scenic River classification system. The Teepee Springs fire did burn across the Salmon River, but the fire did not reach east into the segment of river classified in the wild and scenic system. The portion of Road #1614, running adjacent to the Salmon River, in the fire affected area (outside the classified river corridor) was included for assessment in the project. Both the Slide and Wash fires burned into portions of the wild and scenic river corridor along the Selway River. Road #223, which runs along approximately 19 miles of the Selway River, was removed from the scope of this project because of the wild and scenic river corridor classification. Areas affected by the Slide and Wash fires that were outside of the wild and scenic river corridor were included in the project assessment.

Wilderness

While fires in 2015 did occur in the Selway-Bitterroot, Frank Church River of No Return and the Gospel Hump wilderness areas on the Forests, this project only considered roadside fire affected locations outside of wilderness boundaries. With that filter in place, Road #486 bordering the northwest side of the Frank Church Wilderness, which burned in the Crown fire, was initially reviewed, but because of historic considerations related to the Magruder Corridor, work in that area was deferred for later assessment, and considered outside the scope of this project. The table below provides context for the fires assessed by this project, which crossed into designated Wilderness areas.

Table Rec-1. Fires Assessed for the Roadside, Administrative and Recreation Site Maintenance Project that Burned Within Designated Wilderness Areas

Fire Name	Wilderness Area	Location
Crown*	Frank Church River of No Return Wilderness	Spanned both sides of NW wilderness boundary (* fire area dropped from this project per coarse filter review)
Slide	Selway Bitterroot Wilderness	Eastern edge of fire burned approx. 1.5 miles into western side of Wilderness along the Selway River
Wash	Selway Bitterroot Wilderness	Eastern edge of fire burned approx. .5 miles into western side of Wilderness along the Selway River

Research Natural Areas

The Fourbit Research Natural Area on the Clearwater National Forest was affected by portions of the Fourbit Cr. fire on the Motorway South complex in 2015. Initially, the entire area within the fire perimeter was included for assessment, but after analysis, segments of road within the fire perimeter that fell into either the Fourbit RNA or the national historic trail corridor were removed from the scope of this project. No other RNAs were identified as coinciding with the fire areas assessed for this project.

National Historic Trails:

Both the Nee Me Poo and the Lewis and Clark trails are designated in the National Historic Trail system. Portions of the 2015 fires burned through both of these trail corridors. Road segments that coincided with both a fire perimeter and a historic trail corridor were considered outside of the scope of the project due to the special considerations necessary for areas with this type of classification.

3.4.2 Environmental Consequences

The Roadside, Administrative and Recreation Site Maintenance Project identified two project alternatives, the first being No Action and the second the Proposed Action. This section discusses the direct, indirect and cumulative impacts associated with each alternative.

3.4.2.1 Alternative 1- No Action

A. Direct and Indirect Effects

Motorized and non-Motorized Recreation

Without treatment, recreational access in the project's roaded settings would be markedly reduced, and in some cases effectively closed, as fire affected trees fall across and block road systems and drainage structures. If no management actions are taken, given the number of the fire affected roads across the Forests, the potential for protracted accumulation of downed material across road systems, will substantially increase the long-term deferred road maintenance workload. Potential road deterioration resulting from blocked culverts and ditches could lead to erosion and possible road failures on a large scale. There is also concern about the potential for development of unauthorized/ pioneered routes and subsequent resource impacts, which may result from private citizens attempting to cut their way through, or travel around, blocked roadways to reach popular destinations. In addition to these considerations, if no action is taken, visitors would encounter a roaded, recreational setting with increased risk to safety from hazard trees and unsafe road conditions.

Trailheads intersecting fire affected roads would also be affected by deteriorating or impassable road conditions, under the "No Action" alternative. Similar to the road system, the deferred trail maintenance workload would increase if trailheads were inaccessible, resulting in the potential loss of up to 87 miles of system trails, affecting both single and double track trail users.

While the No Action alternative would make access to the project areas more challenging it would not affect the *variety* of non-motorized recreational pursuits available to visitors in these areas. Fire effects and vegetation succession will determine where many recreational past times are available for the next 10-20 years. For example, the loss of brush fields and understory cover will reduce opportunities to pick huckleberries in the project areas. Conversely, mushroom picking opportunities are more likely recently burned areas, as spores activate in exposed soils. Successional growth of brush and saplings will improved browse availability over time, indirectly affecting wildlife populations and thus hunting opportunities.

Camping

The number of fee campgrounds and the number of fee sites open to visitors will not change regardless of the chosen alternative. Efforts to protect fee campgrounds during the fires resulted primarily in fire effects around the perimeters of campgrounds, with retention of green canopy cover within the campgrounds. Hazard tree felling at most of these locations, both during and immediately after the fires, mitigated immediate risks and all fee campgrounds are scheduled to be open for the 2016 season. While visitors may notice a slight change in the feel or character of campground, due to felled hazard trees and fire scars, only a few campsites may be inaccessible due to felled hazard trees or associated brush that is yet to be removed from the sites. If the No Action alternative is selected, felled trees will be cut up by recreation staff for campground fire wood and brush will be burned onsite, as conditions allow.

With regard to dispersed campsites, selection of the no action alternative would result in many of the burned, dispersed sites along roadsides being inaccessible due either to standing or fallen roadside hazard trees. Because the majority of these sites are in close proximity to road systems, felling of dead and down material by visitors, for firewood, would likely restore access to the most popular dispersed sites within a 5 year window, assuming road access was restored.

Winter Recreation

Under the No-Action alternative, snowmobile use could be negatively impacted by a potential decrease in the number of miles of groomed snowmobile trails. Groomed routes rely heavily on maintained road prisms. Failure to maintain open road systems by removing downed trees during non-winter months could result in a shorter grooming window, as a deeper base of snowpack may be needed to cover downed trees before groomers were able to start their operations. Additional time spent by groomers to clear downed trees from the groomed corridor, could also reduce the amount of time spent on grooming, thus reducing the number of groomed miles available to snowmobilers, as well as skiers and snowshoers, who also utilize groomed routes.

Neither alternative would greatly affect opportunities for cross country, winter activities on ungroomed snowpack. However, the locations available for winter recreation on ungroomed sites will vary since locations access via road corridors would be less available, while new areas may become available in locations where fires removed vegetative cover that would have otherwise precluded over-the-snow travel.

B. Summary of Effects for Alternative 1

The “No Action Alternative” would result in a reduction of safe road access on approximately 133 miles of road, which would subsequently impact recreational access to associated trailheads, trails, and dispersed camping opportunities, as well as decrease the number of miles of groomed snowmobile trails. The deferred recreation facility maintenance workload would increase, but the extent of the impact to all recreation resources is not clearly definable, due to the inconsistent fire effects and related resource impacts across the project area.

Developed, fee camping opportunities would not change as a result of the “No Action” alternative. The range of recreation opportunities available would not change either, although participation at specific locations would change, both due to the fires’ direct impact on vegetation and resource availability, as well as the indirect impacts from delayed maintenance and deterioration of road systems.

3.4.2.2 Alternative 2- Proposed Action

In order to “provide safe and unimpeded access along and near National Forest System roads, administrative facilities and recreation sites,” (Project Initiation Letter 2015) five different management actions were proposed in the project area. Not all actions were recommended in all locations; actions are

dependent upon site conditions and regulatory limitations, and are prescribed for specific locations along designated routes. Proposed management actions include:

- Maintenance of roads, trails, signage and recreation or administrative sites, to repair or replace infrastructure damaged as a result of fire;
- Hazard tree mitigation (felling) along identified road segments;
- Commercial timber removal of felled hazard trees, in specifically identified locations, meeting prescriptive parameters for harvest;
- Fuels reduction, where fuel loading poses a hazard to access on existing travel routes, and
- Reforestation efforts (site prep and tree planting) in areas where stocking levels are insufficient.

A. Direct and Indirect Effects

Motorized and non-Motorized Recreation

The proposed actions will mitigate risk from roadside hazard trees and maintain existing recreational access along approximately 133 miles of fire affected, Forest system roads in the project areas. Implementation may have a brief impact on recreational road and trailhead access along short segments of road within fire affected areas, while equipment is conducting road maintenance and while hazard trees are being felled or loaded for removal. Because the proposed work is focused along relatively short, discontinuous road segments (ranging from .1 to no more than 7 continuous road miles) in any one fire area, minor traffic delays or detours are anticipated instead of closure periods. Fuels reduction work and reforestation efforts, because they are activities conducted outside the road prism, are unlikely to impact recreational access. The project does not propose any new road or temporary road construction, and all gated roads will remain closed during implementation (Project Design Feature # 15), so no change in the miles of accessible road available for recreation use is anticipated, as a result of this project.

Haul routes will all coincide with potential recreation access routes however, no road closures were proposed that would exclude public or logging truck access. In the interest of quickly removing these hazards for public safety, and recouping a compensation for the timber value while it is still merchantable, it was determined that day or time restrictions would not be placed on haul routes, to facilitate timely completion of the work. The disjointed locations that make up the project areas means that many different haul routes will be used to reach the different project areas. In the Wash fire area, south of the Selway River and outside of the wild and scenic river corridor, haul routes would exit via a southerly access route to avoid impact to traffic along the Selway River corridor. Public notification of haul routes is standard and per contract requirements, all haul routes will be visibly signed to increase public awareness about the potential for encountering log trucks on Forest road systems (Design Feature #13).

Per contract requirements, facilities, such as trailheads, that intersect with contract work are required to be maintained and protected during operations. The three trailheads that were identified as needing mitigation efforts included Trail #35 Blacklead, Trail #100 Footrot Corral, and Trail #585 Bat Cr. (Table Rec-2). None of these trailheads experience heavy user traffic; all are single track trails, where motorized use is prohibited year-round. Implementation of management actions will have only a short term impact on trail access during hazard tree felling efforts. During this time, it is feasible the trailheads could be closed for 3-5 days, but no long-term effects to trailhead access are foreseeable.

Of the approximate 140 miles of fire affected trail identified in the project area, only 87.7 miles of trail were identified for proposed trail maintenance and potential brushing treatment. The difference in reported miles vs miles proposed for trail maintenance activities for this project are a result of the following determinations:

- Trails identified as Snow-trails were not included in trail miles, as most groomed routes coincide with identified road corridors, where road maintenance activities may apply.
- Trails in the fire perimeters that fell into areas with special designations, such as Wilderness, National Historic Trail corridors were removed from the scope of this project.
- Two segments of trail identified in the Little Green and Wolf fire perimeters were dropped from the project because no road maintenance or other management activity was proposed in these areas, and the trail components were short, isolated segments (1.56 and .51 miles, respectively).
- Trails identified with "TROAD" designations that were not being actively managed as a trails, prior to the fires were dropped from the mileage summary. These segments, are occasionally still identified as roads, may be overgrown and impassable, are short dead end segments, or are just not actively managed by either the road or trail programs.

Trail maintenance efforts on the 87 miles of fire affected trails in this project should not have a noticeable impact on trail access. Visitors are routinely permitted to utilize trails while maintenance is being conducted. Trail crews take safety precautions in their immediate work locations, and if visitors cannot safely bypass trail hazards in the crew's vicinity, the crews will request short traffic delays, in order clear or repair hazards, thus ensuring safe passage.

Similar to the No Action Alternative, the range of non-motorized recreation activities available in an area will not be altered by the Proposed Action. Rather, effects from the 2015 fires on vegetative succession will be the factor most influential in determining where people choose to participate in non-motorized recreation opportunities such as: hunting, berry picking and collection of mushrooms, antlers, or firewood. The majority of hazard tree felling, along the 30 miles of road where the "drop and leave" prescription is proposed, is scheduled to be performed by hand crews, to minimize ground disturbance and impacts to recreational use. The Proposed Action will affect non-motorized, recreation opportunities primarily by restoring both road and trail access routes that support these forms of recreation.

Camping

Similar to the No Action alternative, the Proposed Action will not alter the number of fee campgrounds or fee sites available to visitors. An initial hazard tree assessment was conducted after the 2015 fires at both Slim's Camp, a non-fee campground, and Selway Falls Campground, a fee site. Felled trees at these locations are slotted to be removed in the Falls Point Deck Sale. Managers intend to assess the sites again in the spring of 2016 to ensure the remaining canopy is not showing signs of indirect stresses caused by the fires. Both of these sites were affected by the Wash fire, and are located outside of the wild and scenic river corridor.

Spring Bar Campground is also a fee site, located along the Salmon River, outside of the wild and scenic corridor. Similar to the campgrounds identified in the Wash Fire, initial hazard tree mitigation was conducted immediately after the fires in the fall of 2015. Felled hazard trees in this location are slotted for removal in the Tepee Deck Sale. A follow up assessment has been requested for this site to ensure canopy health. Should any remaining hazard trees be identified for felling, they could be removed from the site in conjunction with loads hauled from the Tepee Roadside work conducted in other areas of the Tepee Fire. Work completed at this site may require brief closure at specific campsites while timber is loaded for removal, but closures are anticipated to be less than two days during implementation and the sites would otherwise be closed until firewood rounds and brush could be removed, if the No Action Alternative was chosen instead.

In addition to the three campgrounds and three trailheads identified for treatment, a wooden dispersed toilet site affected by the Pete Forks fire, the Allison Creek Picnic area affected by the Teepee fire, and the Indian Hill Lookout, affected by the Wash fire, were also identified in the project as

Administrative/Recreation sites needing hazard tree mitigation. Each site and its prescribed treatment is described in Table Rec-2.

Winter Recreation

The Proposed Action has two potential, but different, temporal effects on groomed snowmobiling opportunities. During implementation of hazard tree removal, a period of up to two years, possibly including two winter seasons, the use of winter haul routes that coincide with groomed snowmobile trails may reduce the overall number of groomed trail miles. Project Design Features require contractors to coordinate with recreation managers and groomer boards to cooperatively discuss which routes will be impacted, where alternate snowmobile trailhead parking can be plowed, and how plowed haul routes will may affect grooming operations. Because of the number of groomed loop opportunities on both Forests, it is generally easier to identify an alternative route for groomed snowmobile use, than it is to identify alternate, cost efficient, routes for log hauling. As such, groomed mileage may be temporarily reduced or location of alternate routes may result in a slight change in groomed mileage.

Potential key roads where haul routes and snowmobile grooming are most likely to coincide, if winter log hauling is initiated, include roads: #100, #101, #103, #104, #250, #284, #362, #421, #443, #464, #468, #500, #514, #519, #520, #535, #547, #595, #1190, and #5173. The total number of miles of groomed trail that could be affected in any given winter is unknown at this time.

Once project implementation is complete, the Proposed Action will benefit winter snowmobile users by maintaining 133 miles of existing road prisms. Maintained road systems contribute to the availability of groomed trail miles, as well as offer opportunities for ungroomed winter access to Forest visitors.

The Proposed Action poses no known impacts to non-motorized, cross country, winter recreation activities. With the exception of short term impacts to groomed access points discussed above, non-motorized winter recreation opportunities would remain unchanged.

Table Rec-2. Summary of roadside administrative and recreation sites where hazard tree mitigation and /or tree removal is proposed.

Zone	Fire Name	Site Type	Site Name	Site Description/ Proposed work
CZ	Boulder	Trailhead	TR #35	Intersection of Tr. #35 w/ Rd #595: Conduct hazard tree mitigation consistent w/ proposed roadside treatment (Drop & Leave)
CZ	Snowy Summit	Trailhead	TR#100	Intersection of Tr. #100 w/ Rd #535: Conduct hazard tree mitigation consistent w/ proposed roadside treatment (Removal)
CZ	Pete Forks	Wooden Toilet	Pete Forks Toilet	Dispersed site, older wooden toilet: Conduct hazard tree mitigation consistent w/ proposed roadside treatment (Removal)
CZ	Wash	Fee Campground	Selway Falls CG	Six delineated campsites w/ picnic table & fire rings and concrete toilet. Hazard trees above site initially felled in Fall 2015 for pick up w/ Falls Point Deck Sale. Reassess tree conditions- if necessary fell additional identified hazards.
CZ	Wash	Non Fee Campground	Slim's Camp	Semi Developed site w/ 3 campsites w/fire rings, concrete toilet, hitch rails and 2 concrete stock feeders-primarily used as outfitter parking location: Hazard trees above site initially felled in fall 2015 for pick up w/ Falls Point Deck Sale. Reassess tree conditions- fell additional identified hazards.

Zone	Fire Name	Site Type	Site Name	Site Description/ Proposed work
CZ	Wash	Lookout	Indian Hill LO	Lookout along Rd #290: Conduct hazard tree mitigation consistent w/ proposed roadside treatment (Drop & Leave)
SZ	Noble	Wooden Toilet & Trailhead	TR #585	Intersection of TR#585 w/ Rd #421: Conduct hazard tree assessment and mitigation (Drop & Leave or Remove, if trees are merchantable and can be added to loads exiting Road #421).
SZ	Tepee Springs	Fee Campground & Boat Launch	Spring Bar CG & Boat Launch	18 Rec Sites open year-round for $12/night. Site has picnic tables, fire rings, 5 toilets, & asphalt roads. Initial hazard tree felling conducted in the fall of 2015 with planned removal as part of the Tepee Deck Sale. Reassess tree conditions- if necessary, fell additional identified hazards. Remove trees in association with other loads in the vicinity. Estimate 2-3 loads, depending ongoing identified mortality.
SZ	Tepee Springs	Picnic Area	Allison Cr. Picnic Area	Day Use Picnic Area with 1 toilet, non-fee site. Conduct hazard tree assessment and if felling is required, remove material in conjunction with either Tepee Decks or Spring Bar loads. Estimate 2-3 trees.
Note:	OHV and Snowmobile routes that run concurrently on road segments were not considered separate Admin/Rec sites and not listed above			

B. Summary of Effects for Alternative 2- Proposed Action

Alternative 2, the proposed action, would have the following effects on the Recreation and Trail resources.

Approximately 133 miles of road and 87 miles of trail would be maintained for safe visitor access. Although no road or trail closures are proposed in the action, maintenance efforts are anticipated to have some short term, temporary effects on visitor access, primarily in the form of travel delays, as equipment is used to load logs and conduct road maintenance. The road maintenance work and log hauling will increase the number of traffic interactions on some Forest roads.

Developed campgrounds will not be affected by either alternative. In the long term, dispersed camping opportunities will increase, as roadside hazards and downed trees are removed from these locations. However, specific dispersed sites may be unavailable to the public for short periods of time if field crews conducting maintenance choose to camp near their work sites. Such occurrences are more likely in remote locations, where daily commutes are impractical, but specific locations have not been identified to date.

In the short term, the number of miles of groomed snowmobile routes could be affected, until winter log hauling is complete. In the long term, upon project completion, the number of groomed miles would increase, as maintenance efforts retain road prisms used for groomed snowmobile routes.

Management actions proposed for Alternative 2 are directly linked to fire affected locations that are outside of areas with special land designations, including Wilderness, Wild and Scenic River Corridors, National Historic Trails and Research Natural Areas. These locations were removed from the scope of this project during initial fire perimeter assessments, so implementation of actions identified in Alternative 2 should no effect on lands with these special designations.

C. Cumulative Effects

Cumulative Effects Analysis Area

Because the proposed actions are focused on reducing risk and providing safe conditions for humans through the maintenance of roads, trails, administrative and recreation sites, recreational access was determined to be the most significant factor influencing selection of the cumulative effects area. Analysis focused on projects that intersected with the 22 fire perimeters reviewed, as well as projects that propose use of primary access roads leading to or beyond the fire perimeters assessed for the Roadside, Administrative and Recreation Site Maintenance Project.

Temporal Scope

The temporal scope of the analysis included a window of 10 years from initial project implementation, as all proposed management activities for this project that could affect recreational access would be completed. While reforestation efforts could persist into a 10 year window, it is highly unlikely that planting efforts would in any way restrict access to authorized recreational pursuits. After a 10 year period, vegetation should have recovered sufficiently to reclaim soils disturbed either by the 2015 fires or by harvest operations, in areas identified for hazard tree removal.

Past, Present, and Foreseeable Actions

Travel routes, whether in the form of foot trails used by native peoples or two track wagon roads built by early settlers, are key components influencing the development and use of lands throughout history. On the Nez Perce-Clearwater National Forests, the earliest two track roads started as wagon routes providing access between settlements in the late 1890s, with incremental development into the early 1920s. As automobiles gained popularity and affordability, road systems continued to develop. By the 1950s and 1960s road systems expanded exponentially on the Forests to accommodate timber harvest and fire management activities (Laven 1991). Today, visitors capitalize on many of these same access corridors, with the majority of recreation use on the Forests now occurring on, or directly adjacent to, existing road systems.

While recreational pursuits draw a large contingent of visitors to the Forests, local communities have long relied on access to forest resources to support or supplement their livelihood. The Nez Perce have origin stories in what is now Idaho County, and their traditional use areas span across Idaho into Washington, Oregon and Montana. The Forests also have rich histories of mining, grazing, logging and fire events that shaped the culture and economy of local communities that exist today.

A review of recent and proposed management projects that intersect with the Roadside, Administrative and Recreation Site Maintenance project includes a broad range resource management actions that have the potential to impact recreational opportunities in some locations. Projects include issuance of grazing, outfitting and special use permits, as well as restoration, stewardship and harvest efforts. With the increase in front-country fires in the last few years, there is a swell in proposed salvage and fuels reduction projects in the next two year period. A list of the projects reviewed for overlap with the assessed fire perimeters and access routes is included in Appendix C.

With regard to the recreation resource, the direct cumulative impact of these projects will be an increased amount of traffic for the next few years on a selection of primary forest travel routes used by recreationists. Increased road traffic, primarily due to hauling from two or more projects will be most substantial on the following Forest roads: **#100, #101**, **#103**, #221, #222, #223, **#250**, #252, **#421**, **#443**, #486, **#500, #520, #535**, #542, **#547, #595**, **#1190**, #1614, **#5173**, #5503.

Road numbers that are underlined above, indicate routes where hauling is proposed for five or more projects, identified in the cumulative impacts analysis. While all proposed projects using a specific haul route may not be active during the same season or year, Appendix C. Identifies implementation of most

projects in a three year window, through 2019. Because most forest roads in question are gravel surface roads that can just accommodate the width of two passenger vehicles, increased interactions with large sized vehicles, is bound to have an effect on visitors travelling for recreational purposes that may not be altogether positive. On the flip side, roads used as haul routes will receive increased maintenance which will benefit recreationists in the longer term.

From the list of roads provided above, those road numbers in **bold** indicate haul roads that may coincide with groomed winter snowmobile routes, should winter hauling be authorized. As previously noted, seasonal conditions can affect the timing of haul activities and the extent to which hauling will affect the number of miles of groomed snowmobile routes is yet unknown.

Since most of the projects reviewed for cumulative effects address fire affected areas, there is no anticipated effect from these projects on existing, developed camping opportunities. With regard to dispersed camping opportunities and non-motorized recreational pursuits, it is anticipated that fire effects and subsequent revegetation will have a greater impact in the next five years on where recreationists choose to pursue their interests, than will project implementation.

3.5 Soils

Introduction

The soils analysis covers the refined project area and mitigations outlined in the Decision Notice. The analysis does not use the original analysis area reflected in Chapter 2 of the Environmental Assessment.

The purpose of this project is to provide safe and unimpeded access along and near National Forest System roads, administrative facilities and recreation sites. The project is needed to maintain the routes, administrative facilities, and trailheads which were damaged by wildland fire.

Issues

One of the issues highlighted by public comment concerns the importance of including potential impacts to soil quality, particularly increased erosion from post-fire hazard tree removal. The Soil Resource report characterizes the existing condition of the post-fire environment and outlines risks from the project to soil quality in addition to measures the project would use to reduce these risks.

Resource Indicators and Measures

Table S-1. Resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure (Quantify if possible)
Soil Quality	Soil Productivity	DSD Rating: based on Project Area (acres and percent) with highest impacts from past timber harvest and highest burn severity
Soil Stability	Potential for surface erosion and mass wasting	Acres of proposed project on soils characterized by high erosion potential and on landtypes with higher risk of mass failures

Relevant Laws, Regulations, and Policy

Regulatory Framework

National Forest Management Act (NFMA) 1976.

NFMA requires that management "…will not produce substantial and permanent impairment of the productivity of the land" (16 USC 1604(g)(3)(C). The NFMA guidelines "insure that timber will be harvested from NFS lands only where soil, slope, or other watershed conditions will not be irreversibly damaged (16 USC 1604(g)(3)(E)(i)).

The Clearwater Forest Plan (Clearwater FP, (USDA 1987a) and Nez Perce Forest Plan (Nez Perce FP, USDA 1987b), as amended, guide all natural resource management activities by providing a foundation and framework of standards and guidelines for National system lands administered by the Forests. This proposed action responds to the goals and objectives outlined in these Forest Plans, and helps move the project area towards desired conditions described in these plans for safe and effective transportation systems (Clearwater FP, II-3; Nez Perce FP, II-1, 2). Forest-wide management direction relevant to this project is summarized below.

The Clearwater Forest Plan standards related to soils listed on page II-33 of the Plan.

- Manage activities on lands with ash caps such that bulk densities on at least 85 percent of the area remain at or below 0.9 gram/cubic centimeters.
- Design resource management activities to maintain soil productivity and minimize erosion.
- The field verification of the harvest on landtypes characterized by high incidence of mass failure.

The Nez Perce Forest Plan standards related to soils listed on page II-22 of the Plan.

- Evaluate the potential for soil displacement, compaction, puddling, mass wasting, and soil erosion from ground-disturbing activities.
- A minimum of 80 percent of an Activity Area shall not be detrimentally compacted, displaced, or puddled upon completion of activities.
- Maintain sufficient ground cover to minimize rill erosion and sloughing on road cut and fill slopes and sheet erosion on other Activity Areas.

Regional guidance on soil management is provided in the Region 1 Forest Service Manual Chapter 2550 Soil Management Supplement 2500-2014-1:

- The supplement updates and clarifies the previous soil quality supplement (FSM 2500-99-1) based on recent research and collective experience. The manual outlines analysis standards that address basic elements for the soil resource: (1) soil productivity (including soil loss, porosity; and organic matter), and (2) soil hydrologic function.
- Soil quality standards apply to lands managed for productivity purposes. The standards do not apply to areas managed for administrative uses such as forest administrative sites and system roads, including the road prism.
- The detrimental soil disturbance described in this analysis does not necessarily result in substantial and permanent impairment. Detrimental soil damage is reversible if chemical, biological, and physical soil processes are in place and time is allowed for recovery.

Federal, State, and Local Laws, Regulations, and Policy

The following Federal and State laws and regulations pertaining to the management of soil resources would be applied to the project:

- FSM 2500 Watershed and Air Management – Washington Office (WO) Amendments 2500-2010-1 (USDA 2010) and 2500-2010-2 and Northern Region (R1) Supplement 2500-14-1 (Regional Soil Quality Standards, USDA 2014)
- Soil and Water Conservation Practices (SWCPs) Handbook - FSH 2509.22 (USDA 1988)
- Idaho Forestry Best Management Practices (BMPs)
- Idaho Forest Practices Act (1974)

Methodology

The analysis uses soil disturbance criteria to evaluate potential long term impairment to soil productivity and compliance with Forest Plan standards. The analysis uses an approach of characterizing risk at a coarse level using spatial analysis of geographic information and supplementing field data for fine level analysis where the coarse filter identifies potential issues with soil quality. Field observations of soil

condition were made during fall 2015 in the Boulder, Wash and Teepee Springs Fire Areas during two weeks of October and during June 2016 for Woodrat.

Soil disturbance thresholds address impairments by land management activities such as timber harvest using measures of the extent and degree of disturbance. Detrimental soil disturbance (DSD) is a standard measure used to evaluate the impact of these management actions whereby long-term reductions in soil productivity could occur. Detrimental disturbance is defined by indications of erosion, compaction, displacement, rutting, severe burning, loss of organic matter, and soil mass movement. (USDA 2014). The Region 1 Soil Quality Guidelines establish a 15 percent areal extent threshold above which soil impairment is plausible. Cumulative effects from past harvest disturbance, mainly skidroads, and the recent effects of the wildfire are considered in this determination. If existing soil condition values exceed 15 percent DSD, then the net effect of the project with remediation should leave the site in an improved condition. For the Nez Perce portion of the forest, the Forest Plan dictates that the net effect of past and proposed action should not exceed 20 percent.

Initially, levels of detrimental soil disturbance were estimated using a GIS-generated analysis of past management activities and BAER reports detailing burn severity to estimate areas where soil disturbance from the proposed activities would be highest. Forest stand database queries were conducted to identify past harvest method and type in addition to the time since harvest. Research and monitoring has concluded the method of harvest as the most important control on the level of impact to soils, where ground-based methods caused on average five times more disturbance than cable-based methods (Archer 2008, Clayton et al. 1987, Clayton 1990, Tepp 2002, Sullivan 1988, Reeves et al. 2011).

This spatial analysis provided a coarse-screen to identify locations where the existing DSD has the potential to exceed Forest Plan allowed thresholds of disturbance. The coarse risk assessment identified road segments in the Woodrat, Teepee Springs, and Wash Fire areas as having the highest risk where removal of hazard trees could impact soil quality. In these areas, field data was collected to determine existing DSD during several days during June 2016.

The DSD assessments used the Regional Soil Monitoring Protocol (FSDMP) to calculate existing disturbance (Page-Dumroese et al. 2009). Soils analysis typically use harvest unit areas to determine percentage disturbance. For this project, the proposed treatment areas do not have distinct harvest unit boundaries. DSD analysis also concentrated on areas where the project plans to remove hazard trees using mechanical equipment since these actions have the highest potential to affect soil condition. The analysis calculated the activity areas by adding lower and upper boundaries outside the road prism and the length of road where hazard tree would be removed. Disturbance intensities were reported by road name and fire. These treatment corridors consist of narrow strips that may extent from road prism to 200 feet on the upside and down to 100 feet below the road. Road prisms were not included in DSD determinations since system roads are not part of the productive landbase; rather, system roads are part of the permanent transportation system.

Existing Detrimental Soil Disturbance was inferred for wildfire areas Baldy, Boulder, Snow Creek, Snowy Summit, Woodrat and Wash based on assumptions of type of harvest and time since harvest using professional judgment, forest monitoring and research (Archer 2008, Clayton 1990, Reeves et al. 2011). For these past harvest areas, skid trails can account for a wide range of the unit area depending on operator efficacy and yarding type. For this analysis, a current condition of 20 percent DSD was assumed unless field information was available. These existing conditions relied on available information in the forest service activity tracking systems (FACTS) database. The predictions were also rectified using high resolution imagery from the National Agriculture Imagery Program (NAIP).

During planning, the soil specialist worked with the Interdisciplinary Team to mitigate project impacts with emphasis where risk was highest for soil damage. Management actions were planned to keep

detrimental soil disturbance below thresholds that indicate potential long term soil impairment. The analysis results accounts for these mitigations.

To evaluate the potential for proposed roadside tree removal to diminish soil stability, we calculated the percent of the roadside corridor with moderate and high erosion potential based on the soil type for each fire area. In addition, we determined whether activities would occur on landtypes rated as landside prone. Proposed actions on soil and/or landtypes classified as landslide prone were field verified. Areas with field verified landslide prone terrain were dropped from proposed hazard tree removal activities.

Information Sources

Information from the Burned Area Emergency Response (BAER) assessments of the 2015 wildfires were used to develop the existing condition and cumulative effects evaluation (see Boulder Fire Burned Area Report, Jay Point Burned Area Report, Motorway Burned Area Report, Woodrat Burned Area Report, Wash Burned Area Report, and Teepee Springs Burned Area Report). The forest service assesses post fire hazard to critical values and proposes response treatments in these Burned Area Reports. The reports include information on post fire runoff response, erosion hazard and fire severity.

Field information was gained through project assessment and through support of the post fire response. The project soil specialist was a member of the BAER teams for the Wash, Woodrat, Boulder, and Jay Point Fires and conducted extensive field visits to these areas. Data collected from field crews surveying road condition and tree mortality helped provide a description of the field condition of roadsides proposed for treatment. In addition, the NEPA ID team completed a driving tour of some of the road segments in Teepee Springs Fire area and other road segments within the Motorway Complex Fires. Field soil conditions surveys were completed in the Teepee Springs and Woodrat Fire perimeters to provide detailed information on DSD.

Incomplete and Unavailable Information

Two fires, Deadwood in the South Fork Clearwater Basin and Lost Hat in the Clearwater Basin have no remote sensing derived soil burn severity data. Based on field reconnaissance in both areas, fire effects in Deadwood were modeled as low severity and Lost Hat was modeled at a moderate severity fire.

Spatial and Temporal Context for Effects Analysis

The Roadside project extends Forest wide and includes roads within 22 fire perimeters. Within the fire perimeters, 133 miles of forest roads have proposed roadside maintenance, including 69 miles of commercial tree removal and 64 miles where trees will be felled and left on site. The Soil Resource Report focuses on the 69 miles where hazard tree removal requires commercial methods.

Spatial Boundaries: Because productivity effects are spatially static and productivity in one location does not influence productivity elsewhere, this analysis identifies road segment corridors with the highest risk of potential soil disturbance from hazard tree removal and related fuels reduction activities. Analysis uses spatial aggregations based on soil type, fire burn severity and past harvest to evaluate DSD against compliance thresholds for DSD intensity.

Temporal Boundaries: The areas proposed for roadside treatment all burned during the 2015 fire season. The 2015 fires created the most significant impact to the watershed resources along the roads proposed for treatment; however, fully describing existing condition necessitates including the impacts of previous management activities and previous fires. Compaction, displacement, mass soil movement (i.e. landslides) and other detrimental soil impacts due to past year's or proposed activities can take several decades to dissipate to the point where recovery of productivity has occurred. Previous management activities that may influence soil resources include previous fires and timber harvest during the last 20 years. Projected DSD effects consider the soil condition by project completion, typically 3 years.

3.5.1 Affected Environment

3.5.1.1 Desired Condition

Maintain high quality water, watersheds, soil resources, and riparian areas in a condition that meets or exceeds State and Federal standards. The Clearwater NF Forest Plan has a desired condition that soil productivity will be maintained (USDA 1987a, p. II-17). The Nez Perce Forest Plan desires management to maintain soil productivity and minimize soil erosion through the application of BMPs, careful riparian area management, use of fish/water quality drainage objectives, and soil and water resource improvement projects (p. II-5).

3.5.1.2 Existing Condition

In 2015, wildfires occurred on every district of the Forest. The fires reduced forest canopy and depending on the intensity, bared soil of groundcover. Soil burn severity categorizes the degree the fire affects the ground surface including loss of the forest floor, surface vegetation, and downed wood. Where fire burned with high soil burn severity, nearly all the pre-fire surface organic matter was consumed and charring of roots is visible (Parsons et al. 2010). Essentially, the ground is bare of either litter or vegetation cover. Where the fire burns with moderate burn severity, up to 80 percent of the surface organic matter may be consumed but typically much more surface cover remains including charred reductions of forest floor. Low severity has mixed mosaic of groundcover with green vegetation evident in parts.

The wildfires generally resulted in moderate and low burn severity conditions (see BAER reports in project file for Motorway North, Wash, Woodrat, Slide, Teepee Springs, Elk city Complex, Boulder, and Jaypoint Fires). High severity conditions ranged from 3-10 percent across the fire perimeters. Within the proposed roadside treatments, the burn severity averaged 3 and 40 percent high and moderate burn severity respectively. Wash and Teepee Springs fire had high rates of high and moderate burn severity from slope effects and wind driven fire conditions. Observations of the ground conditions showed that existing condition was most influenced by wildfire with only minor effects found related to past timber harvest. However, the field surveys in Teepee Springs project area showed high rates of soil disturbance evident from past harvest.

3.5.2 Environmental Consequences

3.5.2.1 Alternative 1 – No Action

No adverse effects to the soil resource would occur from not implementing hazard tree removal. Natural recovery would continue as soils stabilize and vegetate. Trees killed by wildfire would fall to the ground over time and decompose, increasing the ability of soil to retain moisture and grow vegetation. As vegetation regrows woody debris would continue to decompose, adding needed organics and soil wood that increases the soil ability to hold water for plant and soil processes. Microbial activity would increase, which would facilitate decomposition and nutrient cycling. Building a forest floor litter layer would retain nutrients for soil processes and decrease erosion incidence in this post fire environment. Typically, erosion risk decreases substantially within three years after fire.

3.5.2.2 Alternative 2 – Proposed Action

Project Design Features and Mitigation Measures

1. Directionally fell trees to facilitate efficient removal along pre-designated yarding patterns with the least number of passes and the least amount of disturbed area.

Anticipated Effectiveness: Reducing off-road equipment usage on slopes is a highly effective way to reduce the effects of harvesting trees on watershed resources. Research studies analyzing post-fire harvest effects on watershed resources show that slopes compacted by equipment, roads, and skid trails contribute the majority of management caused erosion (Smith et al. 2011, McIver and McNeil 2006, Stabenow et al. 2006, Johnson and Beschta 1980). Minimizing the use of equipment on slopes will greatly reduce soil displacement, compaction, and erosion.

2. In areas with continuous slopes exceeding 35 percent, cable/winch endlining would be used to yard the logs up or down to forest roads. Machinery would remain on the roads except where landings currently exist.

Anticipated Effectiveness: Eliminating construction of skid trails and prescribing cable/winch endlining yarding methods for tree removal on slopes greater than 35 percent will significantly reduce erosion, particularly on granitic and ash cap soils (McGreer 1981, Kidd 1963). Changing logging method from tractor to cable system reduces soil disturbance by 8-20 percent, logging systems that switch from tractor to skyline reduce disturbance by 20 percent (Forest Data and Archer 2008).

3. Limit operating periods to avoid saturated soils and prevent resource damage (indicators include excessive rutting, soil displacement and erosion). Coordination between the Sale Administrator and Forest Soil Specialists would take place in the event of observed rutting or soil displacement to determine if the damage is excessive or is approaching noncompliance with Regional Soil Quality standards. Typically, rutting deeper than 4 inches indicates the potential excessive damage to the soil resource.

Anticipated Effectiveness: Saturated soils (close to or at field capacity) are more susceptible to compaction than drier soils (Alexander and Poff 1985, Adams and Froehlich 1981, Moehring and Rawls 1970). An early research study suggests that on saturated soils one pass with harvest equipment is machine is equal to four passes when soils are dry (Steinbrenner and Gessel 1955). Limiting operating periods on saturated soils will reduce the impact of tree removal on both watershed and soil resources. From Gerhardt et al. (1991), "Soil moisture limitations can reduce surface disturbance. The degree of effectiveness will vary depending on the type of equipment, soil characteristics, and administration of the restriction. Effectiveness will also be dependent on the ability to accurately determine when conditions become too sensitive to operate machinery. In general, this measure is expected to be effective in reducing puddling and displacement. It is not as effective in reducing compaction of volcanic ash influenced soils."

4. Limit Tractor crossings over ditchlines where possible. As needed, install temporary culverts (or crossing logs) to limit damage to ditchlines at tractor crossings. Post-harvest, reconstruct ditch crossings, cut slopes, and fill slopes to standard. Timber Sale Contract Standard Provisions B6.6.

Anticipated Effectiveness: Most road associated sedimentation results from inadequate road drainage (Gucinski 2001). Repairing and installing adequate drainage will be highly effective at reducing sedimentation from project activities.

5. No removal of trees would occur in default RHCAs, as defined in PACFISH and INFISH (300 feet on either side of fish-bearing streams; 150' on non-fish bearing perennial streams and wetlands > 1 acre; and 100' on intermittent streams, wetlands < 1 acre, landslides, and field verified landslide prone areas); and on average slope gradients greater than 60 percent. Unit layout would include reference to the USFWS draft wetlands inventory map to ensure potential RHCAs are reviewed and buffered appropriately. Although hazard trees may be felled in RHCAs, they would be left on site. Where accumulations of fine fuels (<=3" in diameter) exist or would result from hazard tree felling, these fuels could be manipulated and removed (through

lopping, chipping, and/or hand manipulation) from RHCAs to the extent that RMOs are maintained and transmission of fine sediment to stream channels (see Measure 12) is minimized or prevented; intentional prescription burning would not be used in default RHCAs to reduce fuel loading. In addition, bucking of larger stems to lengths of 15 feet or more could also be performed in RHCAs to the extent that current and future woody debris levels are achieved and maintained. No yarding of material would occur across RHCAs.

Anticipated Effectiveness: Protecting RHCAs and avoiding removal of trees in verified landslide prone areas will be highly effective at limiting management caused sedimentation (either through surface erosion or mass wasting) and loss of soils from the slopes.

6. Contractor shall maintain all equipment operating within the project area in good repair and free of abnormal leakage of lubricants, fuel, coolants, and hydraulic fluid. Contractor shall not service tractors, trucks, or other equipment on National Forest lands where servicing is likely to result in pollution to soil or water. Purchaser shall furnish oil-absorbing mats for use under all stationary equipment or equipment being serviced to prevent leaking or spilled petroleum-based products from contaminating soil and water resources. Contractor shall remove from National Forest lands all contaminated soil, vegetation, debris, vehicle oil filters (drained of free-flowing oil), batteries, oily rags, and waste oil resulting from use, servicing, repair, or abandonment of equipment. Timber Sale Contract Standard Provision B6.34

Anticipated Effectiveness: Requiring Contractors to maintain equipment and ensure containment of any fluids used during standard equipment service and/or containment in the advent of accidental spills is a highly effective method for protecting soil and water from pollutants.

7. Locate and design skid trails, landings and yarding corridors prior to harvest activities to minimize the area of detrimental soil effects. Space tractor skid trails a minimum of 80 feet apart, except where converging on landings, and reuse existing skid trails where practicable, to reduce the area of detrimental soil disturbance. This does not preclude the use of feller bunchers if soil impacts can remain within standards. If forwarder operations are used, a slash mat at least 4" thick would be placed on skid trails.

Anticipated Effectiveness: Re-using existing skid trails, reducing the number of passes on skid trails, and limiting the area covered by skid trails will significantly reduce compaction and related erosion in areas of tree removal (Froehlich et al 1985, McGreer 1981, Haupt and Kidd 1965).

8. Recontour excavated skid trails and landings to restore slope hydrology and soil productivity. The use of excavated skid trails and landings will be minimized. Where skid trails and landings are constructed on moderate to severely burned slopes, construction will occur only during a period when soils are not saturated and recontouring and replacement of at least 50 percent cover will occur immediately after use.

Anticipated Effectiveness: Recontouring skid trails on unburned soils is effective for increasing infiltration capacity and reducing runoff (Foltz et al. 2007) and covering rehabilitated trails with at least 50 percent slash cover will reduce potential surface erosion from trails by up to 90 percent (Wade et al. 2012, Foltz et al. 2009). However, on moderately burned ash-cap soils the potential for damage remains high and successful rehabilitation depends on many site specific and climate factors such as remaining understory species, woody debris left on the slope amount of soil displacement, and antecedent soil moisture. Even with this design criteria in place on the skid trail locations, future soil productivity may be slow to recover on these skid trails (Jennings et al 2012; Page-Dumroese et al 2006; Beschta et al 2004; Brais et al. 2000).

9. Scarify non-excavated skid trails and landings that are compacted or entrenched 3 inches or more. Scarify to a depth of 6 to 14 inches but avoid bringing up unfavorable subsoil material. Coarse woody debris would be placed on scarified surfaces.

Anticipated Effectiveness: Highly effective as described in Design Criteria #8.

10. Retain 7-33 tons per acre of coarse woody debris (greater than or equal to 8 inches in diameter) following completion of activities. Drier Sites would retain 7 to 12 tons per acre and moister sites would retain 12-33 tons per acre of coarse woody debris (Graham et al. 1994).

Anticipated Effectiveness: Retaining coarse woody debris will be effective for not only ensuring long-term productivity of the soil, but will also significantly reduce surface erosion as described in low to moderate intensity rainfalls (Robichaud et al 2008).

11. In units with high burn severity, trees would be processed on-site and activity generated slash (tops and limbs) scattered on site to add organic material and reduce surface erosion sufficiently to ensure the coarse woody debris guidelines above are met.

Anticipated Effectiveness: Retaining finer woody debris material is highly effective for maintaining soil productivity and will reduce potential surface erosion from burned slopes dramatically reducing the potential for erosion and possible sedimentation into streams. (Foltz et al 2009).

12. In harvest units adjacent to high fire severity/intensity-affected RHCAs, default RHCA buffer widths would be increased, as needed, to protect RMOs, minimize sediment and maintain function of the RHCA.

Anticipated Effectiveness: Extending a zone of more limited maintenance treatments around moderate to severely burned RHCA areas will ensure reduced erosion into stream channels and the adjacent forest roads from more damaged slopes.

38. Restrict activities within Prescription Watersheds on the Wash and Tepee Springs Fires to only permitting removal activities along maintenance level II-V roads (no removal on maintenance level 1, closed roads). On the Wash fire, restrict removal operations to only permit equipment on the existing road(s) adjacent to Idaho Roadless Areas to limit total disturbed areas.

Anticipated Effectiveness: Reducing total acres of impact for the Wash and Teepee Springs Fires would greatly reduce potential impact to the Soil Resource. Equipment use restrictions would mitigate soil disturbance hazard on poor soils where erosion hazard is high from high and moderate burn severity, and where slopes have steep gradients. Reducing soil disturbance retains protective groundcover that buffers against storm flow that can remove productive topsoil.

Direct and Indirect Effects - Alternative 2

The project proposes to address hazard trees along 133 miles of road across 22 wildfire areas. The project has two distinct prescriptions: drop and leave along 63.9 miles of road and commercial removal along 69.2 miles of road. The drop and leave treatment would not cause adverse effects to soils since no ground based logging equipment would be used. Detrimental soil disturbance is not expected to result from this treatment. The retention of organic matter on the site would conserve groundcover and enable natural soil recovery after wildfire.

The commercial removal would produce soil disturbance and thus this analysis focuses on these effects. The commercial removal would be most prominent in nine fire areas (see Chapter 1) where commercial activities apply to areas greater than an acre. The proposed action limits hazard tree removal to harvesting dead or imminently dead trees along roadside corridors. The methods of tree removal would

vary depending on slope and soil condition. Planned removal would use ground based mechanical methods on 544 acres, ground cable systems on 534 acres and roadside reach methods on 502 acres.

Soil Quality

This analysis uses disturbance criteria as a proxy for soil productivity. Soil disturbance criteria are put in terms of soil quality. Soil function and properties can be affected by ground disturbing activities such as timber harvest and fire. Compaction, displacement, rutting, severe burning, surface erosion, loss of surface organic matter, and soil mass movements can all reduce soil productivity. Surface soil loss through displacement and mixing with infertile substrata has long lasting consequences for soil productivity. This occurs during excavation of skid trails and landings, and displacement of soils during ground based harvest or dragging of trees in cable yarding. Some of the areas proposed for treatment have ash derived soils; the loss of the ash layer reduces water holding capacity and high quality tree rooting material. Since volcanic ash is not easily replaced, these effects may be very long lasting. Areas where the 2015 wildfires resulted in moderately and high severity burns to the soil would be most vulnerable to exceeding soil quality standards as a result of proposed activities.

Wildfire affects soil condition by removing above ground biomass, affecting the assemblage of plant and soil community for soil biological function and also altering the soil ability to infiltrate precipitation and hold moisture (Hart et al. 2005, Neary et al. 1999). The magnitude of these effects may be portrayed by burn severity. High burn severity results in the greatest loss of soil cover and changes to the immediate soil and plant community as the fire has pushed the environment to early successional stage. The impact of the project in the post wildfire environment would be most severe where machinery could compact soils within areas of high burn severity. The equipment can set back plant recovery and impair surface soils that further resists plant and soil recovery. The project addresses these impacts by minimizing the extent of soil impairment and remediating skid trails where compaction most severe.

Table S-2 outlines the extent of ground based harvest on moderate and high severity fire area. Across the project area, roughly 26 acres has ground based harvest on high severity fire. The largest extent is 13.8 acres on the Wash fire at the top of the ridge along FS Road 9720. All other extents with fire areas are less than 6 acres. The Snowy summit and Pete Forks fires have the highest amount of ground based harvest on moderate severity fire at 44.4 and 18.0 acres respectively. The total amount across all fires for moderate severity is 70 acres. Moderate severity fire areas have slightly less risk to impair soil from commercial activities since a greater amount of charred duff and litter cover soils when compared to areas burned at high severity.

Table S-2. Area of commercial harvest removal method and soil burn severity (SBS).

Fire	Ground-based Proposed Removal (acres)	Cable-based Proposed Removal (acres)	Ground-Based on SBS Mod (acres)	Ground- Based SBS High (acres)
Baldy	20.4	17.0	0.4	0
Boulder	1.7	6.8	1.3	0.2
Fourbit Creek	57.6	46.0	0.7	1.4
Musselshell Creek	40.5	34.8	0.2	0
Pete Forks	83.0	42.1	18.0	2.3
Snow Creek	7.5	86.7	0.7	0
Snowy Summit	257.3	118.6	44.4	5.7
Wash	18.6	15.1	1.6	13.8
Woodrat	57.38	166.5	2.9	2.7
Total	544.0	533.6	70.2	26.1

The following removal methods are listed as highest to lowest risk for creating soil disturbance; ground based, cable based and removal from the road. These removal methods have lower disturbance when yarding commercial timber can suspend logs off the ground. The roadside reach method would have mostly full suspension yarding and thus creates minimal detrimental soil disturbance (<1 percent DSD). The cable methods would have full to partial suspension and forest monitoring shows these methods result in an average 4 percent DSD. Ground based measures vary by operator efficacy and site conditions. This project mitigates against environmental conditions that create high rates of disturbance by limiting risk factors. Ground based yarding would result in an estimated 10 percent DSD. Table S-3 outlines the predicted DSD from the project depending on the mix of cable, ground based and restricted road removal harvesting. The reported values highlight commercial harvest since the drop and leave prescriptions would not have measurable adverse effects to soil quality. Table S-2 shows the mix of cable and ground based harvest to explain predicted DSD values.

All reported values account for project mitigation. Mitigation limits ground based machinery to slopes less than 35 percent (PDF 2), avoids ground based operation when soils compact easily during wet conditions (PDF 3), and avoids yarding across sensitive soil types including soils in RHCAs and landslide prone areas (PDF 5). The project also mitigates ground based yarding effects by requiring approved skid trail layout prior to harvest (PDF 7) and felling trees toward the road that would reduce yarding distance (PDF 1).

Soil damage from the harvest operations require a level of remediation. Excavated skid trails and landing construction away from the road prism removes soils. Though these features are not expected widely across the project, we plan to recontour and leave these excavated areas with at least 50 percent groundcover to stabilize soils. The remediation would be done for landings and excavated skid trails within moderate or high severity burn areas (see PDF 8).

The project would remediate non-excavated skid trails that have severe compaction and rutting (PDF 9). Soils generally recover naturally unless the damage is extensive. Tradeoffs of remediation include soil mixing and creating a wider disturbance footprint than the initial damaged soil area. For cases where natural recovery would be minimal, skid trails would be scarified to a depth of 6 to 14 inches to hasten soil recovery. The scarification would improve soil infiltration.

Table S-3. Detrimental soil disturbance for existing condition, treatments and cumulative effects.

Fire	Road #/ acres	Existing DSD % adjacent to Road Prism	Proposed Action DSD %	Cumulative DSD%	Mitigations and site conditions	Area Affected (acres)
Baldy	FS464	0	10	10	None – treatment outside of high burn severity	36.5
Boulder	FS595	5	10	15	No Roadside Removal on high burn severity. Field visits show rapid vegetation recovery with good ground cover of moderate and low severity burns.	8.5
Jay Point	FS362	7	0	7	Restricts equipment to road. Eliminates steep slope hazard.	76.2
Musselshell	FS535	2	0	2	Restricts road treatments near ridgetops and dropped hazard tree removal along portions of the road corridor that are outside the influence of the road prism.	75.3
Pete Forks	FS104	2	10	12	Dropped high soil hazard areas. Remaining treatment area has excellent soil coverage from litter and revegetation post-fire.	125.1
Snow Creek	FS252	-	6	6	None – treatment outside of high burn severity	94.3
Snowy Summit	FS104	5	10	15	Dropped high soil hazard areas. Remaining treatment area has excellent soil coverage from litter and revegetation post-fire.	375.9
Fourbit	FS5109	0	4	4	Dropped high soil hazard areas to avoid high soil burn severity fire areas.	103.6
Woodrat	FS101	7	5	12	Standard equipment limitation.	57.6
	FS5503	7	4	11	Field verified DSD measures.	143.5
	FS418	5	10	15	Field verified DSD measures.	22.7
Wash	FS443	10	0	11	Restricts equipment to road. Eliminates steep slope hazard. Good recovery conditions.	364.8
	FS9720	5	7	12	Standard equipment limitation.	33.7
Teepee Springs	FS263, FS221	10-20	0	20	Restricts equipment to road. Limits disturbance where high severity fire and past harvest soil damage.	61.0

Fire	Road #/ acres	Existing DSD % adjacent to Road Prism	Proposed Action DSD %	Cumulative DSD%	Mitigations and site conditions	Area Affected (acres)
Total						1,580.0

Fuels Reduction Direct Effects

The proposed fuels work would mitigate fuels hazard from the treatments where dropping and leaving harvest trees (3,443 acres) and hazard tree removal using mechanical methods (1,580 acres). A range of options were proposed for the roadside work to reduce fuels since conditions can be highly variable when accounting for existing vegetation, the effects of the burn and hazard tree removal. The treatments are outlined in the fuels report and vary by burn severity and type of hazard tree reduction.

Fuels reduction treatments can reduce ground cover, create erosion from loss of cover and soil disturbed from machine piling of fuels, in addition to having high severity burning where fuels piles burn. The center of burn piles can be severe enough to alter soil structure, reduce nutrients where soils and vegetation recover very slowly over time. Where commercial activities are planned to remove hazard trees using ground based equipment, roughly 544 acres across all the project affected wildfires, the treatment with the highest probable impacts includes machine piling of fuels. Table S-3 accounts for the effects of the fuel treatments in the soil disturbance calculations. Typically, post-treatment soil monitoring shows an increase of one percent DSD from fuel piling, although estimates are difficult since post-treatment monitoring includes effects from timber harvest and fuels treatments.

Prescribed burning would be done using a mix of low and moderate severity to reduce fuels further than what the fire left. It is assumed this burning would be in unburned and low severity burned areas of the wildfire. The prescribed burning would result in local areas of reduced soil cover where heavy fuels burn for longer duration and severity.

The other forms of fuels treatment involve reducing the fuel load by either spreading the load and lowering the fuels profile (lop and scatter, jackpot burning, chipping, bucking), piling fuel and burning, or removing using mechanical means. Of these methods, pile burning likely has the greatest impact to soils by creating long duration burning towards the center of the burn piles. The effect is moderated by the smallness of the piles and typically does not amount to measurable effects above 1 percent DSD depending on the site characteristics, the pile sizes, number of piles and time of burning. Cool weather conditions and snow covered conditions result in the heat from pile burning not penetrating as deep into the ground.

The fuels treatments can affect soils by altering the biomass that contributes towards soil processes. Organic matter contributes sugars and nutrients for soil organisms while also sheltering soil to optimize growing conditions. Coarse wood benefits soils with microsites that can ameliorate moisture. This conditioning can be key on soils burned with high severity on warm aspect sites on lower elevations. The project addresses this concern by leaving tops and limbs where planned harvest of hazard trees on high severity burn areas (131 acres, PDF 11). The project would balance fuels and soil productivity concerns by retaining coarse woody debris from 7 to 33 tons per acres, where available on site and depending on habitat type (PDF 10). Coarse woody debris for this project was defined as downed wood on the ground with 8 inches in diameter or greater.

Cumulative Effects – Alternative 2

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects

Analysis

Soil Stability

The post fire environment has the highest hazard for soil erosion and mass failure in the first years after the fire since the fire changes vegetation structure and slope runoff response (Wonzell and King 2003). The hazard decreases over time as vegetation returns and soils stabilize. Hazard is linked to steep slopes with high soil burn severities where the loss of soil cover and vegetation overstory increases saturated soil conditions prone to failure. Debris flows, a type of mass failure, develop in colluvial hollows along slopes where the concave slope shape focuses water. Commonly, slope concavities have high hazard since these areas concentrate runoff from upslope contributing areas. Rainfall intensity and successional rain storms create the trigger that saturates soils and produces landslides.

Mass failures result in loss of productive soils on hillslopes and potential loss of road infrastructure. Implementing the project during the post-fire period as slopes stabilize increases the chance for project activity to increase the probability of landslides. The limited treatment area of hillsides adjacent to the road (200 feet upslope and 100 feet downslope of roads) results in low risk of project related activities to trigger mass failures since the swath of affected area covers a small cross section of hillslope. The project affects landslide hazard by potentially concentrating runoff on skid trails used to move hazard trees to the roadway. The concentrated runoff can saturate soil materials and road base, creating a hazard for failure. The project also affects landslide hazard by altering the remaining tree canopy and soil cover. Remaining trees provide some level of dispersion of rainfall. Project activities can increase groundcover through breakage of branches.

The potential impacts from project activities increase along switch-backed roads where the project affects a larger portion of hillslopes. Highest risk of mass failures are where commercial hazard tree removal activities occur along unstable ground with steep slopes and high burn severity.

Potential benefits of the project to mitigate slope stability would be clearing trees and slope material from road side ditches that would otherwise risk road and subsequent slope failure. Removal of tree boles also lowers the risk for tree tip that loosens and displaces soils.

Based on the soil and land type risk mapping, the roadsides which burned in the following three fires have the highest risk for landslides and localized soil sloughing: Teepee Springs, Wash, and Woodrat. Initial coarse filter analysis of the project showed the landslide prone extent in these fire areas as: Teepee Springs (579 acres), Wash (110 acres) and Woodrat (162 acres). All other fires had less than 50 acres of landslide prone. The analysis used ratings from the Nez Perce and Clearwater land type layers (Green 1987, Wilson et al. 1983) together with slope classes from a digital elevation model to assess risk.

The project addresses landslide risk by excluding commercial removal on field verified landslide prone soils and not removing trees on adjacent slopes greater than 60 percent slope (PDF 5). In initial assessments, 1,455 acres were either dropped from the proposal or modified to not include commercial removal of hazard trees. The project plans to use a fine scale approach that relies on field observation during implementation to identify signs of LSP hazard and exclude from commercial removal. If identified, the adjoining area would be buffered per RHCA direction and the prescription switched to Drop and Leave (PDF #5). Wash and Jay point fire areas had considerable changes to account for these existing hazard of either high erosion or landslide hazard. The project would limit commercial removal of hazard trees by keeping equipment to the road for Wash on 359 acres and Jay Point on 76.1 acres. These changes would limit the project's interference with natural soil recovery on the unstable soil areas.

Past Harvest Effects

The planned hazard tree removal harvest overlaps with past regeneration and thinning projects where soils could have poor conditions. Prescriptions that could interfere with soil recovery would occur where mechanized removal overlaps with areas severely impacted from log skidding. The drop and leave and

removal from road only prescriptions would not have cumulative effects since either groundcover would be increased or the soil disturbance would be less than 1 percent DSD. Field information was used when available to detail existing soil condition. Table S-3 summarizes predicted cumulative effects based on site assessment and GIS analysis.

Past harvest skidding and temporary road building leave impacts that impair soil condition over long periods of time; these soil impairments are readily visible over three decades after the impact since soils are excavated, compacted or displaced. Past cutting practices left a larger disturbance footprint than contemporary practices because of greater use of bull dozers to yard trees and pile slash along with higher levels of site preparation for tree planting. The major travel-ways take the longest to recover. Dozer piling of slash became less common during the middle 1990s. These older timber practices left soil severe soil disturbance in excess of 20 percent (Clayton et al. 1987, Clayton 1990) while contemporary practices average 10 percent for ground based harvest (Archer 2008, Reeves et al. 2011). Table S-4 details the extent of past harvest in the project area. The data was based on a query of forest service activity tracking systems (FACTS). The database showed only minimal harvest over the past 25 years within the proposed roadside hazard removal. The fire areas with the most overlap include Woodrat (43 acres), Musselshell Creek (23 acres) and Fourbit Creek (22 acres).

The project analysis did not find the project would adversely affect soils condition despite these past conditions (see Table S-3). Fire areas Boulder (8.5 acres), Woodrat along FS 418 (10.2 acres) and Snowy Summit along FS 104 (346.2 acres) had predicted rates of 15 percent cumulative soil disturbance. Over 15 percent, and the project has the potential to adversely affect long term soil productivity. The project mitigates against this hazard by avoiding hazard tree removal on high burn severity slopes within the Boulder fire area. Field examination found the soils to have robust regrowth potential. For Woodrat, the project would mitigate soil impairment by minimizing soil disturbance from machine traffic (PDF 1, PDF 2). The project dropped high soil hazard areas from mechanical hazard tree reduction on Snowy Summit fire. These soils also have robust growing conditions to recover.

Table S-4. Past timber harvest and burn within planned hazard tree removal.

Fire Name	Activity	Removal Acres	1970s	1980s	1990s	2000s	2010s
Fourbit Creek	Regen	97.4	4.8	13.7	8.8	0.0	0.0
Fourbit Creek	Thin	97.4	0.0	0.0	12.8	0.0	0.0
Fourbit Creek	Burn	97.4	0.0	1.2	0.0	0.0	0.0
Musselshell Creek	Regen	64.9	1.8	0.9	2.7	8.2	0.0
Musselshell Creek	Thin	64.9	0.0	8.1	0.0	12.1	0.0
Musselshell Creek	Burn	64.9	0.0	0.0	0.0	4.8	0.0
Pete Forks	Regen	123.3	0.0	2.5	0.0	4.0	0.0
Pete Forks	Thin	123.3	0.0	5.6	0.0	0.0	0.0
Snow Creek	Regen	66.2	7.2	24.2	10.0	0.0	0.0
Snowy Summit	Regen	346.2	1.7	0.4	6.5	0.0	0.0
Wash	Regen	34.5	0.0	11.0	0.0	0.0	0.0
Woodrat	Regen	186.4	0.0	34.1	17.7	0.0	0.0
Woodrat	Thin	186.4	0.0	0.0	22.6	0.0	2.9
Woodrat	Burn	186.4	0.0	0.0	0.0	1.2	9.6

Concurrent with the proposed Roadside Maintenance project are adjacent salvage harvest within Jay Point (private), Fourbit, Lost hat, Musseslshell, Mystery, Yoosa, Snowy Summit, and Woodrat fire perimeters.

The salvage would not overlap in space, but would occur within the same timeframe on adjacent ground. Two entries for timber removal would not occur. The adjacent salvage timber harvest totals 2,147 acres. No adverse cumulative effects would occur to soils since the projects would not treat the same ground.

Compliance with LRMP and Other Relevant Laws, Regulations, Policies and Plans

Table S-10. Clearwater National Forest-Forest Plan Compliance

Standard	Compliance
Manage activities on lands with ash caps such that bulk densities on at least 85 percent of the area remain at or below 0.9 gram/cubic centimeters.	Project design and mitigation measures to minimize soil erosion, compaction and displacement.
Design resource management activities to maintain soil productivity and minimize erosion.	Design and mitigation measures to maintain or improve soil productivity and stability were developed throughout this project.
Minimum coordinating requirements on land types with high or very high mass stability or parent material erosion hazard ratings are: •The field verification of the mapped unit and predicted hazard rating. •Review road locations using a team consisting of an engineering geologist, hydrologist, soil scientist, and a silviculturist. Assess concerns and possible mitigation measures to determine if a geotechnical investigation is needed •After the "P" line has been located, stake mitigating road designs, using the original ID team members and road designer.	Field verification for units with high mass wasting potential will occur prior to project implementation.
Review silvicultural prescriptions and unit locations on landtype 50 (old slump) to determine whether vegetation removal may contribute to slope instability.	Landtype 50 occurs in Woodrat Fire, but not along road segments proposed for treatment.

Table S-11. Nez Perce National Forest-Forest Plan Compliance

Standard Number	Subject Summary	Compliance
1	Evaluate the potential for soil displacement, compaction, puddling, mass wasting, and surface soil erosion from ground-disturbing activities.	Landtypes were identification and evaluated for soil disturbance hazard. Project analyzed the potential for past and current project to create soil disturbance. Landslide hazard has both preliminary analysis and future exclusion during preparation for implementation of the project.
2	A minimum of 80% of an Activity Area shall not be detrimentally compacted, displaced, or puddled upon completion of activities.	The project evaluated the potential for DSD and found that all activity areas not exceed this standard. Design criteria mitigate soil disturbance hazard to meet this standard.
3	Maintain sufficient ground cover to minimize rill erosion and sloughing on road cut and fill slopes and sheet erosion on other Activity Areas.	Project design criteria were developed to minimize erosion by leaving both Coarse Woody Debris and logging slash as mulch.

3.6 Hydrology

Introduction

The proposed actions will remove dead or dying hazard trees from roadside corridors affected by the 2015 Wildfires. In addition, project related activities may include conducting routine maintenance on road prisms and treatment of fuels where hazard tree removal actions generate excess logging debris and slash. Project activities will require the use of mechanized logging equipment outside of the road prisms to remove the trees from burned slopes, and in some cases to pile logging debris for burning. Equipment used to complete routine road prism maintenance will remain within the road prism.

Relevant Laws, Regulations, and Policy

Regulatory Framework

Land and Resource Management Plan

The Nez Perce Forest Plan (Nez Perce FP) and Clearwater Forest Plan (Clearwater FP), as amended, guide all natural resource management activities by providing a foundation and framework of standards and guidelines for National system lands administered by the Forests. This proposed action responds to the goals and objectives outlined in these Forest Plans, and helps move the project area towards desired conditions described in these plans for safe and effective transportation systems (Clearwater FP II-3; Nez Perce FP II-1, 2). Forest wide management direction relevant to this project is summarized below.

The Nez Perce National Forest Plan (page II-2) direction states the following goals:

- Maintain or enhance stream channel stability and favorable conditions for water flow.
- Provide water of sufficient quality to meet or exceed Idaho State Water Quality Standards and local and downstream beneficial uses.
- Protect or enhance riparian-dependent resource

The Clearwater Forest Plan (page II-3) direction states the following goals:

- Manage watersheds, soil resources, and streams to maintain high quality water that meets or exceeds State and Federal water quality standards, and to protect all beneficial uses of the water, which include fisheries, water-based recreation, and public water supplies.
- Insure that soil productivity is maintained and no irreversible damage occurs to soil and water resources from Forest management activities.(Forest Plan, page II-3)

The Standards for each Forest Plan as they relate to water resources is presented later in this report.

PACFISH/PACFISH

On February 24, 1995, the Chief of the Forest Service amended the Nez Perce and Clearwater National Forests Plans and thirteen other Forest Plans in order to implement an interim strategy for managing anadromous fish-producing watersheds on National Forest lands. This direction replaces existing conflicting Forest Plan direction in all cases except where existing Forest Plan direction provides more protection for anadromous fish habitat. On the Nez Perce National Forest, the plan was amendment #20 and on the Clearwater the amendment was #15. These amendments also include direction for restoration opportunities and cooperation with other agencies and individuals. PACFISH/INFISH default buffer widths exceed state best management practice standards.

Forest Plan Stipulation Agreement

Litigation on the Clearwater Forest Plan resulted in a Stipulation Agreement (The Wilderness Society, et al., v. F. Dale Robertson, et al., Stipulation of Dismissal (Civil No. 93-0043-S-HLR), Sept. 1993) that discusses what type of activities the Forest could proceed with and under what conditions. The Agreement states "The Forest Service agrees to proceed only with those projects that would result in no measurable increase in sediment production in drainages currently not meeting Forest Plan standards."

Federal Law

Clean Water Act

The Clean Water Act stipulates that states are to adopt water quality standards. Included in these standards are provisions for identifying beneficial uses, establishing the status of beneficial uses, setting water quality criteria, and establishing BMPs to control nonpoint sources of pollution. Section 313 of the Clean Water Act requires Federal agencies to comply with all Federal, state, interstate and local requirements, administrative authority, and process and sanctions with respect to control and abatement of water pollution. Specifics of pollutants and information can be found in the Existing Condition and Environmental Consequences sections of this report. Management activities should not further contribute pollutants of concern into impaired water bodies.

National Forest Management Act

Project activities will not irreversibly damage water resources. Project Design Criteria and BMPs have been included to protect water resources.

Executive Orders

Executive Order 11988 – Protection of Floodplains

EO 11988 provides for the protection and management of floodplains. These rules are also incorporated as BMPs in the Idaho Water Quality Standards.

Executive Order 11990 – Protection of Wetlands

EO 11990 provides rules for the protection and management of wetlands. These rules are also incorporated as BMPs in the Idaho Water Quality Standards.

State and Local Law

Idaho Forest Practices Act

The Idaho Forest Practices Act regulates forest management on all ownerships in Idaho, including National Forest System lands (IDAPA 20.02.01).The Forest Service has agreements with the state to implement best management practices (BMPs) for all management activities. All activities will meet or exceed guidelines described in the Soil and Water Conservation Handbook (Forest Service Manual 2509.22). Following these BMPs will meet the water quality protection elements of the Idaho Forest Practices Act.

Idaho Stream Channel Protection Act

The Idaho Stream Channel Protection Act regulates stream channel alterations between mean high water marks on perennial streams in Idaho. Instream activities on National Forest system lands must adhere to rules pertaining to the Act (IDAPA 37.03.07). These rules are also incorporated as BMPs in the Idaho Water Quality Standards.

Best Management Practices

A complete list and discussion of BMPs and project design features (PDFs) are included in the Hydrology Specialist Report, Appendix 1. Implementing projects with BMPs reduces our impacts to water quality and ensures the project will meet both Forest Plan standards and Clean Water Act objectives for water quality. The EPA provides a list of BMPs appropriate for forest roads and other forestry related activities in their guide National Management Measures to Control Nonpoint Source Pollution from Forestry (EPA 2005).

BMPs and design features were developed for this project using the National Core BMP Technical Guide (USDA 2012), field verification, and the best available science. Proposed BMPs and PDFs were also discussed with operations personnel to ensure feasibility for implementation effectiveness. Proposed BMPs and PDFs are discussed throughout the effects analysis of this report and are the primary mechanism to mitigate potential hydrologic effects from the project.

At the national scale, a consistent program to monitor BMP implementation and effectiveness has been in development for several years. Monitoring of BMP implementation and effectiveness using the Forest Service's National BMP Monitoring protocols has taken place on the Nez Perce – Clearwater National Forest since 2012. Monitoring results from vegetation management projects indicate that BMPs intended to minimize effects to water, aquatic and riparian resources were successfully implemented, and BMPs intended to minimize effects from landings and ground-based mechanical harvest were successfully implemented, including landing location, spacing of skid trails, and retention of cover. Additional project-level BMP monitoring has occurred as part of project implementation on the Nez Perce – Clearwater National Forest. Monitoring results are cited throughout this report where they are applicable.

Methodology and Information Sources

Analysis Methods

The most thorough approach to evaluating project impacts on water quality, especially on burned soils, includes field collected information, the use of modeling tools to highlight areas most prone to water resource impacts and a scientific discussion explaining the consequences of increased sedimentation on water resources (Hyde et al 2006).

To evaluate the impacts of hazard tree removal on water quality the project hydrologists conducted combined field observations, spatial analysis from project data, and modeling of impacts to water quality.

Information from the IDEQ Subbasin Assessments (IDEQ 2012), GEOWEPP Post-fire sediment modeling (Miller 2016), Burned Area Emergency Response (BAER) Assessments (2015), BARC Imagery from the Forest Service Remote Sensing Applications Center (RSAC 2015), mathematical models, and field reviews were used to analyze effects to water quality from the proposed activities. Forest stand database queries were conducted to identify past harvest activities and the time frame during which they occurred (see project file). Information from the IDEQ 305b/303d Integrated Report (IDEQ 2012) and from the BAER Assessments (2015) was used to develop the existing condition and cumulative effects evaluation. Resource condition observations were conducted in the field during the fall of 2015 and spring of 2016. Data collected from field crews surveying road condition and tree mortality helped provide a description of the field condition of roadsides proposed for treatment. In addition, the NEPA ID team completed a driving tour of some of the road segments in Teepee Springs Fire area and other road segments within the Motorway Complex Fires. Field visits for data collection to validate post-fire soil recovery were completed in May 2016 by experienced soil technicians. A hydrologist visited the Wash, Woodrat, Boulder, and Jay Point Fires and conducted more extensive field visits to these areas in fall of 2015 as part of the BAER efforts.

Use of BAER Team Data: The post-fire BAER teams evaluated soil conditions immediately following the wildfires. The responsibility of the BAER Team is to conduct rapid assessments, identify immediate and potentially significant risks to resources, and to recommend measures that may help prevent damage if needed. The BAER team models potential increased runoff, potential for soil erosion, and debris flows based on the conditions observed in the field and soil burn severity maps. The modeling for the BAER reports are not field collected empirical measurements of sediment yield, should be presented in terms of probability of risk, and do not model the impacts of management activities; however, they do provide a means to characterize post-fire existing condition.

The models used to estimate direct, indirect, and cumulative effects of the proposed action include several models from the suite of available WEPP (Watershed Erosion Potential Prediction) Models and NEZSED. The WEPP models used are ERMiT, GEOWEPP, Disturbed WEPP, and WEPP Watershed Online. The physical basis and performance of the WEPP models is discussed in the model documentation (Elliot et al. 2000, Elliot 2004, Robichaud et al. 2007), as well as several peer-reviewed papers (Elliot 2004, Laflen et al. 2004, Larsen and MacDonald 2007).

The NEZSED model was used to predict the impacts of the tree removal and fuels reduction actions on sediment yield on the area previously known as the Nez Perce National Forest. The methodology for using the NEZSED model is described in detail in the Forest's guidance document, Implementation Guide to Appendix A of the Nez Perce National Forest Plan (Conroy and Thompson 2011) and the Appendix C of the Nez Perce Watershed Database (Hatter et. al 1995). Sediment yield is calculated in tons per year and reported as "percent increase over base" conditions to provide context for each specific watershed. Sediment yield is calculated for base conditions (without management activities), current conditions (cumulative of past and existing management activities combined with base conditions), and predicted conditions for each of the proposed project alternatives (cumulative of past, existing, and proposed activities combined with base conditions). As discussed in Conroy and Thompson (2011), neither hazard tree removal nor log haul should be modeled using NEZSED, particularly since the methodology used in the NEZSED model does not account for sediment yield changes associated with increased road traffic (Cline et. al 1981). Sediment yield increases resulting from burning fuels is appropriate to be modelled using NEZSED, thus the percentages of sediment yield over base conditions were then compared to the sediment yield guidelines for prescription watersheds listed in Appendix A of the Forest Plan.

Additional information about the models used in this analysis can be found in the project file, including what each model measures to evaluate potential erosion related to hazard tree removal and the limitations of model use. Appendix 5, Hydrology Specialist Report includes more detailed methodology about how WEPP parameters were selected.

Incomplete and Unavailable Information

Two fires, Deadwood in the South Fork Clearwater Basin and Lost Hat in the Clearwater Basin have no remote sensing derived soil burn severity data. Based on field reconnaissance in both areas, fire effects in Deadwood were modeled as low severity and Lost Hat was modeled at a moderate severity fire.

Resource Issues and Indicators

The balance of water yield and sediment yield in a watershed influences the water quality/quantity of a stream system. Water yield refers to stream flow quantity and timing and is a function of water, soil, and vegetation interactions. Changes in amount or distribution of vegetation can affect water yield and ultimately alter stream channel conditions. Normally, an ECA analysis would be used to document the potential increases in water yield as a result of a possible action on FS managed lands. However, given that the proposal is only removing dead or imminently dead trees, the project would not increase water yields beyond existing conditions. The effects of the 2015 wildfires substantially overshadow and mask any effects of the hazard tree removal. Any predicted changes to water yield associated with removing

dead/dying trees or reducing fuels would be immeasurable because the increases would be masked by the predicted changes in water yield due to the wildfires. Therefore, the only resource indicator that will be addressed in the watershed assessment of the proposed Hazard Tree Removal project will be sediment.

Sediment –The focus of this analysis will be on the potential to increase sediment delivery to the streams. Hazard tree removal, logging debris/slash reduction, and road maintenance related activities have the potential to increase sediment production and delivery into streams negatively impacting water quality. It is understood that it is a natural process to have sediment move into a channel and that the stream naturally sorts this sediment. When an excess amount of sediment—that is, an addition of sediment over the natural (balanced) amount—is delivered to a stream, the stream's ability to route the sediment out of the system is overwhelmed, and water quality may be reduced. Wildfires, timber harvests and road-related activities have the potential to increase erosion production and sediment delivery into streams.

Roads influence both water quantity and quality. Roads concentrate surface water and are a source of sediment entering streams. The Hazard Tree Removal project was designed to minimize sediment delivery and subsequently, no roads or landings will be constructed with any action alternative. Only existing roads and landings will be used for this project.

For the purposes of the watershed resource, the measurement indicator is sediment delivery to streams which will be addressed in the following manner:

- Qualitative assessment of the potential delivery of sediment to affected streams
- Percent sediment yield increased over base (natural), as modeled by NEZSED (for the areas on the Nez Perce National Forest, only).

Spatial and Temporal Context for Effects Analysis

The project area for the 2015 Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project covers multiple road systems (approximately 133 miles) affected by wildfires in 2015 and is scattered across five Ranger Districts (North Fork, Lochsa-Powell, Moose Creek, Red River, and Salmon River).

The proposed actions will affect water resources nearby to the treatment areas, including roads, recreation and administrative sites and road-adjacent areas along log haul routes. The analysis area for direct and indirect effects on the water quality are the streams located downstream of or adjacent to the roads, recreation and administrative sites where hazard tree and fuel reduction treatments will occur, along with the streams that cross or are adjacent to the road needed for log haul where road maintenance is expected to occur under the proposed action. The effects on water resources will be analyzed at both the site scale and larger scales as needed to address consistency with NEPA, NFMA, Clean Water Act, Idaho State laws, and the current forest plans. For example, the effects on individual streams will be evaluated as well as subwatershed (USGS HU12) or Forest Plan prescription watershed scales.

For cumulative effects, this project will be considered additive with past, present, and reasonably foreseeable activities that overlap in time in space. Again, the cumulative effects of this mitigation project will be considered at both the site and watershed scale.

The temporal boundaries for analyzing direct, indirect, and cumulative effects of this project are during and immediately following implementation and extend to the first 2-5 years after implementation. After 2-5 years, soil cover and understory vegetation is expected to be sufficient to naturally mitigate the proposed ground disturbing activities that affect water resources, and existing road systems will have returned to an equilibrium state of consistent, but lasting, effects on water resources.

3.6.1 Affected Environment

This project will mitigate hazard trees within 34 subwatersheds (HU12, USGS Watershed Boundary Databaset) of the Nez Perce Clearwater National Forest. These subwatersheds are listed in Table H-1, which provides estimates of the total area affected within each subwatershed. The watershed with the largest percent of area affected within this project is the Upper Lolo Creek subwatershed where 1.7 percent of the area will receive treatments to mitigate the hazards of dead, roadside trees.

Table H-1. Affected Subwatersheds and the distribution of proposed treatments (see Figures in Appendix 3, Hydrology Specialist Report as well)

Orig Admin Unit	Subwatershed HUC12 Number	Subwatershed Name (HU12)	Area of each Prescription (Acres)			Total Area Affected (Acres)	Percent of subwatershed area affected by project
			Drop and Leave	Removal	Reach From Road Only		
Clearwater National Forest	170603030104	Upper Crooked Fork Creek	183.6	8.5		192.1	1.0%
	170603030105	Boulder Creek-Crooked Fork Creek	53.5	0.04		53.5	0.3%
	170603030301	Walton Creek-Lochsa River	30.2		76.3	106.5	0.6%
	170603030601	Upper Fish Creek	8.8	0.8		9.7	0.0%
	170603030602	Hungery Creek	35.9	7.1		43.1	0.2%
	170603030705	Deadman Creek	6.0	1.1		7.1	0.1%
	170603030706	Canyon Creek	88.4	1.3		89.7	0.7%
	170603030707	Pete King Creek	86.8			86.8	0.5%
	170603040201	Big Smith Creek-Middle Fork Clearwater River	100.5	223.9		324.4	1.1%
	170603040202	Maggie Creek	0.2			0.2	0.0%
	170603060201	Upper Lolo Creek	80.1	365.4		445.5	1.7%
	170603060202	Musselshell Creek	20.0	29.4		49.4	0.1%
	170603060203	Eldorado Creek	21.1	134.4		155.5	0.6%
	170603060204	Middle Lolo Creek	55.3			55.3	0.2%
	170603060401	Upper Orofino Creek	8.5	80.4		88.8	0.3%
	170603070504	Middle Creek	49.7			49.7	0.3%
	170603070505	Hemlock Creek	74.0	35.6		109.6	0.5%
	170603070601	French Creek	49.5	69.2		118.7	0.7%
	170603070903	Lower Skull Creek	19.1	70.0		89.1	0.6%
Nez Perce National Forest	170602070702	Big Mallard Creek	136.5			136.5	0.4%
	170602090203	Kelly Creek-Salmon River	420.0		11.2	431.2	1.8%
	170602090204	Allison Creek	870.7		47.2	917.9	7.1%
	170602090206	Berg Creek-Salmon River	250.1		2.8	252.9	1.4%
	170602090402	Fiddle Creek-Salmon River	9.7			9.7	0.0%
	170603020205	Otter Creek	0.7			0.7	0.0%
	170603020206	Pinchot Creek-Selway River	3.2			3.2	0.0%
	170603020306	Horse Creek	79.5		40.7	120.1	1.2%

Orig Admin Unit	Subwatershed HUC12 Number	Subwatershed Name (HU12)	Area of each Prescription (Acres)			Total Area Affected (Acres)	Percent of subwatershed area affected by project
			Drop and Leave	Removal	Reach From Road Only		
	170603020307	Lower Meadow Creek	241.2	0.02	201.0	442.2	1.4%
	170603020401	Gedney Creek	88.5			88.5	0.3%
	170603020402	Glover Creek-Selway River	296.9	33.7	123.2	453.8	1.6%
	170603020403	Rackliff Creek-Selway River	27.9			27.9	0.2%
	170603020404	Ohara Creek	2.2			2.2	0.0%
	170603050302	Lower Crooked River	30.6			30.6	0.2%
	170603050401	Upper Newsome Creek	14.9	37.4		52.3	0.2%
Grand Total			3444	1098	502	5044	

In addition to the treatment units, trees will be hauled away from some areas, which would occur on approximately 262 miles of designated haul routes. Appendix 3 of the Hydrology Specialist Report provides maps of the areas where hazard trees will be treated, the haul routes that will be used, and the subwatersheds and forest plan prescription watersheds where these activities are located.

Existing condition

In 2015, wildfires occurred on every district of the Forest. The wildfires created the most significant impact to the water resources along the roads, recreation and administrative sites proposed for treatment; however, fully describing existing condition necessitates including the impacts of previous management activities and previous fires.

Past and current management activities influence current water quality within the project watersheds. There are other ongoing forest uses in the subwatersheds where hazard tree mitigation is proposed, including placer mining, trail use, and grazing that could influence sediment yield in streams; however, at the site-scale, the locations of these activities do not overlap with proposed hazard tree removal, and at the subwatershed-scale, the total area of these activities is small; consequently, the scale of their impact for sediment yield is insignificant compared to effects of harvest, roads, and the extent of recent wildfires.

Both the Forest and Idaho's Department of Environmental Quality (DEQ) monitor water quality in the streams within the proposed project areas.

Several streams have been identified as having elevated levels of sediment based on Forest Plan standards. Table H-7 list streams that are currently considered above Forest Plan sediment standards as measured by instream deposition levels through percent cobble embeddedness. The streams identified in 1997 as above Forest Plan standards are located in watersheds with significant watershed restoration efforts including over 100 miles of roads decommissioned since 1997, removal of failing streams crossings, and replacement of undersized culverts to allow increased hydraulic capacity and provide fish passage. No new roads have been constructed in these areas, with exception of the reduced miles of road and the recent fires all other management impacts (harvest and road use) are at similar levels as in the late 1990s. Given the combined improvements of watershed restoration effects and no changes in management activities that degrade water quality, the water quality in the streams in Table H-2 should either be in the same condition or improved.

Table H-2. Streams in Fire Areas with Sediment Levels above Forest Plan Standards

Fire Area	Stream Name	Data Reference
Eldorado	Eldorado Creek	Jones and Murphy 1997
Musselshell	Musselshell Creek	Jones and Murphy 1997
Higgins Hump	Pete King Creek	Jones and Murphy 1997
Walde Mystery	Walde Creek	Jones and Murphy 1997
Woodrat	Big Smith	Jones and Murphy 1997
Teepee Springs	Allison Creek	2015 Forest Surveys
	West Fork Allison Creek	2015 Forest Surveys

Clean Water Act Listed Water Bodies

303(d) Listed Streams

Several streams on the current 303(d) list (IDEQ 2012 Integrated Report) are in close proximity to the project area or haul route, and all of these streams are listed for water temperature exceedances. The 303(d) listed streams located adjacent to or in close proximity to roads that will be treated or used as haul routes in this project are found in Table H-3. The closest 303(d) listed stream to the proposed hazard tree removal treatments is Walde Creek, which is located about 1,000 feet downhill of Forest Road 5526-1 where drop and leave and subsequent fuels treatments will occur.

Table H-3. 303(d) listed streams in close proximity to roads associated with the project, all listed for water temperature exceedances (adapted from IDEQ 2012).

Water Body Name (Assessment Unit)	HUC4 CODE	Beneficial Use(s) Not Supported	Closest Fire area	Proximity to Project
Lochsa River - Deadman Creek to mouth	17060303	Cold Water Aquatic Life	Baldy	Asphalt haul route on FSR 223 crosses
Canyon Creek - source to mouth	17060303	Cold Water Aquatic Life	Walde - Mystery	located 5 miles downstream from drop and leave
Lochsa River - confluence of Crooked Fork, White Sand Creek,	17060303	Cold Water Aquatic Life	Jay Point	located 0.1 mile downstream from haul route on Elk Summit Road; 1.4 miles from commercial removal where machinery restricted to road
Pete King Creek - Walde Creek to mouth	17060303	Cold Water Aquatic Life, Salmonid Spawning	Higgins Hump	located 2 miles downstream from drop and leave, received Walde Creek as a tributary, which would be more directly impacted
Walde Creek - source to mouth	17060303	Cold Water Aquatic Life	Higgins Hump	located 0.2 miles (about 1,000 ft) downstream from drop and leave on ridge road FS 5526-1
Orofino Creek, including Rhodes, Cow Creek	17060306	Salmonid Spawning	Snowy Summit & Lost Hat	Asphalt haul route on FSR 250 runs parallel for 5.5 miles and crosses 5 times

Impaired Streams with Total Maximum Daily Loads (TMDL)

There are several more impaired streams in close proximity to the treatment areas and haul routes, but all of these impaired streams have been removed from Idaho's most recent 303(d) list. These streams are still considered impaired and not supporting their designated beneficial uses due to exceedances in one or more water quality parameter, such as water temperature, E. coli, sediment/siltation, or physical substrate habitat alterations. All of these streams are no longer 303(d) listed because they either:

- Have an approved Total Maximum Daily Load (TMDL) and are listed as Category 4A on Idaho's 2012 Integrated 303(d)/305(b) report, or
- Are impaired in pollution categories where a TMDL is not required and are listed as Category 4C on Idaho's 2012 Integrated 303(d)/305(b) report.

There are 4 EPA Approved TMDLs that apply to impaired streams that are hydrologically connected to the project, which are listed in table H-4. While the majority of streams under these TMDLs are impaired for water temperature, the South Fork Clearwater River is also impaired for physical substrate habitat alterations, which does not require a TMDL, and sediment/siltation, which is addressed in the South Fork Clearwater River TMDL (IDEQ 2003) and Implementation Plan (IDEQ 2006). The proximity of each of these impaired waters to project activities can be found in the hydrology project file.

The activities proposed in this project are consistent with these TMDLs and will not increase degradation in any impaired water body. In some cases project activities are located a large distance from listed stream segments, and effects are discounted due to this distance, but otherwise, project activities include the implementation of BMPs and PDFs to reduce and/or eliminate effects to the water quality parameters impaired in this area.

Table H-4. Category 4 streams in close proximity to roads affected by the project.

HUC4 CODE	Name of EPA Approved TMDL document(s)	Beneficial Use(s) Not Supported	305(b) Category	Water Body Name (Assessment Unit)	Causes
17060210	N/A – TMDL is not required	Cold Water Aquatic Life	4C	Little Salmon River - 5th order	Physical substrate habitat alterations
17060209	LOWER SALMON RIVER AND HELLS CANYON TRIBUTARIES TMDLS	Secondary Contact Recreation	4A	Allison Creek - 3rd Order	E. coli
17060305	CLEARWATER RIVER, (SOUTH FORK) TMDL and CLEARWATER RIVER, SOUTH FORK (NEZ PERCE RESERVATION LANDS) TMDLS	Cold Water Aquatic Life, Salmonid Spawning	4A	American River - 4th order, East Fork American River to mouth	Water Temperature
			4A	American River - source to East Fork American River	Water Temperature
			4A	East Fork American River - source to mouth	Water Temperature
			4A	Elk Creek	Water Temperature
			4A	Elk Creek-confluence of Big Elk & Little Elk Creeks to mouth	Water Temperature
			4A	Fall Creek - source to mouth	Water Temperature

HUC4 CODE	Name of EPA Approved TMDL document(s)	Beneficial Use(s) Not Supported	305(b) Category	Water Body Name (Assessment Unit)	Causes
			4A	Haysfork Creek - source to mouth	Water Temperature
			4A	Leggett Creek - source to mouth	Water Temperature
			4A	Little Elk Creek - source to mouth	Water Temperature
			4A	Newsome Creek - 4th order	Water Temperature
			4A	Newsome Creek - Beaver Creek to mouth	Water Temperature
			4A	Newsome Creek - source to Mule Creek	Water Temperature
			4A	Pilot Creek - 3rd Order	Water Temperature
			4A	Pilot Creek - source to mouth	Water Temperature
			4A	Red River - South Fork Red River to Siegel Creek	Water Temperature
			4A	South Fork Red River - Trapper Creek to mouth	Water Temperature
			4A	Maurice Creek - source to mouth	Water Temperature
			4A	Whiskey Creek - source to mouth	Water Temperature
			4A, 4C	South Fork Clearwater River - Crooked River to Tenmile Creek	Physical substrate habitat alterations, Sedimentation/ Siltation, Water Temperature
			4A, 4C	South Fork Clearwater River - Tenmile Creek to Johns Creek	
			4A, 4C	South Fork Clearwater River - 5th order mainstem segment	
			4A, 4C	South Fork Clearwater River - tributaries	
			4A, 4C	Huddleson Creek and tributaries	
17060307	CLEARWATER RIVER, UPPER NORTH FORK TMDL	Cold Water Aquatic Life, Salmonid Spawning	4A	Orogrande Creek - 4th Order	Water Temperature
			4A	Sylvan Creek - source to mouth	Water Temperature
17060306	LOLO CREEK TRIBUTARIES TEMPERATURE TMDLS	Cold Water Aquatic Life, Salmonid Spawning	4A	Jim Brown Creek - 1st and 2nd Order Tributaries	Water Temperature
			4A	Jim Brown Creek - 3rd Order	Water Temperature
			4A	Musselshell Creek - 1st and 2nd order tributaries	Water Temperature

The following sections detail existing water quality related to the biggest current contributors to sediment in the project areas: the existing roads and the 2015 Wildfires.

Existing Roads

Forest roads can impact water quality by increasing sedimentation through mass wasting and surface erosion. Surface erosion occurs on all roads but particularly from roads with higher traffic levels that do not receive regular maintenance (Reid and Dunne 1984, Luce and Black, 1999). Surface erosion introduces fine sediments into streams degrading aquatic habitat (McCaffery et al 2007). The steep slopes and geology of the NPC also make many areas at risk for mass failure from roads (McClelland et al 1997). It is well acknowledged in the literature that not all roads have equal impact on water quality, but, in general, watershed road density proves one of the strongest predictors of instream sediment levels (Al-chokhachy et al 2016; McCaffery et al 2007; Opperman et al 2005). At the Watershed-scale, Lee et. al (1997) found that "increasing road density is correlated with declining aquatic habitat conditions and aquatic integrity" (p. 1253). Specifically, pool frequency in large pools and all pools is inversely correlated with road density. Pools are a fundamental aspect of fish habitat. Pools provide rearing habitat for juvenile fish, resting places, overwintering areas, and refugia from floods, drought, and extreme temperatures. The ESA Matrix of Pathways and Indicators of Watershed Condition for Chinook, Steelhead, and Bull Trout, Local Adaptation for the Clearwater Basin and Lower Salmon (Central Idaho Level 1 Team 1998) developed a regulatory framework to assess watershed condition in part based on road density where road densities less than 1 mi/mi2 as properly functioning, from 1 mi/mi2 to 3 mi/mi2 as functioning at risk, and above 3 mi/mi2 as not properly functioning. Table H-5 identifies the watersheds within the project area that have road densities above the 3 mi/mi2 road density threshold indicating that existing roads likely are contributing to instream sediment and degrading water quality.

Table H-5. Fire Areas where High Road Densities May Result in Degraded Water Quality.

Fire Area	Sub-Watershed Name (HUC 12)	Road Density
Snowy Summit, Eldorado, and Upper Lolo	French Creek	3.7
	Upper Lolo Creek	4.5
	Upper Orofino Creek	3.7
	Eldorado Creek	4.3
Walde-Mystery	Canyon Creek	4.3
Teepee Springs	Fiddle Creek-Salmon River	3.2

At the site-scale, sedimentation from individual road segments can be highly variable depending on the position of roads on hillslopes, proximity of road segments to live water, road template insloped with ditch or outsloped, road surfacing, and level of road traffic (Elliot 2013). Delivery of sediment to streams from roads requires a connected segment of the road to live water (Gucinski et al 2001; Wemple et al 1996). Road segments where erosion results in sedimentation into streams are typically connected to live water through ditches or erosion features as gullies or ruts (Elliot 2013). Sediment delivery into streams from surface erosion is dramatically decreased where road construction incorporates constructed drainage features like cross-drains and where vegetated buffers exist around streams (Elliot 2013, Opperman et al 2005). In addition to location of road, buffers, and road design, the road surface is important for controlling potential erosion. Graveling of road surfaces reduces sediment production (erosion) by reducing the surface area of soil exposed to raindrop impact, tire friction, and adverse effects of vehicular weight (Megahan et al. 1991), though in some cases with more traffic the fines from gravel can become a sediment source themselves (Eliot 2013). In a study that compared erosion from both native surface and graveled road segments, native surfaces generated 7.5 times more sediment than graveled road segments (Brown et al. 2013). In the project area, approximately 20 miles of the roads proposed for treatment are

paved and should not produce any sediment. Of the remaining roads, 63 miles of the roads proposed for treatment are graveled and 50 miles are native surface. The bulk of sedimentation will come from the native surface roads in the project areas. About 20% of the native surface roads are in the Teepee Fire area and 40% are within the combined Upper Lolo - Musselshell, and Snowy Summit Fire Areas with the remainder distributed across the project area. Where native surface roads cross streams, the opportunity for erosion into streams is highest. Road segments within the Teepee Springs and the Woodrat Fire Areas have the highest number of perennial stream crossings.

Roads in the Fire areas with the greatest potential to affect water quality are described below.

Roads in the Teepee Springs Fire Area: There are 26 miles of road proposed for hazard tree mitigation; approximately 103 acres of these treated road corridors where trees will be removed and decked with potential for commercial sale. The focus of hazard tree mitigation will be on the arterial routes, Rd#221 and Rd #263. Both roads have gravel surfaces and will receive drainage improvements under the 2015 BAER implementation including 27 culvert upgrades and road cross-drains throughout the entire fire perimeter. The timing of BAER treatments may be after the completion of hazard tree mitigation in this area. Along the arterial roads there 24 crossings of perennial streams with graveled surfaces in good condition. Less than 10% of hazard tree mitigation in the Teepee Springs Fire will occur on road segments with native surface and none of these road segments have perennial stream crossings. Hauling of decked timber will occur along roads #221, #263, and # 536. Road #536 is a ridgetop road and is not located near streams. Both of the 221 and 263 roads are well maintained but they are stream adjacent roads, which could increase risk of sedimentation into steams if a gully develops on the road or the vegetation between the road and stream is lost. For the segments of road where haul would be required beyond the Fire Perimeter, Road #221 closely parallels (typically within 50-200 feet) the mainstem of Allison Creek for about 6 miles (and crosses the stream 4 times) and Rd #263 road also crosses and runs roughly parallel to West Fork Allison Creek.

Roads in the Woodrat Fire Area: There are 7.5 miles of roads proposed for hazard tree removal and related hauling in the Woodrat Fire Perimeter. There are two arterial roads through the Woodrat Fire Area, Forest Rd #101 and Rd #5503. Rd #101 is graveled and regularly maintained with recent culvert upgrades; however, the road is heavily traveled and does show signs of gravel wear and has 11 stream crossings. Road #5503 is a native surface road with 10 stream crossings. Road #5503 has several places at culvert locations where ruts have formed gullies that are hydrologically connected to stream channels. Two other roads, Road #418 and Road #455, have proposed hazard tree removal along short stretches. Road #418 is in good condition with few stream connections, though it is adjacent to Pete King Creek for over a mile. Road number #455 is a native surface road with only a mile of treatment proposed. Because of the soil type in the Woodrat area, native surface roads are highly prone to erosion. Along the area of use needed for Rd #455 there 3 crossings of intermittent stream channels, at each stream crossing there are gullies from the road clearly delivering sediment into streams during periods of runoff (seasonally or after strong rainstorms). BAER Treatments will be implemented along road #101 and #5503 to improve drainage and upgrade culverts; but no work is planned on Rd #455. When the BAER work is finished sediment delivery from both the main haul routes, #101 and #5503 roads will not be at levels to impact stream water quality. Haul for the Woodrat and several other project area would continue outside the fire perimeter down the gravel-surfaced FR 101 for about 0.5 mi to U.S. 12. There would also be some haul from Woodrat down the gravel-surfaced FR 5503 to Highway 12, with about 1.5 mile of haul on Rd#5503 will be beyond the fire perimeter adding to the total affected road miles by the proposed project.

Roads in the Snowy Summit Fire Area: There are 6.7 miles of hazard tree removal proposed. The road segments proposed for treatment are along ridgetops without streams crossings, only a few ephemeral drainage areas with intermittent (seasonal) flow. The roads are a mix of gravel,

pavement, and native surfaces. As runoff disperses along ridgetop roads (as opposed to channelizing and concentrating sediment) the opportunities for erosion to result in direct delivery to streams is much lower than for roads with erosional features directly connected to stream channels. The distance from live water and stable ridgetop location reduces the potential for road associated sedimentation in the Snowy Summit Fire Perimeter. Beyond the 6.7 miles of project roads, there will be an additional 25 miles of road used for hauling on graveled or pavement surfaces. Likely haul routes for any timber removal from the fire perimeter will require about 5 miles of travel from the fire perimeter on Forest Road #535 to the Musselshell Fire Perimeter. This stretch of road has gravel in good condition and one perennial stream crossing (Belle Creek). Once in the Musselshell Fire, haul will likely continue several miles through the Musselshell Fire perimeter on Rd #535 to the paved road FR#100 and all the way to U.S. 12.

Roads in the Upper Lolo (Pete Forks, Four Bit, May) and Musselshell Fire Area: There are 8 miles of road in the Pete Forks, Four Bit, and May Fire Areas and 2.25 miles of road proposed for hazard tree removal within the Musselshell Fire area. The roads are predominately gravel with some native surfaces (1 mile) and 5 perennial stream crossings. The stream crossings are in good condition and have gravel surfaces. Field crews collecting data in fall of 2015 did note any sites of road erosion in these areas. Roads in these fire areas have been recently maintained following fire suppression activities and do not show any current signs where erosion is leading to connected segments with sedimentation into streams. Haul for the Musselshell Creek project area would likely be funneled down the gravel-surfaced FR 535 for about 2.7 miles through this drainage to get to the paved arterial FR100. The haul would parallel Gold Creek and then Musselshell creeks along most of its length, crossing Musselshell Creek once, the gravel and paved surfaces with intact vegetated buffers along these roads will reduce potential sedimentation resulting from the impacts of log hauling.

Summary of 2015 Wildfires

The 2015 Wildfires are the most recent, large-scale disturbance in the hydrologic analysis areas. Recently burned forested hillslopes are typically highly susceptible to erosion and elevated runoff in their natural state. Loss of organic material (soil duff) and fine woody debris reduces overland flow resistance, protection from splash erosion, and surface water storage capacity. Soils can become more water repellant, contributing to elevated runoff.

The rate of sediment yield recovery post wildfire is highly variable and depends upon burn severity, exposed soils, amount of vegetation killed by the fire, proportion of basin burned, precipitation regime and rate of vegetative recovery (Elliot et al 2010). Accelerated soil erosion, potential increases in peak streamflow and potential channel changes (including aggradation or downcutting) are expected to occur due to recent fires. The potential effects from the recent wildfires are expected to continue in the project area for anywhere from three to fourteen years depending upon site conditions (Elliot et al. 2010, Wondzell and King 2003 and Robichaud 2005). Research by Elliot et al. (2010) documented that affects to sediment yields lasted from three to five years, with a likely decrease in rate and intensity each year. Wondzell and King (2003) documented that where riparian zones burned sedimentation rates were expected to be higher than normal over the next two to three years as storm flow removes sediments that were retained by organic debris prior to the fire. Robichaud (2005) reported that sedimentation rates that increased due to wildfire are likely return to background conditions within seven to fourteen years as vegetation recovers and stabilizes the mobile sediment. Peak streamflow will respond in a similar manner to sediment yield with higher flows expected over the next few years with a gradual reduction over the next ten to fifteen years (Driscoll et al 2004). In limited locations, where the large wood in the stream channels was consumed by the wildfires, ample large woody debris is available to replenish the large wood that was once in the channels.

Burn severity was to describe potential watershed effects of the 2015 Wildfires, and potential interactions with roadside hazard tree removal. Burn severity describes the effects of the fire on soil structure, infiltration capacity, and biotic components, and is used to indicate runoff and soil erosion potential from the fire. Burn severity maps were produced and field-verified as part of the Burned Area Emergency Response (BAER) assessment for most of the 2015 fire areas (USDA, 2015, various BAER Reports).

The potential hillslope erosion was predicted by GeoWEPP simulations (Miller 2016) for each 1st order catchment in fire perimeters are presented in Table H-6. GeoWEPP output includes erosion predictions from unburned drainages as well. In general, erosion predictions in unburned areas range between 0-10 tons/acre/yr, thus 10 tons/acre/year is considered a general natural background rate and used to calculate the relative increase of potential hillslope erosion from both wildfire and proposed project activities at the hillslope scale. Other Forest documents and the R1/R4 models rely on more specific erosion rates based on landtypes, which predict higher natural rates of erosion across the Forest with rates ranging between 25 to 60 tons/acre/yr. Nonetheless, the natural erosion rates predicted from different kinds of models (R1/R4 vs. WEPP vs. GRAIP) are not directly comparable or additive, as they are each relative to the assumptions inherent in each specific model. Modeled sediment yield quantities should only be used for relative comparisons rather than as actual calibrated erosion rates.

The highest burn severities and predicted erosion were identified in the Boulder, Jay Point, and Woodrat fire areas on the Clearwater side of the NPC and Wash and Teepee fire areas on the Nez Perce side of the NPC. The average percent increase in predicted potential erosion from burned slopes are summed for each subwatershed (HUC12) in Table H-6 to get an overall figure for potential hillslope erosion.

Table H-6. GEOWEPP Output and Modeled Post-Fire Increase in Sediment for Project Subwatersheds with the highest burn severities and predicted erosion.

Subwatershed Code (HUC12)	Subwatershed (HUC 12) Name	Watershed Area (Acres)	GeoWEPP Output Potential Sedimentation Σ(Tons/acre)for 1 year	GeoWEPP Output: Potential Hillslope Sediment Yield Increase over Unburned[1] Conditions (%)
170602090204	Allison Creek	12891	3393	2.8%
170602090206	Berg Creek-Salmon River	18709	7721	6.0%
170602070702	Big Mallard Creek	36518	3002	1.0%
170603040201	Big Smith Creek-Middle Fork Clearwater River	28875	777	1.0%
170603030105	Boulder Creek-Crooked Fork Creek	16032	875	0.9%
170603030706	Canyon Creek	12576	26	0.0%
170603030705	Deadman Creek	12710	no data	3.7%
170603060203	Eldorado Creek	27199	545	0.5%
170602090402	Fiddle Creek-Salmon River	24676	129	0.9%
170603070601	French Creek	16877	565	1.5%
170603020402	Glover Creek-Selway River	29019	6649	2.7%
170603070505	Hemlock Creek	21421	616	1.0%
170603020306	Horse Creek	9618	466	0.8%
170603030602	Hungery Creek	22677	2777	2.0%
170602090203	Kelly Creek-Salmon River	24420	5628	3.7%

Subwatershed Code (HUC12)	Subwatershed (HUC 12) Name	Watershed Area (Acres)	GeoWEPP Output Potential Sedimentation Σ(Tons/acre)for 1 year	GeoWEPP Output: Potential Hillslope Sediment Yield Increase over Unburned[1] Conditions (%)
170603050302	Lower Crooked River	16972	no data	no data
170603020307	Lower Meadow Creek	31593	11072	5.0%
170603050402	Lower Newsome Creek	18039	654	3.2%
170603070903	Lower Skull Creek	15244	1521	2.8%
170603040202	Maggie Creek	16821	1	0.8%
170602070602	Middle Bargamin Creek	22611	269	no data
170603070504	Middle Creek	17502	255	no data
170603060204	Middle Lolo Creek	29503	60	0.6%
170603060202	Musselshell Creek	35333	29	0.0%
170603030707	Pete King Creek	17621	69	0.2%
170603040101	South Fork Clear Creek	16526	1317	no data
170603030104	Upper Crooked Fork Creek	19448	1688	1.8%
170603030601	Upper Fish Creek	23240	no data	no data
170603060201	Upper Lolo Creek	26817	1123	0.8%
170603050401	Upper Newsome Creek	24509	1682	1.9%
170603060401	Upper Orofino Creek	27944	247	0.6%
170603030301	Walton Creek-Lochsa River	18819	1326	0.9%

[1] Unburned= 10 ton/acre/yr

3.6.2 Environmental Consequences

The proposed action is expected to affect water quality as a result of increases in erosion and sediment delivery to streams. Other relevant aquatic issues were analyzed, and the proposed action is expected to have no measurable impacts on water quantity (i.e. water yield) and other water quality parameters, such as nutrient pollution, bacteria (E. coli), chemical contamination (from herbicides or other contaminants), and changes to water temperature. Hazard tree removal and the limited road maintenance proposed would not appreciably increase the risk of changing runoff timing or magnitude. Adherence to Project Design Features (PDFs) and BMPs will prevent impacts to water quality from equipment spills and the removal of riparian vegetation to prevent increases in stream temperature as well as degradation of channel stability. Floodplains will not be affected by the proposed action, as the proposed action includes avoidance measures that prohibit the creation of landings or skid trails within RHCAs and the removal of hazard trees within RHCAs. This project is not located within or upstream of any municipal watershed, thus there are no effects to municipal watersheds.

Water Quality

Erosion and Sediment Delivery to Streams

Active erosion of the landscape occurs naturally and yields sediment to streams. When chronic or excessive sediment inputs occur, a stream's ability to route the sediment through the system is reduced and water quality and aquatic habitat can be diminished. Headwater streams and wetlands typically trap and retain much of the sediment that washes into them. The faster the water travels, the larger the particles it can carry. Natural obstructions in small streams, such as rocks, downed logs, or even just a bumpy stream bottom, slow water and cause sediment to settle out of the water column (Meyer et al.

2003). Also, as gradient flattens and stream energy diminishes fine sediment is deposited. Deposition often occurs at area where higher gradient tributaries or sections of streams meet lower gradient streams. Lower gradient areas (less than 2 percent) occur in short, dispersed segments in most of the main channels and are the areas where larger amounts of fine materials are located and stored.

Recently burned forested hillslopes are typically highly susceptible to erosion and elevated runoff in their natural state. Loss of organic material (soil duff) and fine woody debris reduces overland flow resistance, protection from splash erosion, and surface water storage capacity. Additionally, roads are known to concentrate surface water and provide a continuous source of sediment to streams. Roads allow substantially less rainfall and snowmelt infiltration than occurs on undisturbed forest floor, intercept subsurface flow paths, and concentrate runoff. Where connected to a stream, unpaved roads are often a source of sediment as well.

Hazard Tree harvest and road-related activities have the potential to increase erosion production and sediment delivery into streams. An effects analysis was completed for this project to provide a measure of the impacts associated with the proposed activities. The analysis includes results from sediment models (WEPP and NEZSED) to provide relative estimates of how past and proposed activities may affect sediment yield. Analyses were conducted on all subwatersheds or Forest Plan prescription watersheds within the larger project area.

3.6.2.1 Direct and Indirect Effects

Alternative 1 – No Action

Effects of past, ongoing, and foreseeable future activities on the affected areas would continue unchanged under the no action alternative. The predicted effects of the 2015 wildfires on water resources would not vary under this alternative and are considered part of the new baseline conditions for all alternatives. Current sediment yield in streams are expected to improve with time, because impacts of recent fires have diminishing potential to affect erosion and sediment delivery as natural recovery occurs. Long-term recovery in all watersheds would be anticipated as trees become established and canopy cover is restored to pre-fire and pre-management conditions. Stream temperatures would be expected to recover to pre-fire values in burned watersheds as riparian and overstory canopy cover re-establishes, with recovery rates dependent on the rate of streamside vegetation re-establishment and growth. Vegetation recovery would be accompanied by decreases in streamflows from post-fire levels due to increased vegetation use of water, but the increase in vegetative canopy should offset this impact to stream temperatures. Streams in the project area identified as impaired on the Idaho 303(d)/305(b) Integrated Report, e.g. Walde Creek and Baldy Creek, would slowly recover to pre-fire conditions.

The existing road network would continue to be a potential source of sediment and provide potential landslide initiation points. Planned road maintenance activities including brushing, blading, and ditch cleaning would continue at current levels and are expected to have some short term increases in turbidity where sediment reaches streams, particularly after substantial rainfall events and where roads lack gravel or hardened surfacing. However, there are limitations on road maintenance funding, thus the minimal amount of road maintenance planned could increase the risk of culvert failures. Other ongoing activities such as roads use, mining, timber harvest, and grazing would continue to influence erosion.

BAER treatments to reduce the magnitude of erosion as a result of recent fires have either already been completed or will be completed in 2016. Maintenance and monitoring of rehabilitation measures implemented under BAER would be ongoing regardless of alternative.

Since no management activities would be implemented with this alternative, there would be no direct effects to sediment yields from management activities above those already occurring or those that already

have the potential to occur. No new cumulative effects would be expected under this alternative since no new activities are proposed.

Alternative 2 – Proposed Action

The greatest potential to impact water quality in this project is due to erosion and sediment delivery to streams. These effects are expected in the project areas close to water where hazard trees will be removed, i.e. loaded onto log trucks and hauled away, where road maintenance is performed, along the entire log haul route, and where fuels treatments are performed to reduce fuel loading on the ground. Best management practices and project design features will be used to reduce and /or eliminate the potential delivery of sediment to nearby streams. The effects of the project will be discussed in relation to proposed activities, since the type of effects and BMPs employed to reduce them remain consistent within project activity. The anticipated effects on water quality, included PDFs and BMPs included, will be discussed in two sections:

1. Roads with log haul and potentially some road maintenance (approx. 262 miles of road), and
2. Roads where trees will be cut down, including drop and leave and removal activities, (approx. 133 miles of road).

Despite the incorporated PDFs and BMPs, some sediment may be delivered to water as a result of project activities.

Log Haul and Road Maintenance

Forest roads are the most likely source of sediment to project area streams, especially where roads used or treated are within 300 feet of water bodies. The sediment generated from these roads may be delivered during subsequent larger rain events after the project activities have ended. Log hauling and equipment use on roads both for road maintenance and hazard tree removal could increase rutting or cause damage to drainage structures that could exacerbate sediment delivery rates (Luce and Black 2001). However, sediment delivery from these roads would be minimized through application of BMPs, (i.e. repair of damaged drainage structures, timing restrictions, etc.) that have been shown to be protective of water quality and beneficial uses (Seyedbagheri 1996; Elliot et al. 2000).

Table H-7 summarizes the 262 miles of road that will be used for log haul, and they are summarized by surfacing type and subwatershed, since road surfacing has been found to directly affect the amount of sediment that is delivered to streams. Maps illustrating these roads can be found in the Hydrology specialist Report, Appendix 3. While some sections of road included in Table H-7 will also receive drop and leave treatments and hazard tree removal, the majority of roads listed in Table H-7 will strictly act as haul routes. Table H-7 does not include road sections that will only be treated by drop and leave treatments if they are not also used for log haul. Sediment delivery to streams is not expected to increase on/from roads that only receive drop and leave treatments, since the only vehicles that will be used to treat those road sections are passenger vehicles within current traffic usage patterns.

Table H-7. Project roads that will be used to haul logs.

Watershed HUC12 Number	Subwatershed Name (HU12)	Length of Haul Route with each Surfacing type (miles)				Total Length of haul route (miles)
		Asphalt	Bituminous Surfacing	Crushed aggregate or gravel	Native Material	
170102051401	West Fork Lolo Creek			1.1		1.1
170602090203	Kelly Creek-Salmon River			5.0		5.0
170602090204	Allison Creek		0.1	18.2		18.2
170602090206	Berg Creek-Salmon River	1.0	8.3	0.4	0.3	10.0

Watershed HUC12 Number	Subwatershed Name (HU12)	Length of Haul Route with each Surfacing type (miles)				Total Length of haul route (miles)
		Asphalt	Bituminous Surfacing	Crushed aggregate or gravel	Native Material	
170602100505	Hailey Creek-Little Salmon River		0.4			0.4
170603020306	Horse Creek			4.9		4.9
170603020307	Lower Meadow Creek			0.1	5.5	5.5
170603020402	Glover Creek-Selway River			1.6	1.9	3.5
170603030104	Upper Crooked Fork Creek			9.6		9.6
170603030106	Lower Crooked Fork Creek			2.5		2.5
170603030208	Lower Colt Killed Creek			0.08	0.06	0.14
170603030301	Walton Creek-Lochsa River			1.1	6.0	7.1
170603030602	Hungery Creek				0.8	0.8
170603030707	Pete King Creek			2.4	1.6	4.0
170603040101	South Fork Clear Creek			0.7		0.7
170603040201	Big Smith Creek-Middle Fork Clearwater River			8.6	5.2	13.7
170603050201	Upper American River			10.9		10.9
170603050202	East Fork American River			1.5		1.5
170603050203	Elk Creek		0.5	2.5		3.0
170603050204	Lower American River			1.0		1.0
170603050401	Upper Newsome Creek			12.1		12.1
170603050402	Lower Newsome Creek			5.7		5.7
170603050501	Whiskey Creek-South Fork Clearwater River			0.2		0.2
170603060201	Upper Lolo Creek	3.9		28.8	9.5	42.2
170603060202	Musselshell Creek	7.4		10.0	0.1	17.4
170603060203	Eldorado Creek	0.0		33.0	0.4	33.4
170603060204	Middle Lolo Creek	1.1				1.1
170603060401	Upper Orofino Creek	9.2		8.8	1.6	19.5
170603070504	Middle Creek			1.2	0.3	1.5
170603070505	Hemlock Creek				2.1	2.1
170603070601	French Creek	0.0		2.0	2.1	4.1
170603070903	Lower Skull Creek			11.9		11.9
170603071002	Sneak Creek-North Fork Clearwater River	5.8		1.1		6.9
	Grand Total	28.4	9.2	186.7	37.4	261.8

Road maintenance activities, particularly in RHCAs, can result in direct sediment delivery to streams. Road maintenance generally includes surface maintenance (blading), surface replacement, drainage maintenance and repair, vegetation management (brushing, limbing, seeding, and mulching), slide repair (minor slope repair), sign maintenance, and placement and maintenance of access controls. There will be no major road reconditioning required or any opening of roads closed by vegetative regrowth in this project. Following fire suppression efforts in 2015, the arterial roads in fire areas received maintenance to rehabilitate damage caused by fire suppression traffic including some reconstruction of drainage features like water bars and cross-drains and blading to remove ruts, leaving the road surfaces in good condition and ready for project use without any additional roadwork.

Ground disturbance from road blading and ditch cleaning, particularly where the road is immediately adjacent to streams, constitutes the greatest risk from increased sediment introduction. Other activities such as culvert and ditch maintenance may also increase sediment delivery to streams. Brushing may reduce stabilizing vegetation on cut and fill slopes, contributing to sediment effects. Impacts to water quality from these activities include short-term sediment impacts to stream turbidity occurring during the next subsequent substantial rainfall event.

BMPs have been developed to address potential effects to sediment indicators. These BMPs include avoidance of sidecasting materials into streams, avoidance of undercutting sideslopes during ditch maintenance, disposal of waste materials in approved areas to prevent entry into water ways. In all project areas, timber sale contract provisions require BMPs for road maintenance and log haul practices to reduce sediment. The BMPs that will be employed are found in Table 2-5 in the EA. These BMPs also work in concert with the PDFs and Timer Sale Contract Provisions to protect water quality, such as preventing haul during conditions when the roads are saturated (BMP-1, PDF #3, Timber Sale Contract Provisions, and restricting activities such as loading and turn arounds away from road drainage structures like culverts (Project Design Feature #4). Application of road BMPs, have been shown to be protective of water quality and beneficial uses (Seyedbagheri 1996; Elliot et al. 2000).

However at both subwatershed-scale and site-scale there may be increases in sedimentation as a result of increased road use from log hauling. The amount of sedimentation into streams from hauling traffic will be a function of road surface, volume of traffic, and the proximity of hauling to stream channels. The volume of log haul (number of return trips) will depend on the acres treated. Furthermore, the condition and type of surfacing on the haul route is directly related to how much sediment is generated from the travelway surface. Surface graveling has been shown to be effective at reducing erosion from road surfaces, especially at road/stream crossings. Studies have found gravel reduces sediment by 70%–79% (Burroughs and King 1989), but the mitigation effectiveness of gravel with lower quality aggregate. Foltz and Truebe (1995) found that the sediment reduction from the marginal-quality aggregate was 31 percent. As such, aggregate use and addition on roads will mitigate some runoff and sediment delivery off roads at varying levels dependent on the quality of the gravel, i.e. hardness and likelihood of breaking down quickly.

Forest roads within 300 feet of water bodies are the most likely source of sediment to project area streams. There are approximately 92 miles of stream within 300 feet of the haul route, and a summary of the subwatersheds and streams with the highest length of stream within 300 feet of the haul routes is provided in Table H-8. Lolo Creek was found to have the largest length of stream within 300 feet of the haul route at 9.9 miles. Road sections that run parallel to paved roads, such as the 4 miles of the Lolo Creek that is within 300 feet of FSR 100, are expected to be minimally affected by haul activities, since no ground disturbing work would occur to the road prism, such as blading or grading, and traffic would have no effect on erosion, since the pavement prevents the development of ruts and rills in the travelway. The only sediment producing activity associated with paved roads in this project would be ditch and culvert cleaning. Ditch grading was found to increase erosion more than grading the travelway or traffic effects in the wet environment of the Oregon Coast Range, which can be attributed to both a loss of ditch vegetation and ditch armoring (Luce and Black 2001). The paved haul routes in this project are expected to receive minimal ditch cleaning through this project, since they often forest highways that receive regular annual maintenance outside of this hazard tree removal project.

Table H-8. Highest lengths of stream within 300 feet of log haul routes summarized by subwatershed.

Subwatershed Name (HU12 Number)	Total Length of streams within 300 feet of haul route (miles)	Stream Name of longest river stretch in each subwatershed within 300 feet of haul route	Total Length of the stream within 300 feet of haul route[2] (miles)	Relationship / Proximity to Roads used in the project
Upper Lolo Creek (170603060201)	14.8	Lolo Creek	9.9	Parallels FSR 103 for 5.9 miles, which is a gravel haul route, and FSR 100 for 4 miles, which is a paved haul route
Eldorado Creek (170603060203)	13.8	Eldorado Creek	8.4	Parallels FSR 500, which is a gravel haul route
Musselshell Creek (170603060202)	11.0	Jim Brown Creek	4.7	Parallels FSR 100 off-forest, which is a paved haul route
Upper Orofino Creek (170603060401)	7.7	Orofino Creek	5.5	Parallels FSR 250, which is a paved haul route
Sneak Creek-North Fork Clearwater River (170603071002)	7.2	North Fork Clearwater River	6.6	Parallels FSR 247, which is a gravel haul route for 1.1 miles and paved haul route for 5.5 miles
Allison Creek (170602090204)	7.2	Allison Creek	5.7	Parallels FSR 221, which is a gravel haul route
Lower Newsome Creek (170603050402)	5.9	Newsome Creek	6.2	Parallels FSR 1858, which is a gravel haul route

[2] These lengths may be larger than the watershed lengths, since they are the full length of stream within 300 feet of haul routes without regard for watershed boundaries.

Native surface roads have been found to produce more erosion and sediment delivery to streams. Log trucks can damage native surface roads through the creation of ruts. Approximately 37 miles of native surface road will be used for log haul in this project. These native surface roads were reviewed for stream crossings (i.e. streams in the National Hydrography Dataset), and only 12 stream crossings were found on native surfaced roads that will be used for log haul. These 12 stream crossings and the name of each steam are listed in Table H-9. These streams are expected to have an increased likelihood of sediment delivery, since they will have increase heavy-loaded traffic and do not have the mitigating effects that exist in areas where roads are surfaced with gravel or crushed aggregate. These stream crossings were also reviewed for their applicability against BMP# 36, and only the Walton Creek crossing at MP 0.1 on Road 362 meets the PDF criteria of being within 1,000 feet of bull trout and steelhead critical habitat. As such, this crossing will receive additional sediment delivery mitigation through either placing rock on at least 100 feet of the road surface on either side of the crossing or through the placement of sediment filtering devices (e.g. wattles, straw bales, filter fences, etc.) in ditch lines and adjacent to the crossing.

Table H-9. Stream crossings on log haul routes that are located on native surface roads.

Fire Name	Native Surfaced Road #	Mile Post (MP) on Road	Stream Channels Crossed	Approximate MAXIMUM Acres of removal above crossing(s)	Stream Name(s) and proximity to sections of Streams with Impaired Water Quality
Musselshell Creek	535	MP 6.5	1	13	Siberia Creek
Snowy Summit	535	MP 12.2	1	8	Unnamed tributary to Lolo Creek
Woodrat	418	MP 3.8	1	20	Pete King Creek - in headwaters section that is fully supporting beneficial uses
	5503	MP 5.2	1	20	Little Smith Creek
	5503	MP 4.7	1	27	Unnamed tributary to Little Smith Creek
	5503	MP 4.0	1	42	Unnamed tributary to Little Smith Creek
	5503	MP 2.9	1	70	Unnamed tributary to Middle Fork Clearwater
Jay Point	362	MP 1.1 and 1.3	2	76	Unnamed tributaries to Lochsa River - 0.3 and 0.4 miles upstream of section 303d listed for water temperature
	362	MP 0.1	1	76	Walton Creek - 0.1 mile upstream of Lochsa River 303d section listed for water temperature
Wash	443	MP 28.8	1	74	Unnamed Tributary to Meadow Creek
	443	MP 28.7	1	73	Unnamed Tributary to Meadow Creek

Several fire areas have very low acres of total treatment along the roadside and will not have traffic volumes high enough to impact increased sedimentation from roads these fire areas include Boulder, Jay Point, Baldy, Snow, Snow Creek, Lost Hat, and Frenchman Butte. The fire areas with the greatest acres of proposed hazard tree removal with higher potential for increased sedimentation from log haul are Teepee Springs, Woodrat, and the combined Upper Lolo fire areas (Musselshell, Eldorado, May, and Pete Forks) and Snowy Summit.

Tree Harvest and Fuels Treatments

After road treatments, the greatest remaining potential threat to water quality in this project is due to increased erosion and sediment delivery in areas where hazard trees will be removed, i.e. loaded onto log trucks and hauled away, and where fuels treatments are performed to reduce fuel loading on the ground. These activities have the potential to exacerbate the susceptibility of eroding burned soils through compaction, rutting, and displacement of soils.

The effects of recent wildfires on water resources are expected to continue throughout this project, including accelerated soil erosion, potential increases in peak streamflow, and channel morphology and stability changes (including aggradation or downcutting). The rate of vegetative recovery post wildfire is highly variable and depends upon burn severity, exposed soils, amount of vegetation killed by the fire, proportion of basin burned, and precipitation regime (Elliot et al 2010). The potential effects from the recent wildfires may continue for anywhere from two to fourteen years depending upon site conditions (Elliot et al. 2010, Wondzell and King 2003 and Robichaud 2005). Research by Elliot et al. (2010) documented that affects to sediment yields lasted from two to five years, with a likely decrease in rate and intensity each year.

The proposed hazard tree removal will create sedimentation impacts analogous to harvest projects on burned soils. Research shows that the bulk of all harvest related erosion occurs along skid trails, skidding pathways, and temporary roads (Megahan and King 2004). Salvage harvest research has shown that erosion and sedimentation increase proportionally to burn severity and in most harvested areas the roads

and skid trails contribute the majority of sediment (Smith et al., 2011; McIver and McNeil, 2006; Stabenow et al., 2006).

Ultimately, water quality is only affected when eroded sediment reaches streams or other water bodies.

The potential impact of salvage harvest operations on water quality can be substantially reduced through restrictions on where and how work is done. For example, skyline yarding of hand-felled trees minimizes soil disturbance, and has substantially less impact on soils than tractor yarding (McIver and Starr 2001, Karr et al. 2004). Avoiding any activities on sensitive ground such as riparian areas or landslide-prone hillslopes prevents damage to these sensitive areas, as well as areas downstream or downslope (Karr et al. 2004, Beschta et al. 2004). The following is a list of the PDFs and BMPs specifically developed for this project to prevent erosion and sediment delivery to streams from tree removal activities:

1. The proposed treatment units are located outside of RHCAs and therefore are at least 300 feet away from fish bearing streams and at least 50 feet from seasonally flowing, non-fish bearing waters.
2. Harvest will be limited to 200 feet from either side of existing forest roads.
3. In areas with slopes exceeding 35%, cable/winch endlining will be used to yard the logs up or down to forest roads. Machinery will remain on the roads where soil standards are not met.
4. In areas under 35 percent slope and with low levels of existing soil disturbance, ground based harvest systems will be used to remove hazard trees.
5. Limit operating periods to restrict activities in order to avoid saturated soils (indicators include excessive rutting, soil displacement and erosion).
6. Limit Tractor crossings where possible and reconstruct ditchlines at each crossing. Install temporary culverts (or crossing logs) as needed to limit damage of tractors crossing ditchlines.

It is expected that minimal soil displacement, compaction or disturbance would occur with the implementation of the design criteria (See project design features) established to prevent increases in erosion and sediment delivery for this project. Proper application of forestry BMPs (Seyedbagheri 1996) should minimize erosion from treatment units and existing log landing areas. The most recent audit of water quality BMPs pertaining to Idaho Forest Practices Rules indicates the USFS averaged 99% compliance with BMP rules since 1996 (IDEQ 2013). Additionally, hazard tree removal (or extraction) harvest would not occur within Riparian Habitat Conservation Areas, which should prevent stream-adjacent ground disturbance, surface erosion, and transport of sediment to streams.

Table H-3 displays the amount of treatment by subwatershed (USGS HU12), acres of proposed treatment and percent of each subwatershed that would be treated. Roadside tree removal and subsequent fuels treatments will occur in 22 subwatersheds where hazard trees will be removed either by keeping equipment on the road (i.e. Reach from Road Only) or across a larger roadside area through the use of landings and skid trails (i.e. Removal). The 22 affected subwatersheds and the type of proposed hazard tree removal are listed in Table H-3, organized by original administrative unit. The percent of the watershed area that is affected by any of the hazard tree treatments is minimal in all locations. The watershed with the largest percent of area that will receive tree removal and fuels treatments is the Upper Lolo Creek subwatershed where 1.36% of the area will be treated for hazard tree removal.

In 12 affected subwatersheds, roadside hazard trees will be dropped by hand-felling methods and left onsite where they fall (i.e. Drop and Leave, such as Pete King Creek (HU12 #170603030707). In these areas, there is limited potential to affect water quality from these activities, and the action with the greatest potential to affect sedimentation is the treatment of fuels to reduce excessive fuel loading, which would be performed as needed, on approximately 25% of the treated area. See the Fire and Fuels/Air

Quality section for a complete description of the proposed burning activities associated with each treatment prescription. Otherwise, water quality is not expected to be affected in these 12 subwatersheds either at the site or watershed scale when burning is not performed, since the action of creating footprints while hand-felling trees is expected to create minimal site-specific erosion that is not expected to deliver to water resources.

In general, the highest potential impact to water quality from hazard tree removal will occur along the roadside corridors in close proximity to water where ground-based methods are used and skid trails may be constructed. Currently there are no planned skid trails; however, where hazard tree removal does extend to the entire 200' corridor skid trails may be constructed as needed. Of the road segments where ground-based removal methods will be used, the highest impact will be on the areas with moderate and high burn severity. Special Use Design Criteria #38 was developed in part to keep equipment off areas mapped as having high burn severity in the Wash fire area. In these areas, heavy equipment will remain on the road prism to obtain trees that will be loaded on trucks and hauled away. Keeping equipment off severely burned slopes will prevent increased erosion caused by soil displacement and gullies forming along compacted equipment tracks concentrated flow in any ruts created by equipment tracks working on burned soils and will also eliminate the need to construct skid trails. The lower slope impacts will also protect currently recovering understory vegetation and accumulation of litter critical for reducing post-fire surface erosion and sedimentation into streams.

The other two high impact areas are Snowy Summit and Pete Forks, 19% of proposed ground-based harvest on moderately burned slopes is in the Snowy Summit area and 7% is in the Pete Forks fire area. The remaining 11% of the proposed ground-based harvest on moderate and severely burned slopes occur in more fragmented patches across all other Fire areas. The Snowy Summit and the Pete Forks fire areas are benefiting from rapid post-fire recovery with excellent revegetation of understory vegetation and very little areas of exposed soil.

Beyond PDF #38 for Teepee Springs and the Wash Fire, the project will include 12 PDFs to protect water from increased sedimentation, found in Table 2-4 in the EA. Most importantly for reducing erosion from tree removal activities are the following: PDF #3 to prevent equipment operation on saturated soils, PDF #5 to maintain RHCA buffers along all stream channels and to treat landslide prone areas as RHCA zones, PDF #11 to require that in high burn severity areas, logging slash and fine woody debris from tree processing remain on the burned slopes, and our rehabilitation PDF #8 and #9 to recontour and mulch skid trails and decompact and mulch non-excavated skid trails. These required PDFs will reduce sediment delivery by capturing sediment on hillsides and within RHCAs so that they do not reach streams. Riparian buffers can eliminate sediment delivery from harvested areas in areas where RHCAs are intact and are unburned (Smith 2013, Elliot 2013). Skid trails and erosion features like gullies that concentrate flow are primarily responsible for sediment delivery to live water from harvested areas (Slesak et al 2015; Wagenbrenner et al 2015; Litschert and MacDonald 2009), which are unfortunately more likely where RHCAs burned with moderate or high burn severity. Maintaining riparian buffers, i.e. RHCAs, decompacting and mulching skid trails, and processing trees on site to leave slash behind on severely burned soils reduces potential for concentrated runoff to occur, which will prevent the development of gullies or other flow paths, reducing potential sedimentation to insignificant levels (Slesak et al 2015; Wagenbrenner et al 2015; Wade et al 2011, Litschert and MacDonald 2009). Adding slash to skid trails increased total ground cover by 20–30% and was found to reduce sediment yields by 5–50 times (Slesak et al 2015; Wagenbrenner et al 2015; Wade et al 2011; Litschert and Macdonald 2009).

In this project there is some potential of increasing sediment delivery to inside ditchlines adjacent to road segments proposed for the road side hazard tree removal. A potential source of sediment to ditchlines would include that sediment generated by tractor skidding over and/or adjacent to existing ditchlines. Sediment delivered into ditchlines could ultimately be delivered into stream channels. Adoption of PDF # 4 specifically highlights this concern and limits tractor crossings over ditchlines, including potentially

installing temporary culverts in ditchlines as needed. Road surfaces and ditchlines will also be repaired and cleaned immediately following operations to reduce the potential to increase sediment delivery to the ditchlines and streams.

Existing conditions within RHCAs will be maintained since only dead and dying would be removed in discreet locations where hazard trees are threatening to fall on adjacent roads. No fuels treatments would occur in RHCAs, and if needed, materials causing excessive fuel loading would be hand-carried out of RHCAs in order to burn it and reduce fuel loading in RHCAs. All tress in RHCAs that are felled will be left on site. Trees that are felled and left in the RHCAs and elsewhere will serve as sediment traps to further prevent the delivery of sediment to streams (Robichaud et al. 2008). Scattered logging slash will provide soil erosion protection from raindrop impact because of proximity to the ground. As such, it is assumed that all RHCAs would be undisturbed from current conditions; logging would be limited to the driest time of the year to prevent road impacts; and all roads, ditchlines and culverts would be protected and/or repaired if damaged during operations.

The PDFs and BMPs (Tables 2-4 and 2-5 in the EA) associated with this project are designed to minimize impacts to water quality, stream channel stability and riparian areas. Riparian Habitat Conservation Areas would further reduce sediment movement to streams from upslope soil disturbance and help maintain stream channel stability (Belt et al. 1992 and O'Laughlin and Belt 1995). Sediment prevention measures around and near stream crossings and ditchlines would prevent sediment from moving into streams. With the PDFs, BMPs, and intact RHCAs, it is expected that there would be no increased delivery of sediment from the proposed Hazard Tree removal project over existing conditions. The trapping of sediment in RHCAs through felled logs and logging slash may have some site specific benefits over current conditions, since additional sediment could be trapped that would have otherwise be delivered to streams due to current, recently burned soil conditions.

Fuels reduction methods following hazard tree activities can increase sedimentation as a result of loss of litter and woody material (slash, downed trees, etc.). The level of impact from fuels treatment depends on the site, proximity to water, and methods used. In addition to the potential loss of fine material providing soil cover, the greatest potential impacts to water quality from fuels treatment are located along road corridors where equipment tracks or hand lines may concentrate runoff, creating gullies that may deliver sediment outside of the treated road corridors. Consequently, the greatest potential impacts to water quality from fuels reduction activities would be where mechanized equipment are used to pile fuels and handlines are constructed in proximity to live water. Again, specific PDFs were included in this project with the intention of reducing the potential of sediment delivery from these physical processes.

The need for fuels treatments will vary based soil burn severity that resulted from the 2015 fires. Treatments along road segments with low and moderate burn severity will allow mechanized equipment to pile fuels and hand line construction to around roadside corridors where post-harvest slash is judged to require prescribed fire. All Design Criteria will be in effect for fuels treatment as well. The critical design criterion to protect areas from erosion associated with fuels treatment include, Design Criteria #2 limiting tracked equipment operation to slopes less than 35%, Design Criteria #4, Design Criteria #5 limiting fuels treatment methods in RHCAs, and Design Criteria #10, retaining 7-33 tons of Coarse Woody Debris per acre. In addition, where the hazard tree treatment prescription requires mechanized equipment to stay on the roads (Remove from Road in the Teepee and Wash Fire Areas), no mechanized equipment will be used on slopes to pile fuels. In areas of high burn severity, no mechanized equipment will be used to pile fuels regardless of slope. In addition, on slopes classified as high soil burn severity where slash and fine material have been left on site as a part of Design Criteria #12, the material will not be left to protect the burned soils from surface erosion, though the material may be lopped and scattered. In areas where hazard trees are felled and left on the ground, there will be no mechanized equipment used on slopes to pile or treat fuels within the Drop and Leave prescription areas. There will be no hand line construction of severely burned soils.

For all areas, limiting the scope of treatment area and implementing the Design Criteria for fuels and hazard tree removal treatments will help mitigate erosion. Maintaining the RHCAs in their current condition will be critical to prevent sedimentation into stream channels. In general, in areas where fuels treatment removes soil cover to less than 50%, which is unlikely but possible on shallower slopes with lower burn severities and leaves ruts from equipment use, hillslope sediment yield could increase by 1-7 tons/acre. However, with restrictions on equipment use and rehab of all skid trails as well as protecting RHCA buffers, sediment delivery to stream channels from site-specific fuel treatments should not occur and increases in potential hillslope erosion will be incremental and immeasurable beyond existing conditions. Any sediment that is delivered from either natural and or project related activities is expected to be not detrimental to nearby streams or water bodies, particularly once larger precipitation events occur this fall and winter, resulting in a natural flushing of fine sediment that reached water.

Direct Effects by Specific Project Area

Estimating Sediment Yield on the Clearwater side of the Nez Perce-Clearwater National Forests

The Clearwater National Forest Plan (1987) details water quality standards by mainstem river and watersheds (designated as HUC6 or smaller HUC7 watersheds in 1987, now HU12 subwatersheds) with standards based on aquatic habitat values. The Clearwater National Forest uses a geomorphic approach to set instream sedimentation standards. Streams with a higher capacity to transport sediment have higher thresholds of acceptable sediment. The Clearwater adopts channel typing as described by Rosgen Channel Types (Rosgen 1994) to classify the geomorphology of the stream, where A type channels are steep channels with high sediment transport capability, B channels have moderate gradients and higher habitat values with high sediment transport capability, and C channels have lower gradients and many deposition reaches, B and C channel types also have higher habitat values particularly for anadromous fish. The streams and Forest Plan Watersheds are listed below with their geomorphic thresholds in Table H-10.

Table H-10. Proposed Hazard Tree Removal Acres within the Clearwater Subwatersheds and Forest Plan Standards

Subwatershed	Stream Name	Water Quality Objective	Channel Type	Forest Plan Sedimentation Allowed Above	Proposed Acres of Roadside Tree Removal by Burn Severity					
					Ground Based Methods			Cable Based Methods		
					Low	Mod	High	Low	Mod	High
Boulder Creek-Crooked Fork Creek	Boulder	High Fish	B	55	4	11	2	17	22	2
	Upper Crooked Fork	no effect	B	45						
Canyon Creek	Canyon Creek	High Fish	C	55	2	0	0	0	0	0
French Creek	French Creek	Low Fish	B	225	88	42	6	55	29	5
Hungery Creek	Gass Creek	no effect	B	45	24	13	0	6	5	0
	Hungery Creek	no effect	A	100						
	Obia Creek	no effect	A	100						
Walton Creek-Lochsa River	Cliff Creek	High Fish	B	55	63	44	6	65	66	7
	Jay Creek	High Fish	B	55						

Subwatershed	Stream Name	Water Quality Objective	Channel Type	Forest Plan Sedimentation Allowed Above	Proposed Acres of Roadside Tree Removal by Burn Severity					
					Ground Based Methods			Cable Based Methods		
					Low	Mod	High	Low	Mod	High
Big Smith Creek-Middle Fork Clearwater River	Little Smith	High Fish	B	55	154	49	36	0	20	14
	Big Smith	High Fish	B	55						
Eldorado Creek	Lunch Creek	High Fish	B	55	32	11	3	33	12	3
	Two-bit Creek	High Fish	B	55						
	Eldorado	High Fish	C	55						
Musselshell Creek	Musselshell Creek	Moderate	B/C	150	60	14	0	52	15	0
Upper Lolo Creek	Lolo Creek	High Fish	B	55	277	104	21	173	54	6
	Yoosa Creek	High Fish	B	55						
Upper Orofino Creek	Orofino Creek	Low Fish	B	225	52	24	2	42	18	1
Lower Skull Creek	Skull Creek	High Fish	B	55	24	8	0	30	14	2
Hemlock Creek	Hemlock Creek	High Fish	A	110	99	79	32	31	27	18

The 1987 Forest Plan set sedimentation (geomorphic) thresholds using an R1/R4 model adapted for the Clearwater National Forest called WATBAL. Like all the R1/R4 derived models, the WATBAL model is a factor-total model that predicts a natural or base sedimentation rate from a land characteristics and predicts a percentage of sediment delivery to streams from project activities. Unlike the Nez Perce Forest Plan, the Clearwater Plan does not require a particular model to analyze impacts from proposed activities and WATBAL has been retired by the Forest. To understand the potential delivery of sediment to streams from project activities we used several WEPP modules as described in the Methodology section. WEPP output is compared to GEOWEPP predicted erosion in unburned areas of the watersheds to determine the percent over background sedimentation caused by project activities.

Disturbed WEPP was used to estimate the potential delivery of sediment to streams from project activities on the Clearwater side of the Forest at the road segment (hillslope-scale), which is fully described in the Methodology section of the Hydrologist Specialist Report. The hillslope scale modeling works well for the proposed Roadside Hazard tree removal, where road segments will have trees removed from road corridors at a maximum of 200 feet above and below the road. The road segments in each fire perimeter have similar soil textures, climates, and slope characteristics. After conferring with one of the WEPP model developers, Dr. Bill Elliot (2016), the decision was made to run Disturbed WEPP for representative road segments. Values for representative road segments are reported as Hillslope-Scale Potential Erosion and then extrapolated and summed for each subwatershed to determine the total predicted sediment yield per Subwatershed as a result of hazard tree removal for each subwatershed.

The strongest controls on WEPP predicted erosion are changes in vegetative cover, slope length, and climate; for each Disturbed WEPP run, climates were customized for the subwatershed/fire perimeter. With the advice of Dr. Elliot, the following variables were used to evaluate erosion potential. In addition to local climate, the variables account for disturbed area, the change in vegetative cover after tree removal, method of harvest, and burn severity (Elliot pers. Communication 2016).

Table H-11. Disturbed WEPP Input Variables for Proposed Hazard Tree Removal with 1 Year of Post-Fire Recovery (Increase in Vegetative Cover % from 2015)

Proposed Hazard Tree Removal Method (one year after wildfire)	WEPP Designation	Cover %	Rock %
Ground-based on Low Severity Burns	Short Grass	77	15
Ground- based on Moderate/High Severity Burns	High Severity Fire	50	15
Cable on Low Severity Burns	Shrubs	85	15
Cable on High Severity Burns	Tall Grass	77	15

For each treated road segment in a Subwatershed, a value of increased erosion (sediment yield in tons/acre/yr) is generated specific to the method of timber removal, (ground vs. cable logging systems) and burn severity. In each Subwatershed, average values for road segments for each harvest method/burn severity category as describe in Table H-11 are extrapolated to all proposed Hazard tree removal in the subwatershed. The average sediment yield values (tons/acre/yr) summed for all treated road corridors in the subwatersheds are reported in Table H-12 as predicted sediment yield from Project Activities. The sediment yield output for each subwatershed are added to the GEOWEPP post-fire predicted increase in sediment yield. The total subwatershed sediment yield is compared to erosion rates predicted for unburned conditions in the watershed (an average of 10 tons/acre/yr) to calculate a percent over base. The values for hillside erosion are calculated as sedimentation from the hillside, the values do not include a prediction of how much of that sediment is delivered to streams, but assumes that the majority would be available for delivery. The Disturbed WEPP output follows for each Subwatershed on the combined NPC Forest and summarized in Table H-12.

Table H-12. Disturbed WEPP Predicted Sedimentation for Proposed Hazard Tree Removal within Clearwater-side subwatersheds–Hillslope Values Extrapolated to Subwatershed and Calculated Based on Harvest Method and Burn Severity

Watershed (HUC 12) Name	Post-Fire Potential Hillslope Erosion Σ(Tons/acre) for 1 year	Proposed Total Hazard Tree Removal (acres)	Predicted Project Sediment Yield per Subwatershed-based on Removal Method and Burn Severity (ton/yr)	Wildfire+Project Subwatershed Increase over Background (%)
Big Smith Creek-Middle Fork Clearwater River	777	223.9	0.55	0.07%
Boulder Creek-Crooked Fork Creek	875	0.04	0	0.00%
Canyon Creek	26	1.3	0	0.00%
Deadman Creek	no data	1.1	0	no data
Eldorado Creek	545	134.4	0.19	0.03%
French Creek	565	69.2	6.8	1.20%
Hemlock Creek	616	35.6	7.04	1.14%
Hungery Creek	2777	7.1	0.7	0.03%
Lower Skull Creek	1521	70.0	2.41	0.16%
Musselshell Creek	29	29.4	0.8	2.75%
Upper Crooked Fork Creek	1688	8.5	0.33	0.02%
Upper Fish Creek	no data	0.8	0	no data

Watershed (HUC 12) Name	Post-Fire Potential Hillslope Erosion Σ(Tons/acre) for 1 year	Proposed Total Hazard Tree Removal (acres)	Predicted Project Sediment Yield per Subwatershed-based on Removal Method and Burn Severity (ton/yr)	Wildfire+Project Subwatershed Increase over Background (%)
Upper Lolo Creek	1123	365.4	23.24	2.07%
Upper Orofino Creek	247	80.4	5.64	2.29%
Walton Creek-Lochsa River	1326	76.3	0	0.00%

Estimating Sediment Impacts on the Nez Perce side of the Forest: NEZSED

Sediment delivery to water bodies was evaluated using the NEZSED model where input data was available, i.e. within areas of the old Nez Perce National Forest. The NEZSED model estimates watershed-scale sediment yield based on a suite of landscape characteristics (topography, slope position, habitat type, soils) and type of management activity proposed. The NEZSED model was derived from the R1/R4 Guide for Predicting Sediment Yields from Forested Watersheds (Cline et. al 1981). The methodology for using the NEZSED model and the model's limitations are described in detail in the Forest's guidance document, Implementation Guide to Appendix A of the Nez Perce National Forest Plan (Conroy and Thompson 2011). Sediment yield is reported as "percent increase over base" conditions. Sediment yield is calculated for base conditions (without management activities), current conditions (cumulative of past and existing management activities combined with base conditions), and predicted conditions (cumulative of past, existing, and proposed activities combined with base conditions) for the proposed action.

Inputs to the NEZSED model include information on Land System Inventory data (soils, vegetation, geologic parent material, landforms), proposed activities, mitigation measures, and information on roads. NEZSED inputs include the hazard tree removal methods as prescribed by project specialists, typically tractor for slopes less than 30% and skyline for roadsides of slopes greater than 30%. Fuels treatment were assumed in all removal areas at low intensity in Teepee and Wash areas, and drop and leave areas were assumed to receive no fuels treatment since the drop and leave prescription is often in RHCAs. It is unlikely that fuels treatment will occur in all removal areas, especially at a contiguous low intensity. These assumptions (i.e. low intensity burn in all removal areas) were assumed in the model to provide overly conservative estimates of sedimentation, i.e. worst-case scenarios. Areas that receive fuel treatments are more likely to burn in a mosaic pattern containing burned and unburned areas. The unburned areas would retain ground cover that could catch and store any erosional material generated from the burned areas

Sediment yields from five sources are included in the NEZSED analysis: natural sources, recent fires, recent and proposed timber harvest, roads, and proposed road projects. Since the exact locations of fuels treatments are currently unknown, an assumption was included in the model that all areas where trees would be removed would receive the equivalent of a low prescribed burn. This assumption is believed to be conservative, since the areas of tree removal measure about a third of the maximum total project area, as compared to the 25% of area that is expected, and because the removal areas are expected to have the highest likelihood of water quality impacts due to the mechanized equipment that will be used.

Recent fires, both wildfire and prescribed burns, included in the model extended back to 2013, since sediment yields usually are the highest the first year after a fire and then decline in subsequent years. Robichaud and Brown (1999) reported first-year erosion rates decreased by an order of magnitude by the second year and then down to no sediment by the fourth year in an unmanaged forest stand in eastern Oregon. NEZSED assumes a similar erosion pattern that extends down to no erosion by the fifth year

after the fire occurred. Erosion from recent wildfires varied in the model based on burn severity and land type.

Recent timber harvest included in the model comprises projects implemented since 2011. Upcoming BAER road treatments intended to protect roads from failure were included as applicable, which are expected in 2016 in the Teepee area and were implemented in the Wash fire area in 2015. Sediment yields from these sources are modeled from the year 2015 (pre-fire conditions) through 2020, when steady-state conditions are reached, i.e. both tree removal and fuels treatments within this project are assumed to no longer contribute to stream sediment yield. Sediment contributions from log haul were evaluated qualitatively, since NEZSED does not predict sediment yield increases related to increases in traffic on already open roads. Impacts on non-National Forest lands are not evaluated under NEZSED due to lack of the necessary input data.

NEZSED results for the Teepee and Wash areas are found in Table H-13 and H-14. These results only represent the highest year of potential sediment delivery, which was 2016 in both of these fire areas, and the values have been routed to the outlet of true watersheds. NEZSED was not run for the Baldy fire area since a maximum of 37 acres of trees would be removed from the Upper Newsome Creek subwatershed (HU12 # 170603050401), which measures a total of 24,521 acres in area. During implementation, the exclusions of RHCAs is expected to reduce those 37 acres further. The proposed activities of removing the dead or dying trees from such a small area located on a ridgetop, in combination with some potential fuels treatment, were considered to be minimal ground disturbance and not an "entry" as described in the Forest Plan (Conroy and Thompson 2011).

Table H-13. Teepee Springs Fire: NEZSED Modeled Percent Sediment Yield Increases for Prescription Watersheds under current conditions, with proposed hazard tree removal, and all other upcoming projects

Forest Plan Prescription Watershed	Average Annual Base Sediment Delivery (Tons/yr)	Estimated Sediment Delivery from different sources in Peak Year of 2016 (Tons/yr)				Percent Over Typical Base Sediment Delivery Rate from (percent)			Allowed in Appendix A
		Current Roads and Past Harvest Activities	Recent Wildfires (2013-2015)	Proposed Hazard Tree Project	All other upcoming Projects	Roads, Past Activities & Recent Wildfire	Proposed Project, roads, past activities & recent wildfire	All Existing and Proposed Activities	Percent Over Base threshold in Forest Plan
ALLISON CREEK	556	19	43	4	23	11%	12%	16%	45%
BERG CREEK	257	0	2	0	0	1%	1%	1%	70%
GUS CREEK	78	3	10	0	1	17%	18%	19%	70%
KELLY CREEK	212	0	5	0	2	2%	2%	3%	60%
PLANT CREEK	13	4	9	2	9	98%	111%	182%	70%
UPPER LITTLE SLATE CREEK	148	0	0	0	0	0%	0%	0%	30%
VAN CREEK	212	3	16	1	4	9%	9%	11%	60%
WEST FORK ALLISON CREEK	248	4	22	0	4	11%	11%	12%	45%

Table H-14. Wash Fire: NEZSED Modeled Percent Sediment Yield Increases for Prescription Watersheds under current conditions and all other upcoming projects (proposed project is only upcoming project)

Forest Plan Prescription Watershed	Average Annual Base Sediment Delivery (Tons/yr)	Estimated Sediment Delivery from different sources in Peak Year of 2016 (Tons/yr)			Percent Over Typical Base Sediment Delivery Rate from (percent)		Allowed in Appendix A
		Current Roads and Past Harvest Activities	Recent Wildfires (2013-2015)	Proposed Hazard Tree Project	Roads, Past Activities & Recent Wildfire	All Existing and Proposed Activities	Percent Over Base threshold in Forest Plan
UNNAMED NO. 11	50.0	0.6	0.0	2.6	1%	6%	70%
FALLS CREEK	306.3	5.2	0.0	2.3	2%	2%	50%
UNNAMED NO. 27	75.1	0.3	0.0	1.1	0%	2%	70%
UNNAMED NO. 28	75.7	2.9	0.0	14.7	4%	23%	70%
UPPER MAIN HORSE CREEK	128.7	4.0	0.0	2.5	3%	5%	NA
EAST FORK HORSE CREEK	137.6	0.1	0.0	0.1	0%	0%	NA
MEADOW CREEK (True Watershed)	3521.9	7.9	0.0	12.5	0%	1%	30%
UPPER AMERICAN RIVER	166.0	4.3	0	4.8	3%	6%	30%
AMERICAN RIVER (True Watershed)	317.2	15.7	0	9.0	5%	8%	30%
FLINT CREEK	110.0	6.6	0	0.6	6%	7%	30%
EAST FORK AMERICAN RIVER (True Watershed)	195.3	7.9	0	0.5	4%	4%	30%

The sediment yield estimated using the NEZSED model is only appropriate for use in determining relative amounts sediment from different land management activities and should not be construed as accurate amounts of sediment that will be delivered to streams. Any sediment generated on-site during these activities is unlikely to be delivered to streams with proper application of the PDFs listed in Table 2-4 and the Water Quality BMPs listed in Table 2-5, yet the NEZSED model does not take into account the preventative effects of these mitigation measures.

In all subwatersheds in the Teepee and Wash fire areas, the expected increase in sediment delivery over base rates is well below Forest Plan thresholds, with the exception of the Plant Creek prescription watershed in the Teepee fire area. The Plant Creek subwatershed in the Teepee fire area is a small watershed compared to the other prescription watersheds, measuring only 356 acres or 0.6 mi2 in area. This entire watershed burned in 2015, creating an excessively high sediment delivery estimate from recent wildfires of 9 tons/yr in 2016, which is equal to 69% of the natural sediment delivery rate. Furthermore, some practitioners consider wildfire to be part of the natural system and a part of the Average Annual Base Sediment Delivery, thus they argue it should not be added into the total percent over base when comparing land management activities to the Forest Plan Appendix A thresholds. In this case, the estimated sediment amount was displayed herein to demonstrate the relative cumulative impacts of all activities in this small watershed.

The only proposed activities in Plant Creek include harvest tree removal, drop and leave hazard tree treatments, and BAER roadwork to stabilize and protect the roads from failing. The BAER roadwork is expected to have a greater impact on sediment delivery in Plant Creek than any of the proposed hazard tree treatments, with a peak estimated sediment delivery rate in 2016 of an additional 71% over base for the road treatments and 13% over base for the hazard tree treatments, but these estimated values do not account of all of the PDFs and BMPs that will be employed to reduce sediment delivery rates. Installation

of the BAER road treatments will stabilize the road and reduce the potential for sediment transport to streams, increased turbidity, and suspended sediment that would occur if road segments or culverts fail. As such, the proposed activities are considered to be compliant with Forest Plan standards since they are intended to improve instream conditions over current conditions and reduce the impacts of roads and wildfire on water quality objectives.

3.6.2.2 Cumulative Effects

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Cumulative water quality impacts can result when the proposed activity (Roadside Hazard Tree treatment) are added to other past, present and reasonably foreseeable future actions that are spatially and temporarily connected. This analysis will disclose the spatial and temporal connections between the proposed action and other past, present and reasonably foreseeable future actions to identify potential areas of overlap, specifically with regard to impacts on water quality. In areas where project effects overlaps are identified at the subwatershed-scale, a closer look at the specific water resources impacted will help determine the significance of the cumulative impacts on water quality.

At the subwatershed-scale, activities that affect water quality are primarily those involving roads and timber harvest projects with related fuel reduction on federal, state, and private lands. Forest databases (e.g. FACTS and the Forest's Schedule of Proposed Actions) were queried to identify past and upcoming activities in the same subwatersheds where the water quality impacts from the proposed Roadside project are expected. Watershed and instream restoration projects also affect water quality, and thus were included in this cumulative effects analysis. A complete table of the projects identified that effect water quality in the same subwatersheds as this proposed action and a qualitative assessment of subwatershed-scale cumulative effects can be found in the Hydrology Specialist Report, Appendix 4.

Management activities that were excluded from more detailed analysis include mining, recreational road and trail use, and grazing. Mining (primarily in-stream suction dredging and placer mining in the fire areas constituting the Upper Lolo area) and recreational road and trail use may impact water quality at the site-scale; however, these site-scale sedimentation impacts do not overlap spatially with the road segments proposed from treatment. Further, mining activities are conducted under Forest Service permits and include BMPs designed to limit the impact of mining to water quality. Grazing activities do occur in project subwatershed and in areas where cattle concentrate near streams, grazing activities will result in sedimentation; however, the impacts of cattle grazing do not overlap spatially with the proposed Roadside project. Grazing on state and private lands are not spatially connected to the proposed project areas.

To determine the areas of highest potential for cumulative water quality impacts, forest databases (e.g. FACTS and the Forest's Schedule of Proposed Actions) and the Forest NEPA program of work were queried to identify past, ongoing, and upcoming activities in the same subwatersheds where water quality impacts from the proposed Roadside project may occur. Appendix 4 of the Hydrology Specialist Report includes the names and descriptions of projects that affect water quality in the same subwatersheds where the proposed action is located. Recently completed projects that were still be affecting water quality were assumed to have been implemented no earlier than 2010, other than any road prisms that still exist on the landscape, even if they are not drivable. The following proposed harvest projects were reviewed and were determined to not contribute cumulatively to the effects of this project on water quality because their spatial boundaries do not overlap with the subwatersheds where Roadside hazard tree removal will occur: Orogrande Fuels near but not overlapping with Snowy Summit treatments and the Bureau of Land Management's Lolo 80 Salvage (near the treatments in the Upper Lolo area).

Qualitative cumulative risk ratings were assigned to subwatersheds affected by this project where the projects identified has some potential to affect water quality. These cumulative risk ratings were assigned

in order to prioritize subwatersheds for further in-depth review of specific water body effects based on the relative risk for cumulative effects. Risk ratings were assigned based on the relative impacts expected from both the proposed action and the projects whose effects overlap in space and time. In areas where the proposed action could have some effect to water quality, but those effects are expected to be minimal or immeasurable, the subwatershed was given a relative risk rating of "Minimal to none." In subwatersheds where the proposed action has the potential for some site-specific measurable impacts, then the relative amount of water quality effects from other projects was used to determine the cumulative risk rating. Subwatersheds in this category were then given a risk rating of either "Minimal to none," "Low," "Moderate," or "High" based on the likelihood of measurable water quality impacts in both the proposed action and the cumulative projects. Appendix 4 of the Hydrology Specialist Report details the cumulative risk rating given to each subwatershed where additional projects were identified that could affect water quality.

Table H-15 summarizes the four subwatersheds that were found to have the highest cumulative effects risk ratings in this project, all of which were given a rating of "Moderate." In all of these subwatersheds, large timber harvest projects were either implemented recently, ongoing, or upcoming. These projects included a suite of commercial thinning, salvage harvest, regeneration harvest, and the associated road activities that accompany such projects. These subwatersheds also have a larger than average concentration of proposed activities in this project, typically including several hundred acres of hazard tree removal, drop and leave, and fuels reduction treatments and anywhere from 14 to 42 miles of log haul on unpaved roads. At the subwatershed-scale, there is not enough information to determine if the impacts of these actions would cumulatively effect the same water bodies; rather, these four subwatersheds are the locations where detailed review and analysis is needed to determine if the impacts on water quality from the listed projects is additive and potentially detrimental.

Table H-15. Subwatersheds affected by the Proposed Project of the highest concern for cumulative effects for water quality.

Watershed Name and Number (HU12)	Roadside Hazard Tree Activities	Cumulative Project Name	Cum Proj Date	Cumulative Project Actions that affect water quality now or into the future
Eldorado Creek (170603060203)	134 acres of removal, 33 miles of haul on gravel roads, 0.4 miles haul on native surface roads	Lochsa Thin	2015	Approx. 1027 acres commercial thin, 3.9 miles temp road
		Lolo First 50 Rd Decom	2016	6.5 miles road decommissioning
		Lolo Insect and Disease	2019	Approx. 1100 acres regen harvest, 7.5 miles temp road
Upper Orofino Creek (170603060401)	80.4 acres of removal, 19.5 miles of haul on a mix of paved, gravel, and native surfaced roads	Preacher Dewey	2014	Approx. 90 acres regen, 700 acres commercial thin, 260 acres roadside thinning/pruning, 2.1 miles permanent road construction, 1.5 miles temp road
Upper Lolo Creek (170603060201)	365 acres of removal and 80 acres of drop and leave, 42 miles of haul on a mix of paved, gravel, and native surfaced roads	Collett Mine	2015	watershed restoration project, approximately 20 acres streamside rehab
		Lochsa Thin	2015	Approx 200 acres commercial thin, 0.2 miles temp road
		Lolo First 50 Rd Decom	2016	27.7 miles road decommissioning
		Lolo Insect and Disease	2019	Approx. 785 acres regen harvest, 1.4 miles temp road

Watershed Name and Number (HU12)	Roadside Hazard Tree Activities	Cumulative Project Name	Cum Proj Date	Cumulative Project Actions that affect water quality now or into the future
Big Smith Creek-Middle Fork Clearwater River (170603040201)	224 acres of removal, 100.5 acres of drop and leave, 8.6 miles of haul on gravel roads, 5.2 miles of haul on native surfaced road	Interface Fuels II	2011	1400 acres commercial thin, 1.5 miles temp road
		Lodge Point Stew	2014	Approx. 1800 acres commercial thin, 5.8 miles
		Woodrat BAER	2015	Replace/upgrade 4 culverts on streams, including Little Smith and Swan Creeks
		Woodrat Salvage 2016	2016	Approx. 380 acres savage, 20 miles of road reconstruction, 12 miles of road recondition, and 1.3 miles of road stabilization

Most 2015 fires areas have some BAER road treatments either recently completed or upcoming this summer that are intended to protect critical infrastructure and protect water quality. BAER road treatments includes a range of activities including armoring or installing drain dips, installing water bars, removing culverts and installing water bars, and replacing stream-crossing culverts with larger capacity culverts. Specific prescriptions have been determine for specific road segments, and the specific treatments are listed below under each fire name. BAER Treatments will include 27 culvert upgrades and approximately 43 miles of road drainage improvement with cross-drains and grading of Forest Roads in the project area.

Over the long term, installation of BAER road treatments would stabilize roads and reduce the potential for sediment transport to streams and increased turbidity and suspended sediment that would occur if road segments or culverts fail. Although these activities provide long-term benefits, the ground disturbance employed to install such features loosens soil and increases the amount of fine sediment available for transport. Additionally, the replacement of stream crossing culverts will require some excavation of stream material, placement of a new pipe, and replacement of fill material. Some direct excavation within the channels would need to occur to provide an adequate size and condition of the bed prior to laying each new pipe. Although best management practices will be used to minimize the actual sediment introduced to the stream during culvert replacement activities, there is no way to completely avoid sediment introduction and disturbance of stream channels in this process. Fortunately, all work is expected to be completed when the streams are dry, either by limiting construction work to the time when streams are naturally dry or manually dewatering the channel using pumps and hoses to route water around the construction area. Erosion and potential sediment delivery would occur when water returns to flowing against disturbed stream channel and banks since loose fill material and soil will be mobilized. As transportable material is removed from the disturbed site, the turbidity levels decrease rapidly to near pre-project levels and are expected to last typically only a few hours but no more than 2-3 days.

The BAER Road work proposed in this project will increase sediment yield to streams in all prescription watersheds, but the resultant sediment yield increase over base would remain below Forest Plan standards in all prescription watersheds except Plant Creek. Plant Creek is an extremely small watershed, measuring only 0.6 square miles, and has multiple switchbacks associated with Forest System Road 263. The combination of hazard tree removal, log haul, and the culvert replacements included in the BAER road treatments in such a small compact area is expected to have a large potential for cumulative delivery of sediment to streams. Fine sediment is expected to delivery directly to Plant Creek, particularly at stream crossings. These effects would be relatively short term pulses of increased turbidity and sediment movement in Plant Creek and some tributary streams where culvert replacements will occur. If sediment does reach flowing waters, it is likely to settle out in proximity of the construction site. These short term

effects will likely only occur at the site scale, and are not expected to propagate downstream to Allison Creek or other fish-bearing streams.

The Lolo 1st 50 Road Decommissioning Project removes approximately 24 miles of system and non-system roads in the Lolo Creek watershed. About 1 cubic yard of sediment would be added to streams during the removal of 96 culverts (based on Foltz et al 2008). This amount of sediment is considered negligible due to the large dispersed area over which activities would occur (all Forest managed acres within Lolo Creek). There will likely be short-term sediment impacts from road decommissioning activities, but long-term benefits. The first 12 miles of road decommissioning will begin in 2016 and the remaining in 2017. Other than occurring concurrently in the Lolo Creek Drainage, the actions in the Roadside project are not spatially connected in any way to the road decommissioning and removing hazard trees will not add to the short-term, site-specific sediment impacts from road decommissioning

The Lolo 1st 50Road Decommissioning Project and the proposed Lolo Insect and Disease project will evaluate whether the additional road construction, reconditioning, and related log hauling will result in significant impacts to water quality from these proposed actions along the road system. The limited scope of the hazard tree removal, the location of road treatment on the upper ridgelines greater than 1000' from live water will ensure the roadside treatments will not result in levels of sedimentation that will create additional impairment to water quality when added to these harvest projects.

In reviewing the projects identified within the Eldorado Creek subwatershed, a singular overlap of projects was identified in the haul route between the proposed action and the Lolo Insect and Disease project. This haul route includes approximately 7 miles of a gravel surfaced road (Road # 5107) that will be used to remove approximately 20 acres in this project and 245 acres of regeneration harvest in the Lolo Insect and Disease project. These log haul routes will cross Trout Creek on Road # 5107, and Trout Creek has been identified as an impaired stream for water temperature with an approved TMDL (IDEQ 2011). These projects are expected to have no effect on water temperature from current conditions since RHCAs around these streams will be maintained and left untreated in both projects, but there is an increased chance of sedimentation in streams crossing the Road #5107, including Trout Creek, since removing that many acres of trees would result in several hundred log trucks traveling down this road and breaking down the gravel road surfacing and road prism edges. The majority of impacts on this road will be more directly related to the Lolo Insect and Disease project, and that project is still in the planning phase. It is uncertain if the units on Road # 5107 (i.e. units 15a, b, c, d, and e) will remain a part of the project. Because the likelihood of cumulative impacts is uncertain at this time, no additional mitigation is required in this project to address potential cumulative effects. The effects from this proposed project on these streams are expected to be minimal with proper application of the BMPs listed in Table 2-5.

In Upper Lolo Creek, the only overlap of water quality impacting activities was in the vicinity and uphill of Camp Creek, which is listed as fully supporting its beneficial uses in the most recent 303(d)/305(b) Integrated Report (IDEQ 2012). In this area, this project is proposing 2 acres of incidental drop and leave in RHCAs, a maximum of 9.7 acres of hazard tree removal. More importantly, several haul routes in this project are stacked on the hillside above Camp Creek, adding up to approximately 10 miles all on the same contributing hillside to Camp Creek. The Lolo Insect and Disease project also has identified 66 acres of regeneration harvest on this same hillside. Again, with proper BMP application, log haul and road maintenance in this proposed action are expected to have minimal sediment delivery to streams, and without knowing if the Lolo Insect and Disease project will retain these units (i.e. units 110, 11d, and 11b), then no additional mitigation is required in this project to address potential cumulative effects.

In the Big Smith Creek-Middle Fork Clearwater River subwatershed, the proposed log hauling from the Woodrat fire area will occur primarily along the arterial Forest Roads #101 and #5503. Hazard tree removal along these roads are only a few miles from U.S. Highway 12, so hauling routes will be short, primarily on graveled roads. Much of the proposed Roadside Hazard tree removal overlaps with edges of harvest units proposed as a part of the Woodrat Salvage project. Plans for Woodrat Salvage are ongoing;

however, it is likely the Forest will proceed with this project and, in this case, the portions of the Roadside treatment areas that overlap with the Salvage project will be incorporated into the Woodrat Salvage Project, so the total cumulative impact from the Roadside project will be even smaller than proposed. In addition to hauling from proposed timber removal activities, BAER road treatments will include 4 culvert replacements and approximately 16 miles of road drainage improvement with cross-drains and grading. The effects to the road system in the Woodrat Fire area from project activities will likely have short-term impacts to water quality; however, the impacts log haul in Roadside project will not add measurably to other harvest activities and the road maintenance work will result in some reduction of sedimentation along road #455. Proposed road prism maintenance, especially along the shorter native surfaced roads will result in some short-term sediment impacts to streams, but it will be a longer term benefit and enhance the benefits from implementing the BAER work.

Consistency with LRMP and Other Relevant Laws, Regulations, Policies and Plans

The Hazard Tree Removal project was designed to meet the Clean Water Act, Idaho State Water Quality Standards, Idaho Forest Practices Act, Idaho Stream Channel Protection Act, and Executive Orders 11988 and 11990. All major streams in the project area would have improved or maintained water quality conditions and would continue to support beneficial uses. Implementation of either alternative should comply with these plans, regulations, and statutes.

Forest Plan standards for water (Nez Perce pages II-21 to II-22 and Appendix A and Clearwater pages II-27 to II-29) apply to this project, and compliance would be achieved via project design features, BMPs, effects analyses, and field reviews (Table H-16).

Table H-16. Compliance with Forest Plan Water Standards

Standard Number*	Subject Summary	Compliance Achieved By following strategy
Nez Perce Forest Plan Standards		
1	Apply Idaho State Water Quality Standards and Best Management Practices	Project design features, SWCPs and BMPs are listed in the Hydrology Specialist Report, Appendix 1.
2	Utilize R1/R4 sediment yield and R1 water yield guidelines	Included in the Effects analysis
3	Evaluate site-specific water quality effects	Field reviews were conducted in 2015 and 2016.
4	Complete watershed cumulative effects analysis	A cumulative watershed effects analysis for the affected watersheds was completed for this project.
8	Meet fish and water quality objectives in Forest Plan Appendix A.	Project design features are listed in the EA and included in the body of this report. SWCPs and BMPs are listed in the Hydrology Specialist Report, Appendix 1.
Clearwater Forest Plan Standards		
a	Secure favorable conditions of flow by maintaining the integrity and equilibrium of all stream systems in the Forest.	Project design features are included in the EA and the body of this report. SWCPs and BMPs are listed in Appendix 1
b	Manage water quality and stream conditions to assure that National Forest management activities do not cause permanent or long-term damage to existing or specified beneficial uses.	Field reviews conducted in 2015 and 2016. A cumulative watershed effects analysis for the affected watersheds was completed for this

Standard Number*	Subject Summary	Compliance Achieved By following strategy
		project. Project design criteria (included in report) and BMPs/SWCP are listed in the Hydrology Specialist Report, Appendix 1.
c	Apply best management practices (BMP) to project activities to ensure water quality standards are met or are exceeded.	SWCPs/BMPs are listed in the Hydrology Specialist Report, Appendix 1.

* Nez Perce Standards 5, 6 and 7 address hydro-electric power developments and do not apply within the context of this project. Clearwater Standards d through n do not apply within the context of this project.

3.7 Heritage

3.7.1 Affected Environment

The USDA Forest Service is mandated to comply with the National Historic Preservation Act (NHPA) of 1966 [Public Law 89-665] and its amendments. Section 106 of the NHPA requires that Federal agencies with direct or indirect jurisdiction over Federal, federally assisted, or federally licensed undertakings afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity for comment on such undertakings that affect properties included in or eligible for inclusion in the National Register of Historic Places (NRHP) prior to the agency's approval of any such undertaking: [36 CFR 800.1]. Historic properties are identified by a cultural resource inventory and are determined to be either eligible or not eligible by the cultural resource specialist in consultation with the State Historic Preservation Office (SHPO). Sites that are determined to be eligible are then either protected in-place or adverse impacts must be mitigated.

3.7.2 Environmental Consequences

3.7.1.1 Alternative 1- No Action

No ground disturbing activity would occur and thus no cultural resources would be directly affected by this project. As trees fall, the potential for indirect impacts to cultural sites would increase. Impacts could include trees falling directly on known or unknown sites, sites being uncovered as trees uproot or through runoff events magnified by a lack of maintenance on the forest infrastructure. Additionally, many cultural sites on the Nez Perce-Clearwater are historic roads and trails. Without maintenance, the no action alternative may negatively affect these culturally important roadways.

3.7.1.2 Alternative 2- Proposed Action

There are 18 cultural resource sites located within proposed project activity areas. Of these 18 sites, four sites have been determined to be eligible for the National Register of Historic Places while two sites are unevaluated and 12 sites are not eligible. For the four sites eligible for the National Register of Historic Places and two unevaluated sites, mitigation measures would be developed in consultation with the Idaho State Historic Preservation Officer (SHPO) in order to achieve a no adverse effect determination prior to project implementation.

3.7.1.3 Cumulative Effects

Because all project activities would be conducted consistent with the National Historic Preservation Act, the Nez Perce National Forest Plan, Clearwater National Forest Plan and the MOA regarding the Nez Perce-Clearwater National Forests Road, Recreation, Administrative Maintenance and Area Salvage Projects, the implementation of these activities would result in "no adverse effect". Thus, there is little potential for project activities to produce or contribute to negative effects that would be cumulative with other actions.

3.8 Timber and Economics

3.8.1 Affected Environment

A. Economic Resource

The Road, Administrative and Recreation Site Maintenance project is located in Idaho and Clearwater Counties in Idaho. Many towns and communities within these counties rely on the forest products industry for employment and revenue associated with timber harvest activities. These communities would experience economic effects as a result of the proposed timber sale.

Timber harvest and processing requires the employment of loggers, equipment operators, mill workers, and a variety of workers in preparation and support roles, such as foresters and accountants. Approximately 11,740 workers, earning over $429 million, were employed in the forest products industry (FPI) in Idaho in 2014, which represents 1.7 percent of all wages and salaries in the state. Of every 10 existing jobs in the FPI, seven jobs in other industries are supported through spending and other means. In addition, forest products industry jobs provide a higher income and socio-economic status to the average worker in Idaho than many other professions. The average salary of a forest products industry worker is $52,000 per job, which is about 37 percent higher than the Idaho average of $36,000 for all non-agricultural jobs. (Simmons et al. 2014).

Reports indicate that the ten Idaho counties north of the Salmon River (Benewah, Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce, and Shoshone,) rely more heavily on the forest products industry than the rest of the counties in the state. This area includes the Nez Perce-Clearwater National Forests, which are located in Idaho and Clearwater counties. In a report released by the Rocky Mountain Research station in 2014, the authors found that less than 20 percent of the state's economic activity is in northern Idaho; however, $420 million out of $743 million in statewide forest industry labor income, (which amounts to 57 percent,) is in these northern Idaho counties (Simmons, et al. 43). Typically 80 percent of all timber harvested from both public and privately-owned timberlands within the ten-county area is also processed at facilities within this area, indicating that the majority of jobs and revenue associated with timber harvest have local impacts in communities in Idaho.

B. Geographic Scope

Project Area: This project is located in the state of Idaho within Idaho County, on the Salmon River, Red River, Powell, North Fork, and Lochsa Ranger Districts of the Nez Perce-Clearwater National Forests. The road segments that comprise this project are within the fire perimeters of the Teepee Springs, Wash, Woodrat, Baldy and other 2015 fires.

Effects Analysis Area: The geographic scope for direct, indirect, and cumulative effects analysis will focus on economic impacts in Idaho, Clearwater, Lewis, and Nez Perce Counties. These are the four counties most likely to be impacted by the proposed timber sale due to their geographic proximity to the project. Processing facilities such as sawmills, pulp mills, post and pole plants, and cedar products manufacturers exist within these counties and would likely purchase and/or process some amount of the wood products harvested from this sale. In addition, these counties contain many towns and communities where forest products industry workers live, work, and spend money, which would contribute to the economic effects of the sale.

C. Methodology

Economic effects and economic feasibility were analyzed for each alternative. Economic effects were measured in terms of changes to jobs, income, and revenue available to local economies as a result of

implementing the alternatives. Economic feasibility was measured by calculating estimated sale value, implementation costs, and present net value of the sale.

The Nez Perce and Clearwater National Forest Plans place value on "nonpriced benefits" such as dispersed recreation, cultural resources, wildlife habitat, visual quality, and anadromous fisheries (Clearwater National Forest Plan, Environmental Impact Statement Vol II, Appendices Part A and B, pages B41-44 and Nez Perce National Forest Plan, Appendix B, pages 51-142). This economic analysis would not revisit the non-priced resource values presented in the Forest Plans and would focus only on those costs and revenues associated with implementing the proposed timber harvest activities within the project area.

Timber Harvest Related Jobs and Income

Annual economic outlook reports for the forest products industry in Idaho and Montana are produced by the University of Idaho and the University of Montana's Bureau of Business and Economic Research. These reports use economic data from the Forest Industries Data Collection System and the IMPLAN model to quantify growth, trends, and changes in the forest products industry. The findings from these reports were used in this analysis to calculate the expected economic effects of the proposed activities within the four-county analysis area.

In Table TE-1 the findings from these reports are listed. The expected economic effects of timber harvest are quantified by the amount of employment or revenue that results from every 1 million board feet (MMBF) of timber harvested.

Table TE-1: Economic Result per MMBF of Timber Harvested

Forest products industry Jobs Sustained	18 jobs per 1.0 MMBF
Revenue to Communities Through Wages and Salaries	$528,000 per 1.0 MMBF
Revenue to Communities Through Sales of Goods and Services	$3,200,000 per 1.0 MMBF

[1] Source: Cook, et al. "Idaho's Forest Products Industry Current Conditions and 2015 Forecast."

Sale Feasibility

The USFS Region One Sale Feasibility Spreadsheet was used to calculate appraised value, sale feasibility, and present net value of the proposed project. Appraised value is calculated by first estimating the cubic and board foot volume of the sale. Volume is determined by stand composition, tree species and size, and burn severity within the project area. A variety of methods were used to estimate sale volume for this project, including field visits and reviews by USFS foresters, field data collected and shared by USFS roadside salvage crews, the USFS stand exam database, and information from 2015 Burned Area Emergency Response (BAER) reports.

After an estimate of sale volume was determined, cost estimates were made for activities associated with harvesting and hauling the timber, such as logging systems costs, haul distance, slash disposal, and road maintenance costs. These estimates were derived from USFS cost guides and recent similar sales in the vicinity. The monetary value of the timber is used to implement these activities. The R1 Sale Feasibility Spreadsheet uses local delivered log prices, stump to mill costs, and recent transactional evidence from local timber sales to arrive at the appraised sale value. A predicted high bid is also calculated, which is the amount the Forest Service expects to receive from bidders above the appraised value. This is based on recent bidding history with similar sales and the competitiveness of local timber markets.

After the appraised sale value is determined, sale feasibility is a simple decision: if the value of the timber and the predicted high bid can support the activity costs associated with harvesting and hauling the

timber, the sale is feasible. If the activity costs outweigh the value of the timber or if the local markets do not support this type or location of sale, the sale is infeasible. Supplemental funding options may be needed to implement the project if it is determined to be unfeasible.

Present net value is determined by subtracting the costs that the Forest Service incurs for implementing the timber sale from the appraised sale value. These costs include sale preparation and layout, cruising and marking, engineering package preparation, and sale administration.

Information provided by these economic models is used as a tool to understand the relative monetary differences between alternatives rather than to predict actual values for each alternative. Market variables may change between now and the time the timber is sold.

3.8.1.1 Existing Condition

The forest products industry in Idaho experienced a downturn as result of the 2008 economic recession and associated decline in home building. Total timber harvest in Idaho prior to the recession in 2006 was estimated at 1.6 billion board feet. In 2009 following the recession, timber harvest in Idaho was less than 750 million board feet, a decline of nearly 47 percent (Simmons et al. 5). Since then the industry has been showing signs of growth and recovery. Total sales of forest products manufactured in Idaho in 2014 were an estimated 1.0 billion board feet, a near return to pre-recession harvest levels (Cook et al. 2015).

The majority of Idaho's timber industry is sustained by harvest from private and state lands. In 2014, private lands provided 60 percent of Idaho's timber harvest volume, state lands provided 29 percent and 11 percent came from National Forest System lands (Cook et al. 3). Clearwater County lead the state in timber harvest with 222 MMBF harvested in 2014, out of a total of 1,066 MMBF statewide. This amounts to 21 percent of Idaho's total harvest. By comparison, Idaho County produced 88 MMBF in 2014. Of the 88 processing facilities currently operating within the state, there are 21 within the four-county analysis area.

Due to the high prevalence of wildfires that occurred in the analysis area during the summer of 2015, timber salvage has been widespread and ongoing on both state and privately-owned timberlands since fires were contained in the fall of 2015. To date, salvage harvest on federal lands has not yet been implemented, but many salvage projects are currently being planned on both Forest Service and BLM lands.

Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Although not a direct economic requirement, Executive Order 12898 requires that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories. The proposed project analysis did not reveal any disproportionately high or adverse effects to minority and low-income populations. This projects is in the vicinity of the Nez Perce Indian Reservation and within an area where tribal members are known to exercise off-reservation treaty-reserved subsistence rights. The Forest worked closely with Nez Perce Tribal staff to determine there would be no negative impacts to tribal members or the forest resources they subsist upon.

3.8.2 Environmental Effects

A. Direct and Indirect Effects

Jobs and income generated from the proposed project would contribute to community stability, sustain forest products industry jobs, and generate harvest-related revenue to local communities.

Employment and income are effects that can be attributed to the harvesting and processing of timber. The number of forest products industry jobs sustained can be considered a direct effect of timber harvest. Revenue available to communities as a result of timber harvest can be considered an indirect effect. Using the findings from Cook et al., these economic effects can be predicted based on the estimated volume of the proposed timber sale and recent economic trends in Idaho forest products markets. Potential economic effects of Alternative 1 (No Action) and Alternative 2 (Proposed Action) are listed in Table TE-2. This does not take into account jobs and revenue from non-federal timber harvest in the area.

Table TE-2: Forest Products Industry Jobs Sustained and Community Revenue by Alternative

Alternative	Analysis Area	VOLUME (MMBF)	Forest products industry Jobs Sustained	Revenue to Communities Through Wages and Salaries	Revenue to Communities Through Sales of Goods and Services
1	All	0.0	0	$0	$0
2	Motorway North	4.2	76	$2,217,600.00	$13,440,000.00
	Motorway South	6.4	115	$3,379,200.00	$20,480,000.00
	Teepee Springs	10.3	185	$5,438,400.00	$32,960,000.00
	Slide/Wash	8.2	148	$4,329,600.00	$26,240,000.00
	Larkin	0.3	5	$153,120.00	$928,000.00
	Jay/Boulder	1.0	18	$528,000.00	$3,200,000.00
	Deadwood	0.1	1	$26,400.00	$160,000.00
	Noble	0.6	11	$316,800.00	$1,920,000.00
	Baldy	0.3	5	$137,280.00	$832,000.00

Source: Cook, et al. "Idaho's Forest Products Industry Current Conditions and 2015 Forecast."

The present net value of a timber sale can also be considered an indirect economic effect. This value represents an approximate monetary return to the United States Treasury from the sale of timber. Table TE-3 lists the appraised value, forest service implementation costs, and estimated present net value of Alternative 1 and Alternative 2.

Table TE-3: Appraised Value and Present Net Value by Alternative

Alternative	Analysis Area	Appraised Total Value[1]	Implementation Costs[2]	Present Net Value	Hazard Tree Mitigation & Fuels Treatment[3]
1	All	$0	$0	$0	$0
2	Motorway North	$1,404,856	$142,650	$142,650	$1,665,000
	Motorway South	$2,153,143	$142,946	$142,946	
	Teepee Springs	$1,801,957	$174,200	$174,200	
	Slide/Wash	$2,939,582	$141,073	$141,073	
	Larkin	$94,132	$12,541	$12,541	
	Jay/Boulder	$176,937	$117,229	$117,229	
	Deadwood	$6,303	$1,914	$1,914	
	Noble	$101,399	$15,314	$15,314	
	Baldy	$57,988	$7,447	$7,447	

[1] Appraised value includes logging system costs, haul distance, BD treatment of activity fuels, skid trail decompaction, erosion control, and road maintenance costs associated with the harvest. Predicted high bid is included. Source: USFS R1 Sale Feasibility Spreadsheet.

[2] Implementation costs include presale layout and cruise design, marking and cruising, and sale administration costs. NEPA analysis costs, which total about $108,200 are not included in this total.
[3] Hazard tree mitigation and fuel treatment cost estimate based on R1 fuel treatment cost guide.

The projected cost of hazard tree mitigation in the Drop and Leave treatment areas including treatment of the fuels created by these activities is also displayed in Table TE-3. Although this number is mentioned in the economic analysis for this project, these activities will not be funded by timber harvest revenue because they will not be occurring within timber harvest areas. Supplemental funding will be required to cover the hazard tree mitigation and fuel treatment costs in the Drop and Leave treatment areas.

Alternative 1 would not harvest any trees and would not generate any direct effects or benefits in the form of employment or revenue. Alternative 1 would not have any costs associated with implementing the project, so its PNV would be zero. A No Action alternative would not offset the $108,200 cost to the government of completing the NEPA analysis. With this alternative the trees would continue to deteriorate from post fire effects, safety would compromised along many of the roads, and within 2-5 years most of the fire-affected trees would no longer be considered merchantable.

Alternative 2 would sustain 563 forest products industry jobs and would provide benefits to local economies in the form of wages, salaries and revenue. Alternative 2 would generate enough value to cover the costs associated with implementing the sale and could potentially provide a bid premium large enough to offset the cost of restoration activities such as reforestation. At present, the proposed action would be considered economically feasible if it can be implemented in a timely manner before further deterioration occurs from post fire effects.

B. Cumulative Effects

The economic effects of timber harvest activities are shown in the previous section. These are described as direct and indirect effects, but they can also be considered cumulative impacts due to the additional jobs, taxes, and income they provide throughout the state.

Current and future salvage harvest will be implemented on state, private, and federal lands in the four-county analysis area within the next 1-2 years as a result of the 2015 fires. This is in addition to regular green timber sales already planned or in progress in the area. The majority of private salvage was implemented and completed after the fires in the fall of 2015. Salvage on state lands is currently being implemented.

There is a need to harvest burned timber in a timely manner before it loses value due to post-fire effects such as checking, insect activity, and decay. These effects increase as time passes after the fire and reduce the delivered log value of merchantable timber.

The Nez Perce-Clearwater National Forests plan to harvest an estimated 90 MMBF of salvaged timber from the 2015 fires. This project accounts for approximately 31 MMBF of the total salvage volume. Sawmill representatives in the analysis area have indicated that processing facilities are prepared for the influx of salvaged timber from all ownership categories and that the economic feasibility of each sale is only limited whether implementation can occur in a timely and efficient manner. If delays occur, the monetary value of salvaged logs will decrease and sale feasibility could be jeopardized.

3.9 Silviculture

3.9.1 Affected Environment

3.9.1.1 Existing Condition

Development of Current Forest Conditions

Cause and Effect Relationship

Forests in the Western United States have been declining in forest health (Western Governors' Association Forest Health Advisory Committee, December 2008). The severity of the problem has been recognized by the public, U.S. Congress, The National Association of State Foresters and the National Association of Counties. About 190 million acres Federal lands face high risk of large-scale insect or disease epidemics and catastrophic fire due to deteriorating ecosystem health and drought (USDA, Feb. 2004).

Natural succession processes, along with the agents of change, are continually changing forest conditions. Interactions of natural disturbance cycles such as, fire, wind events, succession, insects and disease have cascading interactions. Forests grow to become dense and overstocked. Root rot weakens trees, allowing the trees to become susceptible to Douglas-fir bark beetles and mountain pine beetle. Root rot, insect killed and wind thrown trees cause a build-up of large volumes of fuel (Tappeiner et. al., 2007). .

Wildfires have increased in size, intensity and duration across the Western United States in the past decade due to high fuel levels, and bark beetle mortality. Catastrophic fires are often blamed on drought while another underlying cause can be the high fuels buildup of overstocked forests (USDA, Feb. 2004). Trees stressed by competition for sunlight, nutrients and water are susceptible to wildfires, insects and disease epidemics.

Although fire has benefits, including reducing fuel loadings, preparing sites for reforestation, invigorating forage production for a variety of species, large uncontrolled wildfires create several problems. First, wildfires are very expensive to suppress. Secondly, wildfires damage infrastructure (Graham, McCaffrey, and Jain, 2004), timber, houses, power lines and roads. Third, high severity wildland fire can consume organic matter on the soil surface, which negatively impacts nutrient cycling, killing soil microorganisms and releasing carbon dioxide into the air. This negatively affects soil productivity (Smith et al. 2005, Smith 2000, Stoof et al. 2011a). Soil damaged by fire may result in reduced water holding capacity and sedimentation. Fourth, restoration costs are extremely high and not all restoration work can be funded. When fires burn the timber, funding from harvest is often negligible, and does not cover costs for planting trees to restore the forest and sustain forest productivity. Fifth, fires reduce or completely eliminate timber values which reduces the Forests' capability of sustaining local socio- economic stability.

A. Forest Health in the Context of Timber Production

The regulatory framework of timber production is intended to sustain the local economy, and is a Forest, Regional, and National goal directed by the Multiple Use Sustained Yield Act of 1960 (16 USC Sec 528-531, 1996). Harvesting the Forest on a sustained yield basis means harvesting trees at a high level of periodic output in perpetuity to sustain the local communities. Timber harvesting and planting rates are balanced with growth rates to insure the Forest and the local economies are sustained.

Forest Health Defined

A healthy forest ecosystem is characterized by absence of pathogens and organisms at epidemic levels (Tappeiner, Maguire and Harrington, 2007). In healthy Forests, agents of change like pathogens, bark

beetles, wildfire and wind events do not threaten management objectives now or in the future. Healthy forests are resilient to agents of change and anthropogenic disturbances (Edmonds, Agee and Gara 2005). A healthy forest is sustainable and can meet current and future management objectives.

Forest Goals include:

1. Provide a sustained yield of timber and other outputs at a level that is cost efficient and that will help support the economic structure of local communities and will provide regional and nation needs;
2. Insure that soil productivity is maintained and no irreversible damage occurs to soil and water resources from management activities;
3. Protect resource values through cost effective fire and fuels management, emphasizing fuel treatment through utilization of material and using prescribed fire (USDA, 1987); and
4. Plan, construct, and maintain a safe cost efficient Forest transportation system that will achieve Forest plan resource goals and objectives (USDA Forest Service 1987). Currently, the Nez Perce and Clearwater National Forests transportation systems are being reviewed through the designated routes and areas for motorized vehicle use analysis (DRAMVU).

Agents of change like root rot, wind, bark beetles and wildfire create disturbances that can have negative effects to the Forest. The cumulative effect of allowing epidemic rates of bark beetle mortality is to develop high fuel loading. After mountain pine beetle epidemics large fuels and fuel depths are significantly higher (Schoennagel, Negron and Smith 2012). Heat release is approximately 42,000 BTUs higher in forests burning in beetle killed trees than in dry green forest conditions (Jolley, Parsons, Hadlow, Cohn, Mc Allister, Popp, Hubbard and Negron 2011).

High fire intensity can negatively impact soil productivity. High severity wildland fire can consume organic matter on the soil surface, which negatively impacts nutrient cycling, killing soil microorganisms and releasing carbon dioxide into the air. This negatively impacts soil productivity (Smith et al. 2005, Smith 2000, Stoof et al. 2011a). Soil organic matter acts as a soil stabilizing factor and nutrient source. High severity wildland fire can negatively impact soil productivity due to high losses of carbon and nitrogen from combustion of surface soil organic matter (Homann et al. 2011). Higher fire intensity vaporizes more soil nutrients (Neary, Klopatek, De Bano, and Ffolliott, 1999, Grier, 1975, Agee, 1993) and negatively affects soil productivity.

Forest Service vegetation management has many benefits. Forest management can provide timber products, reduce heavy fuels, and maintain a healthy forest. Timber harvest with slash treatment, site preparations for planting and reforestation activities that reduce heavy surface fuel accumulations and reforestation activities ensure the sustainability of the Forest. Surface fuel treatment is particularly important in affecting potential fire behavior (Graham and others, 2004). Sustained harvests create range of age classes across the forest which provides a diversity of wildlife habitats. When properly planned over space and time fuel treatments protect old-growth and interior wildlife habitats from severe wildfire.

Safe roads are essential to Forest management and Forest objectives cannot be met without a safe transportation system. However, roads have become unsafe due to snags and hazard trees falling and blocking roads due to fire caused mortality. These safety hazards have created the need for the project.

Table Silv-1. Resource indicators and measures for the existing condition

Resource Element	Resource Indicator	Measure	Existing Condition
Safe Roads	Miles of roads maintained where	0 Miles of Roads Maintained in 2016	Snags are continually falling over roads, especially during

Resource Element	Resource Indicator	Measure	Existing Condition
	hazard trees are removed		wind and snow events which limits access to the Forest.
Tree Stocking	Trees per Acre	0 Miles of roadside reforested (See Table Silv-2)	133 miles of roads were burned over leaving unstocked areas adjacent to the roads.

3.9.2 Environmental Consequences

3.9.2.1 Alternative 1 - No Action

A. Direct and Indirect Effects

Regeneration and Forest Composition

Natural regeneration is not always successful. Natural regeneration requires a good seed crop, soil disturbance and properly timed rainfall, all at the same time. Often the three requirements for natural regeneration do not align properly and the result is a reforestation failure. Grand fir and cedar could regenerate in moist areas where previously shade tolerant species dominated the site. On ridgetops where Douglas-fir and western larch survived early seral species may naturally regenerate but would have competition from brush species. Given the competitiveness of shrubs as well as the historical variability in natural regeneration success, tree planting after salvage operations better ensures the desired density, species, and distribution of conifers (Newton et. al 2006).

Stands with root rots may not develop into mature stands. Root rots may suspend forest succession by killing regeneration before it reaches pole size (Hagle, Kegley, and Williams - Year Unknown). Regeneration with root rot may take 10-40 years to become established. Douglas-fir and grand fir would be susceptible to root rot and the stand would be in poor health.

Typically one ecological event prepares the conditions for the next ecological event. Without treatment, the remaining snags from the fires would increase fuel loading, similarly to disease and insect mortality. Leaving large quantities of snags could:

1. Allow high hazardous fuel loadings and may lead to catastrophic fires;
2. Promote resistance to wildfire containment increasing fire suppression costs; and
3. Create unsafe travel conditions for the public, Forest Service contractors and Forest Service employees.

Accumulations of large dead woody fuel can smolder for long periods of time allowing winds to fan the flames into a fast moving and dangerous fire ([Chandler and others 1983] as cited in Brown, Rienhardt and Kramer 2003). The long persistence of smoldering fires increase the probability of a reburn (Brown et.al. 2003). Although catastrophic fires are not caused by high fuel volumes high fuel volumes create the conditions needed for catastrophic fire.

Table Silv-2. Resource indicators and measures for Alternative 1

Resource Element	Resource Indicator	Measure
Safe Roads	Miles of Roads Maintained	0 Miles of Roads Maintained in 2016

Resource Element	Resource Indicator	Measure
Tree Stocking	Trees per Acre	0 miles of roadside Artificial Reforestation, Exact Natural Regeneration is Unknown

B. Cumulative Effects

During the great depression, the civilian conservation corps (CCC) helped the Forest Service build fire access roads. The central aim of the roads was to protect the Forest from fire at the lowest costs (Buck, 1936). By the 1950s the Forest Service timber harvest combined with the fire access road system made fire suppression highly effective. Where surface fuels are adequately treated following timber harvest, the resulting overall fuel discontinuity can aid fire suppression forces by altering potential fire behavior and movement across the landscape (Graham and others, 2004; Finney and Cohen, 2003). Big game forage can also be increased in areas where timber has been harvested. While these side effects were beneficial, the lack of road maintenance allowed sediment to be deposited into aquatic systems.

In the early 1990s, Forest restoration activities designed to remedy the sedimentation issue began. Sedimentation was reduced and aquatic systems began to recover. A side effect of the 1990s policies was greatly reduced timber harvesting. Harvesting timber and treating heavy fuels with site preparation for planting in combination with road maintenance is judicious Forest management. Fuel reduction projects using harvesting and site preparation for planting, along with road maintenance provides the most benefits to the Forest, while minimizing the negative effects of sediment deposits in the aquatic system. Cross drainage of roads, particularly in the riparian habitat conservation areas (RHCAs) would be another benefit.

A lack of road maintenance would:

1. Increase contract costs for Forest management and thereby reduce Forest management. The reduction of Forest management would allow overstocked Forests to develop, which leads to bark beetle epidemics and high fuel loading;
    a. High fuel loading would increase the resistance to control of fires.
2. Reduce access for fire suppression forces, which would increase fire suppression costs;
    a. The lack of quick response by firefighters would increase the likelihood of fires escaping initial attack.
    b. Increased escaped fires would increase damage to timber resources, which would create greater risk for the socio-economic stability of the community.
3. Increase resource damage caused by wildfires;
4. Increase the costs of harvesting timber, which would reduce timber values;
5. Increase risk to the public and firefighters using the roads, and
6. Increase sediment deposits into the aquatic system.

Fire protection as required by the Multiple Use Sustained Yield Act would be reduced in the proposed project area. The lack of treatment would increase the resistance to control of wildfires in the proposed project areas, and the Front Country. The reduced fire protection is small, but incrementally becomes substantial over time as experienced in the fires of 2015.

Resistance-to-control is generally viewed as an estimate of the suppression force required for controlling a unit of fire perimeter. Ratings may be subjective as applied in the Photo Guide for Appraising Downed Woody Fuels in Montana Forests (Fischer 1981). For example, "high" resistance-to-control means "slow work for dozers, very difficult for hand crews; hand line holding will be difficult."

High resistance to control is important for several reasons, with regard to both the human factor and the natural resources. The longer the fire burns the more risk there is for accidents. Extended suppression action can deplete firefighting resources. The risk to firefighters increases as fatigue and complacency can create unsafe working environments for fire fighters. The longer the fire burns the greater risk for winds to pick up and create a severe burn (Brown, et. al, 2003) with negative effects.

When there is a high resistance to control the fire burns longer and does more damage to the natural resources. High fire intensity can negatively affect soil productivity. High severity wildland fire can consume organic matter on the soil surface, which negatively affects nutrient cycling, killing soil microorganisms and releasing carbon dioxide into the air. This negatively affects soil productivity (Smith et al. 2005, Smith 2000, Stoof et al. 2011). Soil organic matter acts as a soil stabilizing factor and nutrient source. High severity wildland fire can negatively affect soil productivity due to high losses of carbon and nitrogen from combustion of surface soil organic matter (Homann et al. 2011). Higher fire intensity vaporizes more soil nutrients (Neary, Klopatek, De Bano, and Ffolliott, 1999, Grier, 1975, Agee, 1993) and negatively affects soil productivity.

When there is a high resistance to control, fires burn longer and consumes timber which sustains the local community. Heavy fuels left can lead to severe reburns in 5-15 years and become brush fields due to the severe soil heating (Coppaletta, Mirriam and Collins 2015). These brush field can be initially beneficial for big game browse the first 20 years, but lose that benefit as the brush ages. Persistent brush fields lose their production value from a timber standpoint because of the lack of timber on those sites.

Allowing conditions to develop that would reduce the ecological productivity of the soil, Timber and the sustainability of the local community as required by the Multiple Use Sustained Yield Act is not the most judicious use of the land.

For more information relating to cumulative effects for Alternative 1, see background information and the affected environment section preceding Alternative 1 effects.

3.9.2.2 - Alternative 2

A. Direct and Indirect Effects

Although the project may address tree mortality, tree mortality was caused by the wildfires and not by the project we are proposing.

Roads are critical for timber management, Forest management, fire suppression and recreational access. Roads are essential infrastructure needed to manage the forest for multiple use and sustained yield as directed by Authority: 16 U.S.C. 551, 23 U.S.C. 205, § 212.2 Forest Transportation Program, § 212.4 Construction and Maintenance, § 212.4 Construction and Maintenance, § 212.5 Road System Management, and § 212.10 Maximum Economy National Forest System Roads.

The direct effect will be to provide safe access to the Forest. Field crews could complete their work in an effective and efficient manner with the lowest budget cost possible. The public Forest Service contractors, and Forest Service employees would have safe access to the Forest. The project will allow needed future work to be completed.

The project would have multiple direct effects on snags. Snags would be removed from the project area reducing the foraging area for birds that primarily feed on wood borers, ants and bark beetles. Snags used

as nesting locations for small mammals and birds would be somewhat reduced. However, the safety threat of the snags to people using the area would be greatly reduced. Snags are standing dead fuel. The removal of the snags represents a substantial reduction in heavy fuels (refer to fuels report). The reduction of heavy fuels substantially reduces the resistance to control of fires and reduces fire suppression costs.

Indirect effects along the roads include:

1. Reduction of fuel concentrations and continuity along the roads.
2. Accumulations of slash that would provide ground cover and develop the soil (Graham, Harvey, Page-Dumroese, Minore and Jurgensen 1990).
3. Soil disturbance that functions as site preparations for natural regeneration (Tappeiner et. al., 2007) (Hobbs, Tesch, Owston, Stewart, Tappeniner and Wells, 1992).
4. Create open stands that are susceptible to strong winds (Agee, 1993) (Tappeiner et. al., 2007) also referred to as windthrow.

The project may create some fine fuels. Fine fuels generated through this proposal would be reduced as part of the proposed fuel treatments

Thinned stands are at risk to being blown down by strong winds, also referred to as windthrow. Felling hazard trees would increase wind speed in the stand (Agee, 1993) which may blow down trees that are newly exposed to the wind. Trees resistant to wind have good root systems, and proper height to diameter ratios. Trees released from competition with greater than 40-50 percent crown can grow in diameter and increase wind resistance. However, large canopies may catch the wind and facilitate windthrow. Most stands become windfirm about five years after treatment, however even stable stands can be blown down during extreme wind storms.

The wildfires tree mortality has created a need for reforestation to meet the NFMA requirement to maintain "appropriate Forest cover 16 U.S.C. 1604, 36 C.F.R. 219 et seq. Areas with appropriate conditions for successful planting would be planted immediately. Some areas may need site preparation with jackpot burning or broadcast burning to prepare the site for planting. Site preparations would remove fine fuels 0-3" in diameter and would leave 7-33 tons of fuels/coarse woody debris larger than 3 inches in diameter. Areas that need regeneration would be affected by the project. Effects of the project on regeneration include;

1. Soil disturbance needed for natural regeneration (Tappiener et. al., 2007);
2. Limbs would form a mulch retaining moisture for regeneration planting success. (Graham, Minore, Harvey, Jurgensen, and Page-Dumroese, 1990);
3. Removing the snags during the harvesting process reduces shade and microsites;
4. Excessive slash may prohibit planting;
5. Fallen limbs would form a mulch layer reducing sediment (Graham, Minore, Harvey, Jurgensen, and Page-Dumroese, 1990);
6. Established regeneration may be damaged or killed;
7. Brush and species competitive to regeneration may be killed; and
8. Site preparation for planting would create conditions needed for successful reforestation.

Resource Indicator and Measure 1

By implementing the project 133 miles of roads would be maintained and provide safe road travel. The safe travel is critical for forest management goals and objective to be met. In 2015 firefighters died due to a road accident while escaping a developing large fire. Safe roads allows the public to enjoy the forest and return home safely.

Resource Indicator and Measure 2

By accomplishing 102 miles of roadside reforestation, the forest is maintaining a high level of timber products in perpetuity as required by the Multiple Use Sustained Yield Act of 1960. The Clearwater Forest Plan Timber standard H would be followed and the National Forest Management Act requiring an appropriate forest cover 16 U.S.C. 1604, 36 C.F.R. 219 et seq. would be followed.

Table Silv-4. Resource indicators and measures for Alternative 2 direct/indirect effects

Resource Element	Resource Indicator	Measure
Safe Roads	Miles of Roads Maintained	133 Miles of Roads Maintained in 2016
Tree Stocking	Miles of Roadside Reforested	102 Miles of roadside Artificial Reforestation, Exact Natural Regeneration is Unknown

B. Cumulative Effects

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Roads and road maintenance are expensive but are critical for proper forest management. Road maintenance would be a substantial cumulative benefit to silviculture resource and is essential to managing the forest effectively. Road maintenance provides access to the timber resource allowing needed forest management to occur. Roads allow forest managers to reduce over stocked stands and maintain the health of the forest. The timber targets required by law to facilitate the social-economic sustainability of local communities also reduces high fuel buildups and removes overstocked forests. Timber harvests promotes resistance to wildfires and insect epidemics. Timber harvests are part of the Forest integrated pest management program.

Roads allow quick access for forest managers to salvage decaying forest products and suppress wildfires before they damage Forest resources. Roads increase fire suppression effectiveness and road maintenance reduces sedimentation which benefits fisheries. Roads increase timber harvesting efficiency, reduces Forest management costs, and promotes public dispersed recreation.

Cumulative effects of roads are described below.

Forest Management

Roads are critical for Forest management. Silvicultural treatments and monitoring is significantly more expensive if not impossible in areas without roads. Contractors significantly increase project costs for the lack of access which reduces funding available for areas needing treatment. The lack of treatment acres reduces Forest Protection from insect, disease, climate change, and wildfire suppression. Treatments that promote Forest resiliency to disturbance agents, Forest resistance to disturbance and Forest Recovery from agents of change are reduced or eliminated due to lack of access or the extreme costs due to the lack

of access. Road access is critical for planting and other Forest recovery projects. Many restoration projects simply do not get done because of the high costs associated with the lack of road access.

Inherent in the sustained yield multiple use law is age class diversity and heavy fuel reduction. Reduction of the acres managed for sustained yield reduces the age class diversity and reduces forest resiliency. Roaded areas encourage management that can serve to disrupt fuel continuity at the landscape scale which can minimize risk of large growth of a fast-moving wildfire (Finney and Cohen, 2003).

The f ire resilient species planted along travel routes would be more likely to persist on the landscape given disturbances (citation). The likelihood of trees surviving fuel reduction burns and burnouts makes the Forest more resilient to disturbance agents (citation). Lower stocking along the road makes the stand more resistant to climate change, insects and disease.

Resource Indicator and Measure 1

Road maintenance is expensive but the results allow forest management to proceed without the negative effects of sedimentation into aquatic system. By maintaining 133 miles of roads firefighters can protect forest resources from the negative effects of wildfire. The road maintenance project allows the public to access the forest in safe travel corridors and prevents unwanted entrapments. The project reduces forest management costs and allows more restoration work to be completed.

The project meets the requirements of 16 U.S.C. 551, 23 U.S.C. 205.

§ 212.2 Forest transportation program of work shall be developed each fiscal year in accordance with procedures prescribed by the Chief.

§ 212.4 Construction and Maintenance which is necessary and economically justified for protection, administration, development, and multiple-use management of the federally owned lands and resources served.

§ 212.5 Road System Management which provides the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands.

§ 212.10 M a x i m u m Economy National Forest System Roads which will permit maximum economy in harvesting timber from such lands tributary to such roads and at the same time meet the requirements for protection, development, and management thereof and for utilization of the other resources thereof.

Road maintenance sustains needed infrastructure that has hidden benefits. Road maintenance has unexpressed value in public use of Forest roads, increased value of timber products which incorporates a 61 percent reduction of fire suppression costs.

Resource Indicator and Measure 2

The project maintains adequate stocking by planting along the roadside and complies with 16 U.S.C. 1604, 36 C.F.R. 219 et seq. which states, “It is the policy of Congress that all Forested lands in the National Forest System shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth and conditions of the stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans.” By providing adequate stocking through reforestation, the project meets the requirements of the Multiple Use Sustained Yield Act of 1960 and the National Forest Management Act.

Table Silv-5. Resource indicators and measures for Alternative 2 cumulative effects

Resource Element	Resource Indicator	Measure
Safe Roads	Miles of Roads Maintained	133 Miles of Roads Maintained in 2016
Tree Stocking	Miles of Roadside Reforested	102 Miles of roadside Artificial Reforestation, Exact Natural Regeneration is Unknown

3.10 Wildlife

I. Lynx (Lynx canadensis)

.10.1 Affected Environment

3.10.1.1 Existing Condition

Lynx are associated with relatively high-elevation, moist conifer forests that experience cold, snowy winters and provide a prey base of snowshoe hare. Subalpine fir potential vegetation types provide primary lynx habitat (Interagency Lynx Biology Team 2013). In northcentral Idaho, this includes forests dominated by subalpine fir, Engelmann spruce, or lodgepole pine. Where it is interspersed with primary habitat, cedar-hemlock, grand fir, or Douglas-fir on moist sites at higher elevations support snowshoe hares and would provide foraging habitat for lynx.

Denning Habitat. Lynx den sites are typically located in mature stands with high horizontal cover, abundant coarse woody debris, and higher canopy closure (Squires et al. 2008). Forest understory structure is important component of lynx habitat (Koehler 1990a, Gilbert and Pierce 2005, Squires et al. 2008) as lynx prefer to den in coarse woody debris such as large diameter mature downed trees or small-diameter piled logs, but will also use protected areas in jackstraw trees in regenerating stands, talus and boulders, etc. (Mowat et al. 2000, Squires et al. 2008).

Foraging Habitat. Snowshoe hares are the primary prey of lynx (Koehler 1990b, Squires and Ruggiero 2007). Hare populations are highest in moist coniferous forest stands that are very dense, young, and that have ample overhead cover and browse. To be suitable for hares, foraging and hiding cover should exist at the surface of varying snow depths throughout the winter.

The Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000) was developed after the lynx was listed as a threatened species in March 2000 to guide and encourage recovery efforts. In March 2007, 18 Forest Plans were amended with the Northern Rockies Lynx Management Direction (NRLMD) (USDA Forest Service 2007), which provided lynx management standards and guidelines based on lynx habitat requirements. The LCAS was revised in August 2013 by the Interagency Lynx Biology Team, incorporating the best available science that had been published since the previous edition (Interagency Lynx Biology Team 2013). The revised LCAS synthesize the best available science on lynx and recommends guidelines, objectives, and standards for all projects on public lands within designated lynx range.

The NRLMD established objectives that define desired conditions for lynx habitat and standards that are required to meet the objectives. There are three standards specific to the vegetation management proposed in this project. There is a 30 percent per LAU limit on habitat in stand initiation stage (Standard VEG S1) and a 15 percent change per decade limit on timber harvest (Standard VEG S2) in order that there is a mosaic of young and older stands within each LAU. Standard VEG S1 and S2 are based on a cumulative effects analysis of the past, present, and reasonably foreseeable actions, in addition to the proposed action. Vegetation management that reduces snowshoe hare habitat in mature, multi-storied stands is prohibited (Standard VEG S6) with some exceptions (fuels treatments in wildland/urban interface).

In the 2005 Lynx Recovery Outline FWS categorized lynx habitat as 1) core areas; 2) secondary areas; and 3) peripheral areas. Core areas have both persistent verified records of lynx occurrence over time and recent evidence of reproduction. The fluctuating nature of lynx population dynamics and the ability of lynx to disperse long distances have resulted in many individual occurrence records outside core areas, without accompanying evidence of historic or current presence of lynx populations. Areas classified as

secondary habitat are those with historical records of lynx presence with no record of reproduction; or areas with historical records and no recent surveys that document the presence of lynx and/or reproduction.

The 2005 Canada Lynx Recovery Area map identified the Nez Perce National Forest (NP National Forest) and Clearwater National Forest (CW National Forest) as secondary Canada lynx habitat (USDI Fish and Wildlife Service 2006). There are thirteen verified records of lynx prior to 1960 from the north-central and northern Idaho (Interagency Lynx Biology Team 2013). There is limited information on lynx occurrences on the Clearwater National Forest and no documentation of lynx breeding but the Clearwater National Forest is considered occupied by the NRLMD (USDA Forest Service 2007).

There are inconsistencies in the status of lynx on the Nez Perce National Forest, which has extensive spruce-fir forest and an abundance of snowshoe hare but is labeled as unoccupied in the NRLMD. There are historical and anecdotal observations of lynx on the Nez Perce National Forest but reports are infrequent. Snow track surveys were conducted in 2007 and 2013 using protocol developed by Squires et al. (2004) but they were unable to detect any lynx (Ulizio et al. 2007, Stone et al. 2013). The surveys were conducted only in roaded areas but with two survey replicates the authors felt that the infrequent observations of lynx on the forest were from transient or dispersing individuals.

There are eight unverified lynx observations spanning from 1974 to 2002 in the LAUs where the project activities would take place. Of those observations, two were near to the proposed activities within the perimeter of the Tepee fire: one lynx was seen by a reliable source from one of the roads proposed for treatment (1999) and another less than 2 miles away (1994). Other observations were not directly in the areas proposed for treatment but were within daily movement distance of following fires: Nobel, Crown, Jay Point, and Boulder.

The proposed project activities fall within 22 mapped LAUs across the Nez Perce-Clearwater National Forests. The amount of mapped lynx habitat in each affected LAU is summarized in Table WL-1.

Standard VEG S1 - The NRLMD requires that no more than 30 percent of lynx habitat in an LAU be in stand initiation structural stage because it does not provide sufficient cover to provide winter snowshoe hare habitat. Stand-replacing wild fires create stands in initiation stage. Based on fire severity mapping in the LAUs where the project activities would occur, 2,607 acres of mapped lynx habitat was severely burned in the 2015 fires. Even with that amount of habitat loss, lynx habitat in stand initiation structural stage remains well below 30 percent of the habitat in each of the LAUs (Table WL-1).

Table WL-1. Mapped lynx habitat in stand initiation structural stage in each LAU to evaluate project consistency with Standard VEG S1 in the Northern Rockies Lynx Management Direction.

Forest	LAU	LAU	Lynx Habitat	pre-Fire SI[1]	Habitat Burned[2]	post-Fire SI[3]	SISS HAB
		Acres					(%)[4]
CLW	3	19,621	11,899	35	1	36	0.3
CLW	9	20,921	7,740	163	< 1	163	2.1
CLW	26	38,656	25,646	693	131	824	3.2
CLW	27	26,407	20,975	1,770	140	1,910	9.1
CLW	35	19,087	14,075	37	555	592	4.2
CLW	37	19,648	13,429	649	0	649	4.8
CLW	38	26,520	21,188	391	216	607	2.9
CLW	39	17,285	14,175	1,285	< 1	1,285	9.1
CLW	47	16,852	11,556	637	169	806	7.0

Forest	LAU	LAU	Lynx Habitat	pre-Fire SI[1]	Habitat Burned[2]	post-Fire SI[3]	SISS HAB
		Acres					(%)[4]
CLW	51	22,187	20,013	1,671	8	1,679	8.4
NEZ	2070601	23,092	20,384	13,674	0	13,674	67.1
NEZ	2070602	22,622	14,386	3,461	0	3,461	24.0
NEZ	2070603	24,204	6,576	75	0	75	1.1
NEZ	2070702	46,017	33,915	5,594	0	5,594	16.5
NEZ	2090204	38,208	5,994	1,149	16	1,165	19.4
NEZ	2090401	29,671	16,719	1,842	64	1,906	9.7
NEZ	3020204	35,033	12,287	1,161	30	1,191	10.3
NEZ	3020301	24,079	23,241	4,251	0	4,251	18.3
NEZ	3020305	55,704	28,445	750	1,173	1,923	6.8
NEZ	3020402	75,498	31,503	14	102	116	2.9
NEZ	3050305	24,058	10,764	667	0	667	6.2
NEZ	3050401	36,641	16,515	4,467	0	4,467	27.1

[1]preFire SISS = acres of mapped lynx habitat in stand initiation structural stage per regeneration harvest and severe fire

[2]Habitat Burned = acres of mapped lynx habitat that burned severely in 2015

[3]postFire SI = preFire SI + Habitat Burned

[4]SISS HAB = percent of mapped lynx habitat in the LAU that is in stand initiation structural stage.

LAU 2070601 lies partly within the East Meadow Creek Roadless area which has a designation of "Primitive" and Frank Church River of No Return Wilderness. Primitive Roadless and Wilderness designation does not allow timber harvest. Current percentage of stand initiation structural stage is due to past fires. Operations associated with the Roadside, Administrative Site and Recreation Site Maintenance Project related activities will occur along a travel corridor between the two areas which is not designated as either Roadless or Wilderness. Additionally, these activities will not additively contribute to the current level of lynx habitat in SISS within this LAU.

LAU 30560401 currently stands at 27.1 percent SISS. This is primarily a result of the McGuire Fire which burned approximately 3,600 acres of lynx habitat in 2012. Approximately half the lynx habitat burned in the McGuire Fire falls within the Dixie Summit-Nut Hill Roadless area which has a designation of Backcountry Restoration. Activities associated with the Roadside, Administrative Site and Recreation Site Maintenance Project related activities are projected to minimally contribute to the current level of lynx habitat in SISS within this LAU however will not drive SISS over the 30 percent threshold.

LAU 2070602 which is at 24 percent SISS, very near to the 30 percent NRLMD threshold, lies almost completely within the Frank Church River of No Return Wilderness and is bounded by Idaho Roadless Areas designation of Backcountry Restoration and Primitive. Operations associated with the Roadside, Administrative Site and Recreation Site Maintenance Project are not scheduled to impact any lynx habitat within that LAU. Activities associated with the Roadside, Administrative Site and Recreation Site Maintenance Project will not contribute to the current level of lynx habitat in SISS.

Standard VEG S2 – None of the affected LAUs contain more than 2 percent of lynx habitat that has been regenerated by timber management activities within the last 10 years. Removal treatments in this project

have potential to regenerate mapped lynx habitat but it would be less than or equal to 2.7 percent of the habitat in the LAU.

Standard VEG S6 – Vegetation management that reduces snowshoe hare habitat within mature, multi-storied stands is prohibited because it provides both foraging and denning and is important habitat to lynx (USDA Forest Service 2007).

In this project, there will be no tree removal within old growth stands, which are by nature mature and multistoried. As proposed, removal can occur in mapped old growth only if the stand no longer retains old-growth characteristics following fire. Less than 2 acres of forest was classified as old growth within the proposed project. This limited area experienced moderate severity burn (per BARC) but a majority of the trees appear to have died per photographs of the site. Young trees also appear to have died and there is no existing understory. Since this site no longer contains a mature and multi-storied stand it is, therefore, currently not suitable for lynx and would not result in a reduction of snowshoe hare habitat.

Tree removal is proposed for mapped foraging and denning habitat. There are 5 distinct areas with mapped lynx habitat: two within the Tepee Fire (on both the east and west ridges above Allison Creek drainage); one within the Baldy and one within the Nobel fire; and most of the mapped habitat occurs on the road system in the vicinity of Hemlock Butte (Snowy Summit fire), which is in LAU #38 on the Clearwater NF. Existing habitat in these areas were assessed using photos, field notes, and a review of current and historical aerial imagery (back as far as 1992) in Google Earth. None of these areas can be described as mature, multi-storied habitat that provide the dense cover required to support snowshoe hares. Much of the area would not normally provide forage and cover for snowshoe hares and in many places, the fire acted to further remove understory.

3.10.2 Environmental Consequences

3.10.2.1 Alternative 2 – Proposed Action

Analysis Methods

Mapping of primary habitat is based on forest types necessary to support lynx survival and reproduction in northern and central Idaho, which is subalpine fir, Engelmann spruce, and lodgepole pine vegetation types (Interagency Lynx Biology Team 2013). In 2014, mapped lynx habitat was revised to develop consistent mapping criteria across both Forests, and to include the best available scientific information that has become available since 2007. Potential vegetation types (PVT) for subalpine fir, Engelmann spruce, and lodgepole pine were mapped as potential primary habitat. Secondary habitat was selected from PVT classes where cedar-hemlock, grand fir, or Douglas-fir on moist sites were dominant; and where it was directly adjacent to primary habitat. Habitat was classified based on existing vegetation (R1-VMap) and habitat in stand initiation structural stage was selected using spatial data on severe fires and regeneration harvest.

A. Direct and Indirect Effects

There are a total of 1,323 acres of proposed treatment within mapped lynx habitat. Of this, 825 acres are proposed for removal and 498 acres are proposed for tree felling without removal. As discussed above, a vast amount of this area cannot be described as having the dense understory cover required to support snowshoe hares and, therefore, is not likely to provide foraging habitat for lynx. There is still some potential that there is foraging habitat for snowshoe hares within the proposed project area but project activities would be affecting less than 1 percent of the mapped habitat in these LAUs.

Timber removal of felled hazard trees in areas suitable for lynx denning would reduce future cover of large woody debris and thus remove potential denning structures, however denning habitat is not a limiting factor (NRLMD pg. 173) There are 251 acres proposed for removal that are mapped as lynx

denning habitat. The maximum number of acres in one LAU slated for removal within mapped lynx denning is 140 acres in Clearwater National Forest LAU #38 on the road system in the vicinity of Hemlock Butte. However, that is only 1.5 percent of the 8,798 acres of mapped denning habitat in that LAU.

Fuels reductions remove or reduce the understory and ladder fuels, which provide dense horizontal cover important to snowshoe hares. Fuels reductions, therefore, have the potential to reduce the quality of habitat for hares and lynx. In this project, fuels reductions would remove accumulation of fine fuels (≤3" diameter) that result from hazard tree felling. However, existing brush and understory vegetation would be left intact unless damaged incidentally.

Implementation of the vegetation management treatments and other maintenance activities which are part of this project may result in negligible, short-term direct effects to lynx related to disturbance, in the form of increased noise levels, use of mechanized equipment, vibrations, or other disturbances associated with increased human presence and activities. Direct effects could be related to disturbance to individual lynx, causing lynx to avoid perceived threats associated with human and equipment presence, and increased noise during project activities. However, these actions are expected to result in minimal responses of temporary and insignificant potential avoidance behaviors. These effects are not considered a significant disruption to lynx behavior. No anticipated risks of direct mortality or long-term impacts to the population are expected.

Table WL-2. Mapped lynx habitat by LAU and the area of mapped habitat affected by the proposed project treatments.

Forest	LAU #	LAU acres	Lynx Habitat acres	Removal acres	Drop-Leave acres	%Hab in LAU[1]
CLW	*3*	19,621	11,899	0	0	0
CLW	*9*	20,921	7,740	0	0	0
CLW	*26*	38,656	25,646	31	23	0.21
CLW	*27*	26,407	20,975	8	182	0.91
CLW	*35*	19,087	14,075	3	11	0.1
CLW	*37*	19,648	13,429	0	0	0
CLW	*38*	26,520	21,188	521	47	2.68
CLW	*39*	17,285	14,175	3	8	0.08
CLW	*47*	16,852	11,556	49	0	0.42
CLW	*51*	22,187	20,013	48	1	0.24
NEZ	*3020402*	75,498	31,503	0	27	0.09
NEZ	*3020204*	35,033	12,287	0	0	0
NEZ	*3020305*	55,704	28,445	0	140	0.49
NEZ	*3050305*	24,058	10,764	30	11	0.38
NEZ	*3020301*	24,079	23,241	0	0	0
NEZ	*2070601*	23,092	20,384	0	0	0
NEZ	*3050401*	36,641	16,515	11	17	0.17
NEZ	*2070602*	22,622	14,386	0	0	0
NEZ	*2070603*	24,204	6,576	0	0	0
NEZ	*2070702*	46,017	33,915	110	14	0.37
NEZ	*2090204*	38,208	5,994	0	0	0.00
NEZ	*2090401*	29,671	16,719	11	17	0.17

Forest	LAU #	LAU acres	Lynx Habitat acres	Removal acres	Drop-Leave acres	%Hab in LAU[1]
[1]%Hab in LAU = % of total mapped habitat in the LAU that would be affected by project treatments						

B. Cumulative Effects

The past and present actions that have affected lynx include timber harvesting, large fires, travel management, and state-level game management. Fire suppression and timber management have affected landscape-scale characteristics of vegetation composition and structure. Regeneration timber harvest and stand-replacing fires convert forest stands to stand initiation structural stage that is not suitable for the snowshoe hare for at least 10-25 years. Stand-replacing fire affected >2,600 acres within the LAUs affected by this project. Regeneration and stand-replacing fire also increases the time until a stand is in multi-story structural stage, which is considered the best habitat for lynx. Precommercial thinning, fuels treatments and other treatments to reduce fire hazard remove or reduce the understory and ladder fuels, which provide dense horizontal cover important to snowshoe hares. Travel management and increased road densities over time improve access to lynx habitat by trappers and fragments existing habitat. Although there is no legal harvest of lynx in Idaho, mortality may result from illegal or incidental harvest by hunters and trappers and trapping had been a significant source of mortality in the past (Ruggiero et al. 2000).

Table WL-3. Projects from Cumulative Effects Table (Appendix C) Which May Contribute Cumulatively to Effects This Project.

Forest	LAU #	Post-File SII Analysis Determination	Lynx Habitat Potentially Affected by Activities Related to Roadside/Rec/Admin Site Project (%Hab in LAU[1])	Projects Within LAUs Which Contribute Cumulatively to SISS	% SISS Habitat Created by Cumulative Effects Projects	Cumulative SISS as a result of the Roadside Rec/Admin Site Project and Projects listed in Appendix C (% Habitat Remaining)
CLW	*3*	0.3%	0%	None	0	0.3% (99.7%
CLW	*9*	2.1%	0%	None	0	2.1% (97.9%)
CLW	*26*	3.2%	0.2%	Boulder Fire Salvage Powell Divide	0 1%	3.4% (96.6%)
CLW	*27*	9.1%	0.9%	Boulder Fire Salvage Powell Divide	0 1%	10.0% (90%)
CLW	*35*	4.2%	0.1%	None	0	4.3 (95.7%)

Forest	LAU #	Post-File SII Analysis Determination	Lynx Habitat Potentially Affected by Activities Related to Roadside/Rec/Admin Site Project (%Hab in LAU[1])	Projects Within LAUs Which Contribute Cumulatively to SISS	% SISS Habitat Created by Cumulative Effects Projects	Cumulative SISS as a result of the Roadside Rec/Admin Site Project and Projects listed in Appendix C (% Habitat Remaining)
CLW	*37*	4.8%	0%	None	0	4.8 (95.2%)
CLW	*38*	2.9%	2.7%	Snowy Summit Salvage French Larch	0 <1%	5.5 (94.5%)
CLW	*39*	9.1%	0.08%	None	0	9.2 (90.8%)
CLW	*47*	7.0%	0.4%	None	0	7.4 (92.6%)
CLW	*51*	8.4%	0.2%	None	0	8.6% (91.4%)
NEZ	*2070601*	67.1%	0%	None	0	67.1% (32.9%)
NEZ	*2070602*	24.0%	0%	None	0	24% (76%)
NEZ	*2070603*	1.1%	0%	None	0	1.1% (98.9%)
NEZ	*2070702*	16.5%	.4%	None	0	16.9% (83.1%)
NEZ	*2090204*	19.4%	0%	Chair Point and Van-Keating Ridge Salvage	0	19.4% (80.6%)
NEZ	*2090401*	9.7%	.2%	Van-Keating Ridge Salvage	0	9.9% (90.1%)
NEZ	*3020204*	10.3%	0%	None	0	10.3% (89.7%)
NEZ	*2030301*	18.3%	0%	None	0	18.3% (81.7%)
NEZ	*3020305*	6.8%	.5%	None	0	7.3% (92.7%)
NEZ	*3020402*	2.9%	.1%	None	0	3.0% (97%)
NEZ	*3050305*	6.2%	.4%	None	0	6.6% (93.4%)
NEZ	*3050401*	27.1%	.2%	None	0	27.3% (72.7%)

Of the proposed timber salvage projects being planned by the Nez Perce Clearwater NF only the effects of those associated with the Bounder Fire (LAU 26, 27), Snowy Summit (LAU 38), and Teepee Springs (LAU 2090204, 2090401) overlap with anticipated effects of activities proposed in this project. A review of specialist reports for these salvage projects indicates that there will be no associated effect on lynx habitat because 1) salvage units fall within a LAU but do not include habitat or 2) project falls within an LAU but any pre-fire habitat has been converted to non-habitat as a result of the fire. Removing fire-killed trees will reduce future potential denning habitat in subsequent years. Salvage projects that fall outside of an LAU and therefore will not affect lynx habitat include Woodrat CE (Woodrat Fire), Upper Lolo CE (Musselshell, Yoosa, Fourbit, Mystery/Walde), and Lost Hat CE. Vegetation management projects which will potentially contribute cumulatively to this project include the French Larch and Powell Divide Projects. Neither project, cumulatively with this project will drive SISS above the 30 percent threshold. Wapiti Thin does not fall within a LAU and therefore will not contribute cumulatively to effects on lynx habitat.

Vegetation management in the reasonably foreseeable future salvage projects will be consistent with standards and guidelines in the NRLMD. Silvicultural treatments of regenerating stands within lynx habitat may only be implemented under the restrictions set forth during informal consultation between USFS and FWS. This Project is not expected to impact the availability, distribution, or connectivity of lynx habitat as demonstrated through establishment of compliance with Northern Rockies Lynx Management Direction, habitat acreage analysis, and narrow scope of project design.

Conclusion

The project would be consistent with all standards and guidelines in the Northern Rockies Lynx Management Direction (see 12 May 2016 Biological Assessment Appendix C: Northern Rockies Lynx Management Direction table) with the exception of one LAU. Lynx Analysis Unit 2070601 is currently above the 30 percent SISS threshold. The level of SISS within this LAU is a result of recent fires. Project related activities proposed within this LAU will be occurring is areas which no longer represent lynx habitat as a result of the stand replacing nature of the fire and therefore will not add to the current level of habitat in SISS. Two other LAUs (2070602 and 3050401) are within 10 percent of reaching the SISS threshold. However, as with LAU 2070601, the level of lynx habitat at SISS is a result of recent fires and the activities associated with this project will not drive acres SISS over the 30 percent threshold. The project will not lead to more than 15 percent of lynx habitat in the LAU having been regenerated through vegetation management projects within the previous ten-year period. No regeneration or precommercial thinning is proposed in lynx habitat under any of the alternatives. No mature multi-story stands would be affected in LAUs due to project activities because the design features ensure treatments would target individual hazard trees for removal which don't typify mature multi-story conditions. There are no proposed activities within designated critical habitat so the project will have no effect on critical habitat.

Proposed activities are not likely to adversely affect lynx due to insignificant effects. If transient lynx are present, negligible short-term direct effects may occur related to disturbance during project implementation. However, disturbance would be of short duration. Travel habitat would be maintained across the LAU so if a transient lynx were present, it would be able to disperse. There are incidental sightings of lynx within the project area but infrequent observations combined with no verified records of lynx based on surveys indicate that lynx observations on the forest were from transient or dispersing individuals and confirms that there is not a reproducing population of lynx on the forest. No measurable effects to lynx populations at the Forest or Regional scale, or alteration of current population trend, are expected from the activities proposed in this project.

II. Black-backed woodpecker

3.10.3 Affected Environment

The project area is within the range of black-backed woodpecker (BBWO) and contains suitable habitat for this species. The fires in 2015 burned over 14,000 acres of treed habitat within the sub watersheds to be affected by this project. These burned areas may provide habitat for black-backed woodpecker. The areas with the greatest coverage of higher severity burn are likely to support black-backed woodpecker in the next 4-6 years. Tepee, Wash, and Slide fires had the greatest amount of stand-replacing wildfires (Table WL-3).

3.10.3.1 Existing Condition

Black-backed woodpeckers are a disturbance-dependent species that occupy recently burned forest (Hutto 1995, 2008, Hoyt and Hannon 2002, Saab et al. 2007, Rota et al. 2014a, b) and mountain pine beetle infestations (Fogg et al. 2014, Rota et al. 2014a, b, Saab et al. 2014). The black-backed woodpecker is strongly associated with patches of high-severity stand-replacement fire (Hutto 2008). Black-backed woodpecker abundance peaks 1-2 years following a fire but they continue to use post-burn areas for up to 4-6 years (Hutto 1995, Saab et al. 2009, Saracco et al. 2011, Rota et al. 2014b). Abundant snags associated with severely burned forests provide both prey (beetle larvae) and nesting sites (Hutto and Gallo 2006). Post-fire stands with greater snag basal area are more likely to support greater numbers of black-backed woodpeckers than similar-sized stands with lower snag basal area (Tingley et al. 2014).

Occupancy by black-backed woodpecker is significantly higher in unlogged burned areas than logged burned areas (Saab et al. 2007). Post-fire salvage-logging studies show that post fire specialist species, such as the black-backed woodpecker, are absent from burned stands that have been salvage logged (Hutto 2006).

Black-backed woodpeckers occupy a wide-variety of post-fire conifer forest habitats. Higher pre-fire crown closure (Saab et al. 2007) and increasing elevation (Saracco et al. 2011) have been shown to increase the likelihood of black-backed woodpecker presence (Saab et al. 2007). Overstory composition, as reported in studies of black-backed woodpecker, include: ponderosa pine, Douglas-fir, subalpine fir, spruce, grand-fir, western larch, lodgepole pine and mixed stands of the aforementioned species.

Black-backed woodpecker home ranges are relatively large, typically > 247 acres (Tingley et al. 2014). Black-backed woodpecker home ranges are also highly variable (59 to >1,000 acres) with lower ranges in the first few years following a fire (Rota et al. 2014b, Tingley et al. 2014). Rota et al. (2014b) suggest that patches of wildfire habitat at least 494 acres can support a pair of black-backed woodpecker but they also found some black-backed woodpecker using areas over 1,000 acres.

Population Trends

The National Breeding Bird Survey (BBS) is a national bird occurrence monitoring program coordinated by the US Geological Survey. These routes are used to monitor long-term changes in populations as part of the national Breeding Survey effort (Sauer et al. 2014). Although single survey routes do not have an adequate number of data points to show population trend individually (by route), they do indicate if black-backed woodpeckers were detected or not, and when combined with the other routes, they provide a measure of relative statewide population trend. Nationally, this portion of the Northern Rockies shows a long-term upward trend in the population of black-backed woodpecker of greater than 2.1% over a 48-year period (1966-2013). For the state of Idaho, the BBS data shows a long-term upward trend of .85% in the population from 1966 to 2013.

Population trends were reviewed across a larger scale from the USGS – Patuxent Wildlife Research Center's North American Breeding Bird Survey web site (http://www.mbr-pwrc.usgs.gov/bbs/bbs.html).

Analysis for cavity nesting species revealed that among all BBS cavity nester data for the years 1966-2013, black-backed woodpeckers are categorized as an "increasing species.

Using data from Samson (2006a), estimates of black-backed woodpecker habitat in burn areas range from 4,235 acres in 1990-1993 to 44,530 acres in 2000-2003 (enough post-fire habitat that could support approximately 70 to 121 pairs in 1990-1993 or 224 to 385 pairs in 2000-2003) (based on a territory size of 178 to 306 hectares as cited in Dixon and Saab 2000). Estimates of black-backed woodpecker habitat in insect-infested areas range from 16,010 acres in 1990-1993 to 308,920 acres in 2000-2003 (enough post-fire habitat that could support approximately 52 to 90 pairs in 1990-1993 or 1009 to 1735 pairs in 2000-2003).

More recent data from 2009-2015 fire reporting used to model black-backed woodpecker habitat indicates that fire has burned over 472,359 acres across the Forests. Using territory sizes 247 to 494 acres (Rota et al. 2014b, Tingley et al. 2014), the acreage represents enough habitat to support 956-1,912 black–backed woodpecker pairs. Half (50 percent) of the black-backed woodpecker habitat on the Nez Perce-Clearwater NF lies within large blocks of habitat in wilderness and roadless (excluding Backcountry Restoration).

3.10.4 Environmental Consequences

Analysis Methods

Rota et al. (2014b) studied movement of black-backed woodpecker within a post-burned landscape and made the recommendation to land managers to exempt at least 50 percent of the area where wildfire burned at least 988 acres from salvage logging in order to support more than one breeding pair of black-backed woodpecker. This recommendation was used to analyze the potential effects of the Roadside Hazard project on black-backed woodpecker. Burned conifer was considered habitat for black-backed woodpecker and for each fire over 988 acres in size, the potential loss of habitat was evaluated to make sure less than 50 percent of habitat (burned conifer) was not altered.

Table WL-4. Fire severity and acres of proposed treatments within the fire perimeters (severity per the Burned Area Reflectance Classification mapping).

Fire Name	Low	Mod	High	Total Acres[1]	Treatment				% Treatment
					Drop & Leave		Removal		
					Acres	M-H Severity	Acres	M-H Severity	
Musselshell Creek	210	22	0	832	3	0	98	2	0.6
Snowy Summit	3,720	1,504	213	6,861	8	0	533	112	1.8
Fourbit Creek	268	61	20	1,554	5	0	104	6	0.7
Woodrat	2,208	1,243	1,182	6,472	31	0	364	48	1.2
Boulder	1,807	2,299	272	5,012	206	111	46	38	4.9
Pete Forks	3,899	2,562	599	7,980	79	17	172	32	1.4
Fire Creek	380	306	24	997	28	3	0	0	2.8
Wash	14,741	6,967	8,466	36,853	302	174	721	167	1.3
Snow Creek	1,770	621	76	3,309	5	0	84	10	0.5
Jay Point	1,060	1,231	275	4,503	1	1	105	41	0.9
Noble	2,143	1,217	522	6,054	14	7	122	51	1.1

Fire Name	Low	Mod	High	Total Acres[1]	Treatment				% Treatment
					Drop & Leave		Removal		
					Acres	M-H Severity	Acres	M-H Severity	
Tepee Springs	43,764	34,949	10,841	95,709	286	86	1,325	827	1.2
Slide	4,598	2,206	2,298	10,279	88	7	0	0	0.9
Baldy	1,878	1,112	123	6,683	15	0	37	0	0.2
Crown	11,078	7,555	3,422	33,509	0	0	0	0	0.0
Green	951	97	0	1,077	0	0	0	0	0.0
Wolf	840	368	45	1,385	0	0	0	0	0.0

[1]Total Acres - includes acres of unburned area, which are not displayed in this table.

3.10.4.1 Alternative 2 – Proposed Action

A. Direct and Indirect Effects

All project actions have potential to result in injury, death, or disturbance to black-backed woodpeckers. Death and injury could result from the felling of nest trees and the use of mechanized equipment. Mobility would limit the threats to adults, but there is still potential for accidental death and/or injury if the woodpeckers are present during project activities. Post-fire management activities, including hazard tree removal, have resulted in negative impacts such as reduced abundance and reproductive success of black-backed woodpecker (Hutto and Gallo 2006, Koivula and Schmiegelow 2007, Saab et al. 2007, 2009, Hutto 2008).

Hazard tree removal would have the most pronounced effects on black-backed woodpecker habitat through habitat modification from the removal of fire-killed trees. This project would remove hazard trees in 5,048 acres that could be used by black-backed woodpecker for foraging and nesting. That includes 1,111 acres of drop and leave treatment and 3,938 acres of removal, the latter being more likely to have a greater impact on habitat. Of the acres proposed for removal treatment, 1,337 were classified as moderate or high severity; treatment within these areas have the greatest potential to have an impact on black-backed woodpecker.

The greatest amount of potential treatment within moderate and high severity burned areas is in the Tepee fire where 827 acres are proposed for removal in moderate/high severity burn. As discussed above, black-backed woodpecker home ranges tend to be large and they vary in size but using home range sizes from the literature (247 to 494) (Rota et al. 2014b, Tingley et al. 2014), the area that is proposed for removal could potentially support 1.7 to 3.5 pairs of black-backed woodpecker. However, this represents only 1.2 percent of the area burned in the Tepee Fire, which is well under the 50 percent recommendation given by Rota et al. (2014b).

Overall, given the acres burned in the 2015 fires, the proportion of acres proposed for treatment to the number of acres burned is relatively low and fall well under recommendations for mangers (Table WL-3). Potential direct and indirect effects are considered to be short term and spatially limited to treated areas. Untreated areas that burned at high severity and are suitable black-backed woodpecker habitat would be left intact providing nesting and foraging habitat for black-backed woodpeckers. After project completion, there would still be more burned-forest habitat than existed prior to the fire.

B. Cumulative Effects

Cumulative effects to black-backed woodpecker include past and ongoing activities, particularly fire and insect outbreaks. In 2015, 40 fires larger than the minimum home range for black-backed woodpeckers (247 acres (Rota et al. 2014b)) burned 186,000 acres of timber across the forest. Given the strong association of black-backed woodpecker to recently burned forest, the fires in 2015 created a significant amount of habitat. Outbreaks of wood-boring beetles will also attract these woodpeckers. Refer to population trends section above for additional background information.

Vegetation management of insect and disease affected stands and fire suppression could potentially remove habitat for black-backed woodpecker. Wood-boring beetles are considered detrimental to commercial timber operations, but they are a critical source of forage for many woodpeckers, including black-backed woodpecker. Fire suppression has altered the temporal and spatial distribution of existing black-backed woodpecker habitat and fire suppression prevents the creation of new habitat.

There are multiple salvage logging projects being planned and many of those are within the same fire perimeter as the proposed project. These projects could affect up to an additional 3,000 acres of black-backed woodpecker habitat. Therefore, an additional 6-12 pairs of black-backed woodpecker could be cumulatively affected based on the minimum 247-497 acre home range acreage (Rota et al. 2014b, Tingley et al. 2014).

Outside the Project area, untreated stands would continue to die and create snags, thus providing high quality habitat over the long-term. In addition to the approximately 267,280 acres burned on and immediately adjacent to the Forest in 2015 an additional 205,079 acres burned previously on and adjacent to the forests from 2009 to 2014. The 472,359 acres in post-fire condition presents a snag rich environment for 956 to 1,912 pairs of black-backed woodpeckers. The Project's contribution to cumulative effects results in 6,569 acres of Black-backed woodpecker habitat affected which is less than 1.5 percent of the available habitat on the Forests. Given this the proposed treatments within the project area along with cumulative actions of other projects would not affect the viability of black-backed woodpecker because there is a large amount of available habitat forest-wide. This trend would continue as insect and disease outbreaks occur, thus maintaining black-backed woodpeckers at low, endemic levels as forage and snag habitat is provided throughout the analysis area and over time.

Table WL-5. Black backed woodpecker habitat cumulative effects.

Fire Name	Fire Acres	Project Name	BBWO Habitat	BBWO Habitat Within Proposed Roadside Treatment Segments	BBWO habitat Treated by Other Projects Within Cumulative Effects Area(s) Treatment Areas	Cumulative Total BBWO Habitat Affected by all Treatments	% BBWO Habitat Proposed for Treatment (% Habitat Remaining)
Musselshell	833	Upper Lolo EA	5,162	2	1,271	1,279	25% (75%)
Fourbit	1,557			6			
Mystery/Walde	330			0			
Yoosa	321			0			
Snowy Summit	6,923	French Larch	9.5	112	1.5	614	14% (86%)
		Lost Hat/Snowy Summit EA	4,300		351		

Fire Name	Fire Acres	Project Name	BBWO Habitat	BBWO Habitat Within Proposed Roadside Treatment Segments	BBWO habitat Treated by Other Projects Within Cumulative Effects Area(s) Treatment Areas	Cumulative Total BBWO Habitat Affected by all Treatments	% BBWO Habitat Proposed for Treatment (% Habitat Remaining)
Lost Hat	73						
Boulder	5,012	Boulder CE		149			
Teepee Springs	20,484	Chair Point CE	8,704	913	250	1,413	16% (84%)
		Van-Keating ridge CE			250		
Deadwood	133	Deadwood Salvage CE	0	0	0	0	0 (0)
Woodrat	6,500	Woodrat Salvage EA	2,200	48	462	510	41% (59%)
N/A	N/A	Lochsa Thin (incl. Wapiti)	2,960	0	125	125	4% (96%)
N/A	N/A	Powell Divide	400	0	20	20	5% (95%)

There is high potential for this species to be present during the proposed activities and there is a real threat of loss of nest tree as a direct result of project activities, especially during the breeding season when eggs or nestlings may be in the nest (25 April to 20 July).

Conclusion (Black-backed woodpecker)

May adversely impact individuals or habitat, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide. Potential effects of this project include the loss of habitat resulting from hazard tree removal and the threat of accidental injury or death, mostly through the accidental removal of active nest trees.

Recent fires have created a profusion of snags across the Nez Perce-Clearwater National Forests, which would become suitable nesting, roosting, and foraging habitat within the next decade for many species including black-backed woodpeckers. Other natural disturbances on the Forest, such as bark beetle outbreaks, have also created ample acreages of snag habitat. As a result of these two combined natural events there has been a wealth of habitat created for those species associated with snags.

Activities that reduce the potential for wildfire and epidemics or outbreaks of insect populations do and will reduce habitat for black-backed woodpeckers. At the forest scale and across the species range, impacts of this project appear insignificant. Populations are capable of responding fairly quickly to favorable conditions created by large, intense fires and insect outbreaks (which is occurring on the Forest) where these birds exploit the insect populations that develop in fire killed and stressed trees.

The removal of dead and dying trees and potential snags as a result of activities associated with this project, other current and foreseeable projects, and the amount of habitat left on the landscape across the Forest, is sufficient in meeting the needs of black-backed woodpeckers. Therefor populations are not likely to be affected at the Forest level or across the range of the species. Disturbance impacts may create direct (displacement, harm or fatality) or indirect affects (loss of habitat, changes in prey availability, disturbance) to black-backed woodpeckers in the affected areas. Between 2009 and 2015 fire has burned approximately 472,359 acres across the Forests. The Project's contribution to cumulative effects results in 6,569 acres of Black-backed woodpecker habitat affected, which is less than 1.5 percent of the available habitat. No measurable effects to black-backed woodpecker populations at the Forest or Regional scale, or alteration of current population trend, are expected from the activities proposed in this project. Based in this information it is determined that salvage activities "May impact individuals or habitat, but will not likely to contribute to a trend toward federal listing or reduced viability for the population.

III. Fisher

3.10.5 Affected Environment

Fishers are low density forest carnivores that are known to occur on the Nez Perce-Clearwater National Forests. A total of 1,399 acres (13 percent) within the footprint of the proposed project (10,454 acres) is modeled as fisher habitat (see analysis methods below). The Clearwater sub-basin is thought to be the core of fisher habitat in the inland Northwest (Olson et al. 2014, Sauder 2014). Not all are verified, but there are close to 600 records of fisher observations across the Nez Perce-Clearwater National Forest and a particularly high density of those observations occur in the vicinity of the 2015 Motorway Fire Complex.

3.10.5.1 Existing Condition

In the northwestern United States, fishers historically occupied coniferous forest ecosystems. Populations declined in the late 19th and early 20th century through a combination of over-trapping and habitat destruction (Powell and Zielinski 1994). During the early 1960s the fisher was thought to be extirpated from the state. Currently, the State of Idaho ranks fisher as critically imperiled (S1) because of low populations and lack of population trend data in the state. The fisher is a sensitive species on both the Nez Perce and Clearwater National Forests and is MIS on the Nez Perce National Forest.

Fishers occupy mesic low- to mid-elevation conifer forests and evolved in a complex landscape mosaic shaped by natural disturbance such as fire and tree disease. Studies of habitat selection by fishers consistently show a preference for mature forest and features characteristic of mature forest including: large diameter trees (Jones and Garton 1994, Raley et al. 2012, Schwartz et al. 2013), dense forest cover (Jones and Garton 1994, Raley et al. 2012, Schwartz et al. 2013, Sauder and Rachlow 2014), forests with high structural complexity (Zielinski et al. 2004, 2010, Purcell et al. 2009, Weir and Corbould 2010, Schwartz et al. 2013, Truex and Zielinski 2013, Sauder and Rachlow 2015), and abundant snags and cavities (Zielinski et al. 2004, Raley et al. 2012, Schwartz et al. 2013). On the Nez Perce-Clearwater National Forests, fishers avoid drier forest types dominated by ponderosa and lodgepole pine and select for forests with representative cover of grand fir and western red cedar (Jones and Garton 1994, Schwartz et al. 2013). Forests within or adjacent to riparian areas are particularly important (Jones and Garton 1994) as these areas are used extensively for foraging, resting, and travel corridors. However, riparian stringers that bisect open landscapes are not likely to be sufficient for persistence (Schwartz et al. 2013).

3.10.6 Environmental Consequences

Analysis Methods

For this analysis, potentially suitable habitat was determined using a model (Sauder 2014) that combines 3 models of fisher habitat including: a climate model (Olson et al. 2014), a landscape-scale model (Sauder and Rachlow 2014), and a home range scale model (Sauder and Rachlow 2015). The Sauder (2014) model identifies relative probability of fisher occurrence and is continuous across the landscape. Sauder (2014) calculated thresholds for the probability model that he considered "probable" habitat and "high quality" habitat. For this analysis, the same thresholds were applied to the model across the forest to produce maps of probable and high quality habitat in each affected old growth analysis unit.

The methods for estimating the number of acres of suitable habitat within the project area was determined using a combination of the Sauder (2014) model and existing vegetation data modeled by the Region 1 existing vegetation mapping program (R1-VMap) (Barber et al. 2011). The Sauder model is considered the best available science for a landscape scale analysis of fisher habitat in Region 1 but is better applied at a sub watershed level or larger (6th level Hydrological Unit Code) (J. Sauder, pers. comm.). For this reason, stand-scale vegetation characteristics were selected for within the area considered "probable habitat" by the Sauder (2014) model. The GIS query within probable habitat was based on R1-VMap. Stands classified as having a grand fir or western red cedar dominance type (determined by the species with the greatest abundance of canopy cover, basal area, or trees per acre), canopy cover > 25 percent, DBH > 15", and < 4,800" elevation were selected. The analysis of potentially suitable habitat is not intended to determine absolute acres but to assess the potential habitat impacts of the proposed project.

Fire severity is relevant to understanding the project effects to fisher. Following the fires in 2015, fire severity was mapped by the Burned Area Emergency Response (BAER) team. The map product is a satellite derived map of the post-fire vegetation condition and is referred to as the Burned Area Reflectance Classification (BARC). Fire severity, where referenced in this document, was derived from the 2015 BARC maps. Classes reflect the degree of soil heating and the amount of perennial vegetation killed (Debano et al. 1998) Table WL-6.

Table WL-6. Definitions of fire severity based on the amount of perennial vegetation killed (Debano et al. 1998).

Fire Severity	Trees with no visible damage	Survival of fire-damaged trees	Type of tree damage
High	<40%	< 60%	Largely by root-kill
Moderate	30-70%	40-80%	Fire-damage
Low	≥ 60%	>80%	Scorched crowns, shoot-kill (top kill but sprouting), or root-kill (top kill and no sprouting)
Unburned	Unburned areas within the fire perimeter		

3.10.6.1 Alternative 2-Proposed Action

A. Direct and Indirect Effects

The proposed treatments could affect up to 742 acres of modeled fisher habitat, 573 acres of removal and 169 acres of drop and leave (Table WL-7). For all but the Allison Creek sub watershed, project activities would affect a very low percentage (<2 percent) of modeled fisher habitat in each sub watershed. However, activities in the Allison Creek sub watershed could potentially remove 11.5 percent of the modeled fisher habitat. Sauder (2014) reports there is a significant decline in fisher habitat suitability

when canopy cover less than 40 percent represents greater than 5 percent of the home range of a female fisher. None of the salvage areas within the sub-watersheds, with the exception of the Allison Creek sub-watershed, represents a 5 percent reduction in suitable habitat.

Table WL-7. Summary of potential fisher habitat as estimated by a landscape scale model (Sauder (2014)) and stand-scale existing vegetation model and summary mapped habitat that would be affected by the proposed project activities.

Sub watershed	HUC6 Acres	Fisher Habitat Acres	% HUC 6	Sauder (2014) Prob. Habitat	Sauder (2014) High Quality	Treatment Acres Drop-Remove	Treatment Acres Drop-leave	% Hab Untreated	% Hab Treated
Allison Creek	12,899	1,109	8.6	28.6	1.5	52	75	88.5	11.5
Lower Meadow Creek	31,587	3,754	11.9	55.1	8.7	53	34	97.7	2.3
Big Smith Creek-Middle Fork Clearwater River	28,880	8,534	29.5	67.5	25.2	91	21	98.7	1.3
Middle Lolo Creek	29,511	3,701	12.5	34.0	29.7	44	1	98.8	1.2
Gedney Creek	30,818	2,234	7.2	15.7	1.7	0	22	99	1.0
Lower Skull Creek	15,243	5,340	35.0	65.2	2.1	47	4	99	1.0
Canyon Creek	12,577	6,120	48.7	100.0	95.4	46	3	99.2	0.8
Upper Lolo Creek	26,820	10,833	40.4	97.9	76.0	79	5	99.2	0.8
Eldorado Creek	27,203	12,732	46.8	98.9	79.9	67	2	99.5	0.5
Musselshell Creek	35,342	5,727	16.2	42.0	40.6	26	0	99.5	0.5
Pete King Creek	17,623	8,566	48.6	100.0	76.2	37	0	99.6	0.4
Glover Creek-Selway River	29,016	10,395	35.8	74.9	27.9	22	1	99.8	0.2
Upper Orofino Creek	27,950	4,142	14.8	39.8	37.4	8	0	99.8	0.2
Ohara Creek	37,882	9,975	26.3	88.9	36.3	0	2	100.0	0.0
Totals						573	169		

Because of the potential for removing relatively high amount of modeled habitat in the Allison Creek sub watershed, the Biologist reviewed other information about the potential of the area to support fisher including: aerial photographs, photos and notes from field crews, and personal notes from a field visit. I determined that fisher habitat in this area would be limited to the riparian drainage along Allison Creek. The riparian along Allison Creek includes 52 acres of modeled habitat proposed for drop and leave treatment. The potential removal treatment area (75 acres) designated as fisher habitat is on a steep, dry slope with a significant amount of ponderosa pine and large openings in the canopy, which is not likely to provide habitat for fishers (Weir and Corbould 2010, Schwartz et al. 2013).

The fires in 2015 did not burn uniformly across the landscape and variation in fire frequency and intensity would result in residual standing and downed structure and a mosaic of young and intermediate-aged forest patches if left unmanaged. The effects of treatments in this project would be variable dependent on fire severity. The areas that experienced stand-replacing wildfire are not likely to be currently providing fisher habitat but only one percent of the modeled fisher habitat that is proposed for treatment experienced high severity fire. Approximately 90 percent of the modeled fisher habitat that is proposed for treatment experienced no fire to low severity fire (per BARC). Low intensity fire would create some of the structures that fishers require (snags, cavities, downed wood). By removing fire-killed and live trees with

structural defects as proposed in this project, there will be a loss of fisher habitat that may have been created or improved by the mixed- and low-intensity fire areas being treated in this project.

The type of treatment would have different effects on fisher habitat; with removal treatments having a greater impact on fisher habitat for a longer time. There would be a total loss of snags on approximately 169 acres of modeled fisher habitat with the removal treatments. Multiple aspects of total snag removal will have a negative impact on a snag-dependent species such as the fisher including the loss of snags of varying sizes, varying states of decay, and loss of large snags that are particularly important to snag-dependent species (Lehmkuhl et al. 2003, Hutto 2006). Snag reduction following post-fire logging is felt longer term because hazard trees include damaged green trees that would contribute to future snag densities.

In many cases, trees would be felled without removal because they are within lands designated for greater protection (e.g., riparian habitat conservation area (RHCA) and others). Fishers are often associated with riparian areas so there is a relatively greater likelihood of fishers using these areas. Snag reduction in riparian areas will occur in approximately 145 acres of fisher habitat. However, the drop and leave treatments and hazard trees that are felled will be left on site and will contribute to downed wood structure that fishers prefer.

B. Cumulative Effects

Cumulative effects to fisher include past and ongoing activities, particularly vegetation management that includes timber harvest. Past disturbances such as fire or vegetation management projects that have reduced canopy closure, removed downed wood, large snags and large live trees with structural defects which have impacted the availability of roosting and denning structures, forest connectivity, and prey species are considered to have contributed to the current condition.

Current and reasonably foreseeable future actions that have the potential to affect fisher and fisher habitat within the analysis area include proposed post-fire salvage operations, vegetation management in older forests, transportation management, and ongoing firewood gathering. A list of projects considered for cumulative effects, primarily salvage projects related to the fires of 2015, are listed in Appendix C, and addresses as to their cumulative effects on fisher and fisher habitat below.

Table WL-8. Fischer cumulative effects.

Fire Name	Project Name	Type of Project	Proposed Timeline	HUC 6	Considered for Cumulative Effects
Big Hill	Big Hill Salvage	Fire Salvage	2016-2017	Pete King Creek	No. Project Dropped
Boulder	Boulder Salvage	Fire Salvage	2016-2017	Boulder-Crooked Fork Creek/Upper Crooked Fork Creek	Yes however salvage is proposed for units which no longer represent fisher habitat as a result of fire severity. No cumulative effects.
Boulder	Powell Divide	Timber Sale	2016-2017	Upper Crooked Fork Creek, Boulder-Crooked Fork Creek, Lower Crooked Fork Creek.	Yes. A review of the project Environmental Assessment and Wildlife Specialist Report indicates that this project would reduce fisher summer habitat by 20 acres (1%) within the project area and would result in a MIIH determination.
Deadwood	Deadwood Salvage	Salvage Harvest	2016-2017	Six-miles Creek, Lower Crooked River.	No. No Roadside Rec/Admin Site Activities Proposed for these sub-watersheds.

Fire Name	Project Name	Type of Project	Proposed Timeline	HUC 6	Considered for Cumulative Effects
Fourbit	Fourbit Salvage	Fire Salvage	2016-2017	Eldorado Creek	Yes. Fourbit Salvage project has potential to reduce post-fire fisher habitat in Eldorado Creek sub-watershed by 2%. Cumulatively these two projects have the potential to reduce post-fire fisher habitat by 2.5% within the sub-watershed.
Lost Hat	Lost Hat/Snowy Summit Salvage	Fire Salvage	2016-2017	Upper Orofino Creek	Yes however salvage is proposed for units which no longer represent fisher habitat as a result of fire severity. No cumulative effects.
Musselshell	Musselshell Decks	Sale of logs decked as a result of fireline construction	Finish June 2016	Musselshell Creek/Upper Lolo Creek	No. Deck sale a result of fireline construction and would not alter additional fisher habitat.
Musselshell	Musselshell Salvage	Fire Salvage	2016-2017	Musselshell Creek/Upper Lolo Creek	Yes. Musselshell and Yoosa (see below) salvage projects have potential to reduce post-fire fisher habitat in Musselshell Creek and Upper Lolo Creek sub-watershed by 4%. and <1% respectively. The Roadside, Rec/Admin Site Project cumulatively with these projects has the potential to reduce post-fire fisher habitat by 4.5% and <1.5% in Musselshell Creek and Upper Lolo Creek sub-watersheds respectively.
Snowy Summit	Lost Hat/Snowy Summit	Fire Salvage	2016-2017	Upper Orofino Creek/French Creek	Yes however salvage is proposed for units which no longer represent fisher habitat as a result of fire severity. No cumulative effects.
Snowy Summit (Includes Yoosa Fire)	French Larch	Regeneration Harvest 1,989 ac., Commercial thinning 334 ac., Pre-commercial thinning 645 ac., Temp. Road Const. 10 miles, Long Term Road Storage 10 miles, Decommissioned Road 9 miles.	2019	French Creek, Upper Orogrande Creek, Hemlock Creek	Yes. The Draft French Larch project Wildlife Specialist Report indicates that the project will increase "open cover" by 4.9%. However, none of the sub-watersheds listed would overlap with this project and would not contribute cumulatively to this project.
Teepee Springs	Van-Keating Ridge Salvage	Fire Salvage	2016	Upper Little Slate Creek, Van Creek, Kelly Creek, Allison Creek	Yes however salvage is proposed for units which no longer represent fisher habitat as a result of fire severity. No cumulative effects.
Teepee Springs	Chair Point Salvage	Fire Salvage	2016	West Fork Allison Creek, Plant Creek, Allison Creek, Gus Creek	Yes however salvage is proposed for units which no longer represent fisher habitat as a result of fire severity. No cumulative effects.
Yoosa	Yoosa Salvage	Fire Salvage	2016-2017	Upper Lolo Creek	Yes. Yoosa and Musselshell (see above) salvage projects have potential to reduce post-fire fisher habitat in Upper Lolo Creek sub-watershed by <1%. The Roadside, Rec/Admin Site Project cumulatively with this project has the potential to reduce post-fire fisher habitat by <1.5% in the Upper Lolo Creek sub-watershed.

Fire Name	Project Name	Type of Project	Proposed Timeline	HUC 6	Considered for Cumulative Effects
Walde/Mystery	Walde/Mystery Salvage	Fire salvage	2016-2017	Canyon Creek	Yes. Walde/Mystery Salvage project has potential to reduce post-fire fisher habitat in Canyon Creek sub-watershed by 2%. Cumulatively these two projects have the potential to reduce post-fire fisher habitat by 2.8% within the sub-watershed.
N/A	Wapiti	213 acres of pre-commercial thinning.	2018	Eldorado Creek	Yes. A review of the project Environmental Assessment and Wildlife Specialist Report indicates that this project would retain fisher habitat within the project area and would result in a MIIH determination.
Woodrat	Woodrat Salvage	Fire Salvage	2016-2017	Big Smith Creek-Middle Fork Clearwater River/Middle Lolo Creek	Yes however salvage is proposed for units which no longer represent fisher habitat as a result of fire severity. No cumulative effects.
Woodrat	Woodrat Deck Sale	Sale of logs decked as a result of fireline construction	June 2016	Big Smith Creek-Middle Fork Clearwater River	No. Deck sale a result of fireline construction and would not alter additional fisher habitat.
Woodrat	Smith/Swan Deck Sale	Sale of logs decked as a result of fireline construction	June 2016	Big Smith Creek-Middle Fork Clearwater River	No. Deck sale a result of fireline construction and would not alter additional fisher habitat.
Woodrat	Lyon's Deck Sale	Sale of logs decked as a result of fireline construction	June 2016	Big Smith Creek-Middle Fork Clearwater River	No. Deck sale a result of fireline construction and would not alter additional fisher habitat.

Reviewing the list of projects within the foreseeable future listed above indicates that salvage projects related to the Fourbit, Musselshell, Yoosa, and Walde/Mystery Fires will overlap in time, space, and will have effects on fisher habitat. None of these project, taken cumulatively with this project, will drive open canopy conditions to over 5% in any of the subwatersheds where the projects overlap (Upper Lolo, Musselshell, Canyon Creek, and Eldorado Creek). Several proposed fire salvage projects (Lost Hat/Snowy Summit Salvage, Woodrat Salvage, Van-Keating Ridge Salvage, and Chair Point Salvage) were determined have no effects on fisher habitat. Fire severity within these proposed salvage areas was such that any pre-fire fisher habitat was converted to non-habitat therefore salvage in these areas would not as a result in a loss of available habitat. There are no activities under the Roadside Rec/Admin site Project proposed for the Deadwood salvage area therefore the project would have no cumulative effects on fisher habitat.

Vegetation Projects (French Larch, Powell Divide, Wapiti) were also reviewed. The French Larch Project proposes several prescriptions including regeneration harvest as well as commercial and pre-commercial thinning which would reduce canopy cover and habitat for fisher. However, none of the project related activities fall within sub-watersheds which overlap with those of the Roadside Rec/Admin Site project and therefore would not contribute cumulatively to the effects of the Roadside Rec/Admin Site Project. The Wapiti project is a pre-commercial thinning area associated with the Lochsa Thin EA. The project would pre-commercially thin approximately 213 acres however the EA and Specialist report indicate that the project will have no effect on fisher habitat though, because habitat is available and present, may cause disturbance to individual fishers. Lastly, the EA and Specialist Reports for the Powell Divide project indicate a potential reduction of 20 acres of fisher habitat which represents 1% of the available fisher habitat

The majority of these projects would have no cumulative effects on fisher habitat when considered cumulatively with the Roadside Rec/Admin Site Project because 1) they do not occur in the same sub-watershed, 2) where they do overlap, fisher habitat has been temporarily eliminated as a result of the severity fire and additional habitat would not be converted as a result of the activity or 3) the activity (i.e. deck sales) would have no effects on fisher habitat. The remainder of the projects (Musselshell Salvage, Yoosa Salvage, Walde/Mystery Salvage, Fourbit Salvage, Wapiti Pre-commercial Thinning, Powell Divide) will have an effect on fisher habitat which are cumulative to the effects of the Roadside Rec/Admin Site project however these projects would not convert greater that 5% of the post-fire fisher habitat to a canopy cover of <40% which would limit habitat suitability related to fisher as identified by Sauder (2015).

C. Conclusion

After analyzing the Direct, Indirect, and Cumulative Effects related to the Roadside Rec/Admin Site Project I have determined that this project may adversely impact individuals or habitat, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.

Potential effects of this project include the loss of habitat resulting from hazard tree removal, the threat of accidental injury or death, and disturbance to individuals. No treatments are planned for old growth forest, which has good potential for supporting fishers. There would be sufficient habitat unaffected by the proposed actions to continue to support fisher. Fisher habitat remains well distributed across the Nez Perce-Clearwater National Forests and based on monitoring and widely scattered incidental sightings, local fisher trends remain relatively stable on the forest.

IV. Dry-forest, Snag Associates: Flammulated owl, pygmy nuthatch, white-headed woodpecker, fringed myotis

These four species all require large-diameter (mature and old growth) open-crown dry-site forests dominated by ponderosa pine and/or Douglas-fir, and the presence of large snags for nesting and/or roosting. Because of habitat similarities between these species, they are analyzed as a group.

Habitat Relationships (Flammulated owl, pygmy nuthatch, white-headed woodpecker, fringed myotis)

Flammulated owls are seasonal migrants to northern latitudes during the spring and summer. Primary nesting habitat is comprised of older forest dominated by ponderosa pine and Douglas-fir with moderate canopy cover (35-65 percent) and larger trees (Groves et al. 1997). Flammulated owls nest in cavities excavated by other species, especially northern flickers and pileated woodpeckers. Their diet consists mainly of insects, particularly moths and beetles.

Pygmy nuthatches are resident species in ponderosa pine forests. Pygmy nuthatches are found almost exclusively in ponderosa pine forests although secondary habitats include Douglas fir and aspen. Pygmy nuthatch use cavities in snags for roosting and for breeding so they prefer old and mature forest. Pygmy Nuthatch abundance correlates directly with snag density and foliage volume of the forest, but inversely with trunk volume; this implies it needs heterogeneous stands with a mixture of well-spaced, old pines and vigorous trees of intermediate age (Balda et al. 1983). Their diet consists mainly of insects during the breeding season and in some areas they forage almost exclusively on pine seeds in the non-breeding season (Kingery and Ghalambor 2001).

White-headed woodpeckers are primarily associated with mature ponderosa pine forests White-headed woodpeckers are primarily associated with mature ponderosa pine forests with moderate canopy closure (Latif et al. 2015). They are weak primary excavators and require snags in advanced stages of decay in order to excavate a cavity (Buchanan et al. 2003). Insects are an important food resource, especially in the

breeding season, and pine seeds are an important food resource, particularly in late summer to winter (Kingery and Ghalambor 2001). The woodpeckers forage relatively superficially and rarely drill deep into live, decaying, or dead wood (Garrett et al. 1996).

In Idaho, the fringed myotis is associated with grasslands, xeric shrublands, ponderosa pine, Douglas-fir and mixed xeric forests (IDFG 2005). Maternity colonies, day roosts, and night roosts are located in caves, building, mines, rock crevices, bridges, and tree hollows. Roost trees tend to be large diameter snags in early to medium stages of decay.

3.10.7 Affected Environment

For this analysis, potential habitat for the dry snag associates is defined as mixed ponderosa pine and mixed Douglas-fir habitats consisting of large trees (≥15" DBH). Each species will have somewhat different habitat preferences (e.g., canopy cover tends to be more open and patchy for white-headed woodpecker), so stand selection based on these characteristics estimates area with some potential to support one or all of the species and is likely to overestimate habitat coverage for any individual species.

Large ponderosa pine or ponderosa/Douglas fir habitats are the warmest and driest forested habitat types on the forest that usually occur at either low elevations, mid-elevations on south aspects, and/or on drier soils. Large ponderosa and/or Douglas-fir dominated stands cover roughly 12 percent of the forested land on the Nez Perce-Clearwater NF (per R1 VMap) but are patchily distributed. Of the subwatersheds (6th level HUC) that will be affected by this project, four have good coverage (10-35 percent) of potential habitat and all of those were affected by the Tepee Springs fire so treatments within this fire perimeter have the most potential to affect these species. Moderate coverage (5-10 percent) of potential habitat coverage is within areas of the Slide, Nobel, Wash, and Woodrat fires.

Much of the fire-affected area with treatments proposed in this project have very low coverage of dry forest with large trees and are unlikely to support the dry forest snag associates because habitat is spotty and dispersed. Only treatments within the Nobel, Slide, Tepee Springs, Wash, and Woodrat fires would potentially impact these species. Only the subwatersheds with treatments that could affect habitat within these five fires were analyzed for effects. On the Nez Perce-Clearwater NF, white-headed woodpeckers are not found outside of the Salmon River drainage so they are only likely to be present in the vicinity of the Tepee Springs fire.

3.10.8 Environmental Consequences

3.10.8.1 Alternative 2- Proposed Action

A. Direct and Indirect Effects

Project actions in areas with potential habitat have potential to result in injury, death, or disturbance to flammulated owls, pygmy nuthatches, white-headed woodpeckers, and/or fringed myotis. Death and injury could result from the felling of nesting or roosting trees and the use of mechanized equipment. Mobility would limit the threats to adults, but there is still potential for accidental death and/or injury if any of the species are present during project activities.

Hazard tree removal would modify habitat from the removal of fire-killed trees that offer cavities, structure and foraging opportunity for these species. This project would remove hazard trees in approximately 562 acres of potential habitat. That includes 121 acres of drop and leave treatment and 441 acres of removal, the latter being more likely to have a greater impact on habitat because of the more complete removal of structure. Within each subwatershed analyzed, only the Allison Creek and Gedney Creek subwatersheds would have more than 5 percent of potential habitat proposed for treatment. No more than 1.6 percent of the combined habitat available in the involved subwatersheds would be treated.

The relatively limited amount of proposed treatment is unlikely to have an impact on any of the species analyzed.

TableWL-9. Summary of the acres of potential habitat for mature dry forest associates by subwatershed and the amount of potential habitat that would be affected by the proposed activities. Only subwatersheds

Fire Name	HUC 6	HUC 6 Name	Removal	Drop & Leave	Habitat in HUC6	% treated
Tepee Springs	170602090204	Allison Creek	244	42	4,543	6.3
Tepee Springs	170602090301	Upper Little Slate Creek	6	26	669	4.8
Slide	170603020401	Gedney Creek	0	20	91	22
Tepee Springs	170602090203	Kelly Creek-Salmon River	61	13	8,581	0.9
Tepee Springs	170602090206	Berg Creek-Salmon River	120	8	5,576	2.3
Woodrat	170603040201	Big Smith Creek-Middle Fork Clearwater River	4	0	2,121	1.3
Noble	170602070702	Big Mallard Creek	1	10	1,345	0.9
Wash	170603020307	Lower Meadow Creek	4	1	2,657	0.2
Tepee Springs	170602090402	Fiddle Creek-Salmon River	0	1	4,180	0.0
Slide	170603020402	Glover Creek-Selway River	0	0	1,264	0.0
Slide	170603020206	Pinchot Creek-Selway River	0	0	2,708	0.0
Slide	170603020403	Rackliff Creek-Selway River	0	0	609	0.0
Slide	170603020405	Goddard Creek-Selway River	0	0	565	0.0
Wash	170603020402	Glover Creek-Selway River	1	0	1,264	0.0

B. Cumulative Effects

Fire exclusion and selective logging of large-diameter ponderosa pine in the early 20th century favored the development of forests with dense, small-diameter shade-tolerant species (Harrod et al. 2008, Merschel et al. 2014). As a result, old forests dominated by open, or patchy large-diameter ponderosa pine, which support flammulated owl, pygmy nuthatch, white-headed woodpecker, and fringed myotis are now a minor component of forested landscapes. The fires in 2015 will have created snags that can be used for habitat by these species. In the areas where large ponderosa forest was severely burned, there may have been a loss of habitat. However, in locations that were less severely burned, the fires were likely to have created snags interspersed with live vegetation, thus enhancing habitat for these species.

Foreseeable future actions that have the potential to affect the mature dry forest associates within the same subwatersheds analyzed include vegetation management in older ponderosa pine and/or Douglas-fir forests, including other timber salvage projects of the 2015 fires. Depending on the extent of salvage removal in the same area, the combined effects of multiple projects to remove fire-affected trees on less than 3,000 acres could be a potential to reduce snag densities across the landscape beyond the normal range (Bollenbacher and Bush 2009), which could have detrimental effects to the snag dependent species in this analysis. Removal of snags through post fire logging reduces densities and size classes of snags remaining after wildfire (Russell et al. 2006). Post fire salvage logging increases the rate that remaining

snags fall and shortens the time period that the remaining snags provide suitable habitat (Russell et al. 2006).

Maintaining clumps of large snags in post-fire landscapes is necessary for maintaining breeding habitat of cavity-nesting birds (Saab et al. 2009). Effects would be limited by the projects' wildlife design criteria in combination with their focus on treatment of dead and dying trees.

Other foreseeable future actions that have the potential to affect the mature dry forest associates include transportation management, and ongoing firewood gathering. Access restrictions association with the reduction of cross country travel would help alleviating the loss of snags and logs taken by firewood gatherers.

C. Conclusion

May adversely impact individuals or habitat, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.

Potential effects of this project include the loss of habitat resulting from hazard tree removal, the threat of accidental injury or death, and disturbance to individuals. There would be sufficient habitat unaffected by the proposed actions to continue to support the mature dry forest associates in this analysis.

Because of the threat of loss of nest or maternal roosting tree as a direct result of project activities, if any flammulated owls, pygmy nuthatch, white-headed woodpeckers, or bat roosts are detected in the project area during implementation; a wildlife biologist should be notified and they would determine the appropriate conservation measures necessary to avoid adverse effect.

V. Old-forest, snag and downed wood associates: Pileated woodpecker, American marten, and bats (long-legged myotis, long-eared myotis)

These four species all require large-diameter snags and coarse woody debris for nesting and/or roosting and foraging. Because of habitat similarities between these species, they are analyzed as a group.

Habitat Relationships

Pileated woodpeckers are dependent on large snags and decadent trees for nesting, and decadent trees, snags, and downed logs for foraging (Bull 1987, Mellen et al. 1992, McClelland and McClelland 1999, Wisdom et al. 2000, Raley and Aubry 2006), which are common elements of mature forest. Pileated woodpeckers are considered a keystone species because of their role as primary excavators for a variety of mammals and birds that use cavities for nesting, denning, roosting, and resting (Martin and Eadie 1999, Bonar 2000, Aubry and Raley 2002). The larger cavity openings made by the pileated woodpecker are particularly important for larger species (e.g., pine marten) (Bonar 2000, Aubry and Raley 2002). Trees (both live and dead) used for roosting and nesting include grand fir, western larch, ponderosa pine, and Douglas-fir (Bull and Holthausen 1993, McClelland and McClelland 1999). The majority of pileated woodpecker foraging activity occurs on logs and dead trees, and their diet consists primarily of wood-boring insects, particularly carpenter ants (Bull and Holthausen 1993).

American marten generally occupy higher elevations in cold moist and cold dry forests (i.e., subalpine fir, grand fir, Engelmann spruce, hemlock, and cedar) (Youkey 2012). The forests are characterized by being multi-storied, closed-canopied, and having medium and larger trees. Abundant coarse woody debris is another characteristic of marten habitat, which is likely related to the role woody debris plays as habitat for small mammals such as mice and voles.

The long-eared and long-legged myotis live in coniferous forests in mountain areas, roosts in small colonies in caves, mines, cliff face crevices, rock outcrops, buildings, bridges, and under tree bark.

3.10.9 Affected Environment

For this analysis, habitat for the snag and downed wood associates is defined as mesic coniferous forested habitats consisting of large trees (≥10" DBH). Marten tend to be found in higher elevations and occupy colder habitat types. Pileated woodpeckers are often in moist or mesic forest types; in general, they would be more abundant in lower elevations than marten. Project activities proposed for mesic forest types with large trees has potential to be occupied by either or both of these species.

The myotis bats occupy a broad range of habitats and because they sometimes use large snags for roosting, there is a potential for both species to be affected by the project activities that remove snags. Both species of bat were detected on all surveys in the central zone of the Nez Perce-Clearwater NF that covered a broad range of elevations and habitats. Although they were detected in all locations they were detected at lower levels of abundance than other bat species (Baumgardt and Sauder 2012).

Mesic stands with large trees are abundant and cover an estimated 65 percent of the forested land on the Nez Perce-Clearwater NF (per R1 VMap). Of the subwatersheds (6th level HUC) that will be affected by this project, all have high proportion of potential habitat.

3.10.10 Environmental Consequences

3.10.10.1 Alternative 2-Proposed Action

A. Direct and Indirect Effects

Project actions in areas with potential habitat have potential to result in injury, death, or disturbance to pileated woodpeckers, marten, long-legged myotis, and long-eared myotis. Death and injury could result from the felling of nesting or roosting trees and the use of mechanized equipment. Mobility would limit the threats to adults, but there is still potential for accidental death and/or injury if any of the species are present during project activities.

Hazard tree removal would modify habitat from the removal of fire-killed trees that offer cavities, structure and foraging opportunity for these species. Hazard tree removal can mean a significant reduction of future surface woody fuels for long periods of time (Peterson et al. 2015), which can have an impact on the species like these who have a strong association with downed wood. This project would remove hazard trees in approximately 2,749 acres of potential habitat. That includes 561 acres of drop and leave treatment and 2,188 acres of removal, the latter being more likely to have a greater impact on habitat because of the more complete removal of structure, particularly for these species that rely on downed wood. The most amount of removal of habitat is in the Allison Creek subwatershed. Within this subwatershed, there are 235 acres are proposed for removal treatment, which is 4 percent of potential habitat. This limited removal is unlikely to have an impact on any of the species analyzed.

The impacts of removing downed wood will be reduced by design criteria #10 that requires the retention of 7-33 tons per acre of coarse woody debris (greater than or equal to 8 inches in diameter) following completion of activities.

B. Cumulative Effects

Fire exclusion and selective logging of large-diameter ponderosa pine in the early 20th century favored the development of forests with dense, small-diameter shade-tolerant species (Harrod et al. 2008, Merschel et al. 2014). As a result, old forests dominated by open, or patchy large-diameter ponderosa pine, which support flammulated owl, pygmy nuthatch, white-headed woodpecker, and fringed myotis are now a minor component of forested landscapes.

The fires in 2015 will have created snags and downed wood that can be used for habitat by these species. In the areas where old mesic forest was severely burned, there may have been a loss of habitat. However, in locations that were less severely burned, the fires were likely to have created snags interspersed with live vegetation, thus enhancing habitat for these species.

Foreseeable future actions that have the potential to affect these species within the same subwatersheds analyzed include: vegetation management in older mesic conifer forests, including less than 3,000 acres in other timber salvage projects of the 2015 fires. Depending on the extent of salvage removal in the same area, the combined effects of multiple projects to remove fire-affected trees there could be a potential to:(a) reduce snag densities across the landscape beyond the normal range (Bollenbacher and Bush 2009) and (b) significantly reduce surface woody fuels, including large diameter fuel loads. Removal of snags through post fire logging reduces densities and size classes of snags remaining after wildfire (Russell et al. 2006). Post fire salvage logging increases the rate that remaining snags fall and shortens the time period that the remaining snags provide suitable habitat (Russell et al. 2006). Maintaining clumps of large snags in post-fire landscapes is necessary for maintaining breeding habitat of cavity-nesting birds (Saab et al. 2009).

Other foreseeable future actions that have the potential to affect these species include transportation management, and ongoing firewood gathering. Access restrictions association with the reduction of cross country travel would help alleviating the loss of snags and logs taken by firewood gatherers.

C. Conclusion

May adversely impact individuals or habitat, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.

Potential effects of this project include the loss of habitat resulting from hazard tree removal, the threat of accidental injury or death, and disturbance to individuals. There would be sufficient habitat unaffected by the proposed actions to continue to support the old mesic forest associates in this analysis.

VI. Effects Common to All Species

A. Alternative 1-No Action

The conditions that would develop from not implementing the proposed action would result in a continuation of existing condition and related trends. The no action alternative would maintain existing post-fire snag habitat, canopy cover, and stand structure. The hazard tree mitigation component of this project would not occur; and no salvage harvest of dead or dying timber would take place. The road and recreation maintenance portions of the project may be implemented in part under separate NEPA, although under a delayed schedule. Fire killed and weakened trees would continue to fall. There would be no potential for direct or indirect effects from the no action alternative because none of the proposed activities would be implemented. There are no cumulative effects associated with the no action alternative, since project activities would not result in direct or indirect effects upon terrestrial wildlife species. Current management plans would continue to guide Forest management in the project area. Future insect outbreaks and root disease would create more habitat for those species associated with snags and down wood. Future habitat changes would occur through natural forest regeneration with fire-killed trees and post-fire tree mortality (expected from bugs) increasing the availability of snags that would ultimately contribute to coarse woody debris across the landscape into the short and long-term future. Cover and forage within the project area will improve over time as trees start growing resulting from natural regeneration. Over time, the amount and distribution of available habitat for some species could decline as the young trees would eventually grow out of the reach of small animals, and self-pruning could reduce the amount of horizontal cover. As snags start to fall, they will provide cover, denning, roosting, and foraging sites for many species. Depending on the amount of down woody material on the

ground at any given point in time, it can act as an impediment for animals traveling through the area. There would be no temporary disturbance to any wildlife given no activities would take place. Therefore, the No Action Alternative would have no effect upon any terrestrial species or their respective habitats, so this alternative is not addressed further.

B. Alternative 2- Proposed Action

Reforestation Activities

Reforestation may have short-term impacts, but is considered a long-term beneficial effect to terrestrial wildlife and is not addressed further in this report. Short-term adverse effects of this proposed action may be partly offset by beneficial effects of reforestation during the early seral stages for terrestrial wildlife species that use those forests.

VII. Effects to Big Game Vulnerability

A. Elk Security/Vulnerability

The removal of roadside cover, and thereby increases in big game vulnerability, is currently related more specifically to the effects of the fires. Within the "*Interagency Guidelines for Managing Elk Habitats and Populations on U.S. Forest Service Lands in Central Idaho*" (Servheen 1997) elk habitat security is considered to be 1) contiguous blocks 250 acres or 2) greater than ½ mile from open roads and 3) 60% or more hiding cover. It is not within the scope of the Roadside, Recreation and Administrative Sites project to effect road density and so, technically, the project will have no effect on elk security. Neither is it within the scope of the project to alter seasonal (hunting season) accessibility. Roadside segments proposed for treatment however have the potential to increase elk vulnerability during the hunting season due to potential alteration of roadside cover provided principally by burned tree boles. This is minimized through filtering and design criteria such as retention of live green trees and retention of dead and dying trees which do not pose a hazard to the road. The effects are also temporally limited as regeneration once again provides adequate screening to reduce roadside vulnerability within 5-10 years. This is recovery will be sped up through planned reforestation. However, reforestation is a double edged sword. Reforested areas can also have the effect of reducing browse for big game species. In this instance this might also prove beneficial by limiting desirability of roadside vegetation drawing elk and other game species closer to roads and thereby resulting in a vulnerability risk from hunting, poaching, and vehicle collision.

There is potential for increases in big game roadside vulnerability as a result of the project however these effects are minimized through the application of project filters and design criteria. Eventually (5-10 years) natural regeneration will once again provide roadside cover. Where reforestation is prescribed this process will be accelerated. Given these the potential for the Roadside, Recreation and Administrative site project is expected to have minimal short term effects on big game roadside vulnerability.

B. Connectivity/Security Related to Other Species within "Drop and Remove" Road Segments

Though actual quantities of basal area to be removed have not been determined yet there appears to be limited potential for alterations of roadside cover leading to a loss of connectivity as a result of hazard tree mitigation. The removal of roadside coved and thereby connectivity is currently related more specifically to the effects of the fires. However, an analysis of the potential impacts to habitat connectivity (this analysis was completed for lynx but provides an idea of where there is a *potential* for significant reductions in roadside cover for other species) created by felling and removal along significant stretches of road proposed for hazard tree mitigation was conducted by: 1) combining all road segments proposed

for felling and yarding; 2) burn severity of moderate to high; 3) on slopes of less than 35 percent; and 4) fell in lynx habitat.

The result is an indication of potential segments with sufficient burn severity to create large numbers of dead and dying trees on slopes (< 35 percent) where there is an opportunity for hazard trees to impact roads from 200' relatively equally from either side of the road. This analysis indicates that, of the 103 miles of road proposed for felling and removal of hazard trees, approximately 2.5 miles meets the criteria used in the analysis. Of this the longest individual segment is .3 miles and equated to approximately 16 acres. Areas of felling and leaving will leave coarse woody debris on the ground and thereby provide connectivity. These areas have the *potential* to create openings and lack coarse wood debris and, as such, may serve as barriers to movement of certain species (i.e. lynx, fisher, etc.). However, it is important to note that the roadside hazard tree project does not propose any treatments outside of burn areas and retains live green trees as well as dead and dying trees which do not pose a hazard to the road prism. Additionally, in areas of drop and remove, hazard trees which are un-merchantable as a result of size (generally <8 inches in diameter) or defect will be dropped and left on site. Areas of verified landslide prone and RHCAs have also been prescribed for drop and leave.

These filters and design features serve to retain and increase current levels of CWD, retain potential future CWD, and so provide some mitigation for loss of potential cover for connectivity. Eventually (20-25 years) natural regeneration will once again provide canopy/ground cover for these species and their prey.

VII. Wildlife Summary

Table WL-10. Analysis conclusions for Alternatives 1 and 2.

Species	Determination	
	Alternative 1- No Action	**Alternative 2- Proposed Action**
Black-backed woodpecker *(Picoides arcticus)*	No action would have no impact on Black-backed woodpecker.	The Post-fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project may adversely impact Black-backed woodpecker individuals or habitat, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.
Flammulated owl *(Otis flammeolus)*	No action would have no impact on Flammulated owl.	The Post-fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project may adversely impact Flammulated owl individuals or habitat, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.
Pygmy nuthatch *(Sitta pygmaea)*	No action would have no impact on Pygmy nuthatch.	The Post-fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project may adversely impact Pygmy nuthatch individuals or habitat, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide
white-headed woodpecker *(Picoides albolarvatus)*	No action would have no impact on white-headed woodpecker.	The Post-fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project may adversely impact white-headed woodpecker individuals or habitat, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.
Mammals		

Species	Determination	
	Alternative 1- No Action	**Alternative 2- Proposed Action**
Fringed myotis *(Myotis thysanodes)*	No action would have no impact on fringed myotis.	The Post-fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project may adversely impact fringed myotis individuals or habitat, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.
Long-eared myotis *(Myotis evotis)* **& Long-legged myotis** *(Myotis volans)*	No action would have no impact on long-eared myotis and long-legged myotis.	The Post-fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project may adversely impact long-eared and long-legged myotis individuals or habitat, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.
Fisher ***(Pekania pennant)***	No action would have no impact on Fisher.	The Post-fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project may adversely impact Fisher individuals or habitat, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.

3.11 Idaho Roadless Areas

3.11.1 Affected Environment

This analysis focuses on the potential effects of project activities on wilderness attributes as defined in Forest Service Handbook (FSH) 1909.12 (72.1). The analysis for the effects on other roadless resources such as water resources, soils, visual quality and wildlife habitat may be found in other sections of this Environmental Assessment. The 2008 Idaho Roadless Rule (36 CFR 294 subpart C) integrated local management concerns and the need to protect these areas in concert with the national objectives for protecting roadless area values and characteristics. The rule does not limit or prohibit removal of hazard trees adjacent to forest roads for public health and safety reasons (73 CFR 61463 and timber harvest that would occur under Alternative 2 is incidental to this action.

The final rule designated 250 Idaho Roadless Areas and established five management themes these include Wild Land Recreation, Special Areas of Historical and Tribal Significance, Primitive, Backcountry Restoration, and General Forest, Rangeland, Grassland. Allocation to a specific theme does not mandate or direct the Forest Service to propose or implement any action; however, the management themes provide an array of permitted and prohibited activities. It is important to note that certain activities (road building, mineral development, and timber cutting) vary from theme to theme, while other activities (motorized travel, grazing, motorized and mechanized use) are not changed by this rule.

The term roadless area refers to an area of at least 5,000 acres, without developed and maintained roads and substantially natural in condition as described in FSH1909.12. A roadless area is specifically defined as an area that meets the minimum criteria for wilderness. Unroaded lands typically share similar characteristics and are often smaller. The effects of the proposed alternatives on roadless and unroaded areas will concentrate on the following wilderness attributes: natural integrity, undeveloped characteristics, outstanding opportunities for solitude and primitive recreation, special features and values, and manageability.

A. Resource Indicators

The purpose of this analysis is to evaluate the environmental consequences of the proposed alternatives on the wilderness characteristics in the roadless and unroaded area expanse.

B. Current Conditions

Roads adjacent to 14 Idaho Roadless Areas were affected by nearly 184,000 acres of wildfire during the 2015 fire season. While the roads are not part of the Idaho Roadless Area (IRA), maintenance of the roads and recreation sites necessitate some activities to be done immediately adjacent to the roadway to preserve the infrastructure. Approximately 62 miles of roads are immediately adjacent to areas designated as an IRA.

Table RD-1. Proportion of roadless areas affected by the proposed action.

Roadless Area Name	Theme	Road Number	Acres of Hazard Tree Fall and Remove	Miles of Fall and Remove	Acres of Hazard Tree Fall and Leave	Miles of Fall and Leave	Total Acres	Total Miles	Percent of Roadless Area
Bighorn - Weitas	Backcountry Restoration	Totals:	120.4	5.88	11.7	0.42	132.1	**6.3**	0.05%
		FS RD 547		2.3					
		FS RD 535		1.3					
		FS RD 104		1.6					
		FS RD 103		0.68		0.42			
East Meadow Creek	Primitive	Totals:	0	0	14.6	0.8	14.6	**0.8**	0.02%
		FS RD 290	0			0.8			
Eldorado Creek	Backcountry Restoration	Totals:	11.1	0.37	0.5	0	11.6	**0.37**	0.20%
		FS RD 524		0.32					
		FS RD 5110		0.05					
Gospel Hump	Backcountry Restoration	Totals:	42.9	0.46	15.3	0.31	58.2	0.77	0.0013
		FS RD 1190 E		0.06		0.02			
		FS RD 421		0.4		0.29			
Hoodoo	Wild Land Recreation	Totals:	0	0	68.9	3.25	68.9	**3.25**	0.03%
		FS RD 595		0		3.25			
John Day	Backcountry Restoration	Totals:	0		0.2		0.2	**0**	0.00%
Lochsa Face	Backcountry Restoration	Totals:	27.3	1.52	0	0	27.3	**1.52**	0.04%
		FS RD 362		1.52		0			
Mallard	Backcountry Restoration	Totals:	62.9	1.4	5.6	0.11	68.5	**1.51**	0.35%
		FS RD 421		1.29		0.11			
		FS RD 9555A		0.11		0			
Mallard-Larkins	Backcountry Restoration	Totals:	12.5	0.58	1.9	0.08	14.4	**0.66**	0.01%
		FS RD 252		0.58		0.08			
North Lochsa Slope	Primitive	Totals:	0	0	78.3	3.94	78.3	**3.94**	0.07%
		FS RD 483				0.44			
		FS RD 75291				0.1			
		FS RD 500				3.4			

Table Rd-1, continued.

Roadless Area Name	Theme	Road Number	Acres of Hazard Tree Fall and Remove	Miles of Fall and Remove	Acres of Hazard Tree Fall and Leave	Miles of Fall and Leave	Total Acres	Total Miles	Percent of Roadless Area
O'Hara - Falls Creek	Backcountry Restoration	Totals:	49.2	2.5	1.1	0.03	50.3	**2.53**	0.20%
		FS RD 443		2.5		0.03			
	SAHTS[1]	Totals:	0		0.95	0.08	0.95	**0.08**	In above
		FS RD 651				0.08			
Rackliff - Gedney	Backcountry Restoration	Totals:	0	0	196.4	3.26	196.4	**3.26**	0.20%
		FS RD 319				2.63			
		FS RD 317				0.63			
	SAHTS	Totals:	0	0	0.2	0.01	0.2	**0.01**	In above
		FS RD 319				0.01			
Sneakfoot Meadows	Backcountry Restoration	Totals:	28.6	1.82	0	0	28.6	**1.82**	0.10%
		FS RD 362		1.22					
		FS RD 111-A		0.6					
West Meadow Creek	Backcountry Restoration	Totals:	90.1	3.41	94.6	8	184.7	**11.41**	0.20%
		FS RD 290		0.18		5.25			
		FS RD 443		3.23		2.07			
		FS RD 290F		0		0.68			
	SAHTS	Totals:	0	0	6.9	0.35	6.9	**0.35**	In above
		FS RD 443				0.14			
		FS RD 290				0.21			
Totals			**445**	**17.94**	**489.1**	**20.64**	**934.1**	**38.58**	

All or a portion of the road is closed

All or a portion of the road is IRA on both sides

[1] Special Areas of Historic or Tribal Significance

The fires caused hazardous tree conditions along many National Forest System roads. While some hazard trees were felled immediately following fire suppression activities, a large number of fire-damaged trees remain and may or will become weakened since suppression activities. The roads within the project area are utilized by Forest Service employees, contractors, as well as forest visitors for recreational activities, woodcutting, hunting and fishing.

Some roads impacted by the wildfires lie within Idaho Roadless areas. All roadside hazard tree removal treatments within Roadless Areas occur in areas managed under the Backcountry Restoration theme. Hazard trees in other, more conservative themes, will be felled but not removed. The cutting, sale, or removal of timber is permissible in Idaho Roadless Areas designated as Backcountry Restoration only: vii) Where incidental to the implementation of a management activity not otherwise prohibited by this subpart (36 CFR Part 294.2(c)(1)(vii). Removal of hazard trees adjacent to forest roads within Idaho Roadless areas for public health and safety reasons is allowed. Specifically, this project proposes to remove hazard trees adjacent to the roads within the roadless areas described below.

3.11.2 Environmental Consequences

3.11.2.1 Direct, Indirect and Cumulative Effects

The proposed action to cut hazard trees is limited to 200 feet or less from existing Forest System Roads, therefore the effects are generally going to be the same or similar across all of the Idaho Roadless Areas within this project's area. For this reason, this analysis will combine the effects discussions, rather than repeating separate conclusions for each IRA. Where there are specific effects to an individual Roadless area, they are discussed individually below. Key assumptions of a 200 maximum width is for analysis purposes only, to describe what would be the "worst case" scenario. The actual effects are expected to be far less.

A. Alternative 1- No Action

Fire killed and weakened trees would continue to fall and block Forest roads. Forest visitors and workers will continue to be exposed to hazardous conditions as trees fall, cause resource damage, and block safe ingress and egress to national forest lands. Maintenance actions would not occur and forest infrastructure would be at risk. Lack of maintenance could render infrastructure in less than safe conditions and may result in closure of roads, trails, recreation sites or administrative sites in the future. Lack of access may limit visitor's opportunities to access trailheads or remote sections of the IRAs.

Natural Integrity. Natural processes would be allowed to continue. Where road access is blocked due to fallen trees, routine maintenance cannot occur, culverts may become plugged leading to catastrophic road failures which could have significant negative effects to the natural integrity of the area, including TES habitat. Additionally, as trees die and fall over, the tree usually pulls up a large clump of the root mass creating a hole. These holes have been observed (Indian Hill road) as a point of slide/slump initiation, particularly on the top of road cut slopes and in a heavy rain of quick snowmelt year since the stump holes allow for water infiltration.

Undeveloped. Lack of maintenance could create a loss of undeveloped character due to an increase in unauthorized user created routes (developments), which often take the path of least resistance and around heavy concentrations of blown down trees. No action or de facto abandonment of roads without proper surveys could again result in road failures that would need to be addressed in the future. The entire road decommissioning program on the Nez Perce and Clearwater National Forests is founded on these premises and has received support from the same commenters that have voiced concerns over this proposal.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation. Where roads become blocked by fallen trees; a lack of road maintenance would limit access to existing opportunities for primitive and unconfined recreation.

Special Features or Values. The Selway Wild and Scenic River corridor is a special feature that is adjacent to two IRAs, the Rackliff-Gedney and West Meadow IRAs. Two roads located in the vicinity of Selway Falls are in close proximity or adjacent to the boundary of the Selway Wild and Scenic River corridor. Effects to scenic quality on lands adjacent to the Wild and Scenic River corridor are described in the visual quality report (section 3.13) for Alternative 1.

Manageability. No action would not affect the manageability of the IRAs as future wilderness areas.

Trammeling. No action would result in less "trammeling" (the lack of human control or manipulation). Failure to address hazard trees now could result in a heavier footprint in the future if management actions are needed to address resulting heavy concentrations of trees across roads for public access, fire access or other resource management related access. Heavy trammeling could result if due to lack of road maintenance culverts fail, resulting in heavier maintenance activities in the future.

B. Alternative 2- Proposed Action

Direct and Indirect Effects of Fell and Remove Areas, Alternative 2.

Table Rd-2. Effects of fall and remove

Effect to Wilderness Quality or Attributes for the following Falling and removing hazard trees would be as described in Chapter 2 of the EA. Hazard trees with 200' or less from Forest system roads would be identified and cut, followed by removal using conventional logging machinery (skidders, skylines). Locations within Idaho Roadless Areas where **felling and removal** of hazard trees are proposed are all designated as Backcountry Restoration. The following IRAs have falling and removal proposed; Bighorn-Weitas, Eldorado, Gospel Hump, Lochsa Face, Mallard, Mallard-Larkins, O'Hara-Falls Creek, Sneakfoot Meadows, West Meadow.			
Wilderness Quality or Attribute	**Is there an effect?**	**Which direction is the effect?**	**Description of the effect.**
Untrammeled This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems inside wilderness. In summary, *wilderness is essentially unhindered and free from modern human control or manipulation.*	Yes; Temporary	Slightly Degrading for a short period of time	The untrammeled quality of the roadless area would remain consistent with that described in the Idaho Roadless Rule decision in the long term. Trammeling resulting from the falling of hazard trees will be noticeable until the openings in the 200' or less roadside areas are revegetated. In the short term, hazard tree falling and/or removal will hasten succession in the 200' or less areas adjacent to the road. (See also Undeveloped Section below)Activities target only hazard trees that occur immediately adjacent to existing Forest Roads which have been determined through a roads analysis to be part of the minimum transportation system and therefore to be maintained on the landscape. Timber removal machinery including skidders, skylines and logging trucks would be operating in treatment areas for a period of several days to several weeks, depending on hazard tree concentrations and topography (steeper areas generally take longer to remove trees using skyline systems). Evidence of timber removal would be similar to logging areas where the road surface can be tracked or rutted. Similarly, ground based machinery operating off-road in tractor units can leave ruts and skyline systems can displace soil as they drag trees uphill to the road. However, NEPA design measures, contract standards and Best Management Practices (BMPs) administered on-site by certified sale administrators would minimize these disturbances (trammeling). Freshly cut tree stumps are generally very pale and would stick out in stark contrast to the black or burned areas, however this condition is fleeting as the wood generally fades to a brown, then grey appearance within weeks. This condition is generally only noticeable in areas below the road, since the angle of viewing incidence of cut areas above the road from below would preclude seeing the top of the freshly cut stumps since they are generally cut perpendicular to their growth axis.
Natural	Yes	Slightly Degrading in the short term;	The Natural Integrity would remain consistent with that described in the Idaho Roadless Rule decision in the long term. In the short term, the

Effect to Wilderness Quality or Attributes for the following Falling and removing hazard trees would be as described in Chapter 2 of the EA. Hazard trees with 200' or less from Forest system roads would be identified and cut, followed by removal using conventional logging machinery (skidders, skylines). Locations within Idaho Roadless Areas where **felling and removal** of hazard trees are proposed are all designated as Backcountry Restoration. The following IRAs have falling and removal proposed; Bighorn-Weitas, Eldorado, Gospel Hump, Lochsa Face, Mallard, Mallard-Larkins, O'Hara-Falls Creek, Sneakfoot Meadows, West Meadow.			
Wilderness Quality or Attribute	**Is there an effect?**	**Which direction is the effect?**	**Description of the effect.**
This quality monitors both intended and unintended effects of modern people on ecological systems inside wilderness since the time the area was designated. In summary, *wilderness ecological systems are substantially free from the effects of modern civilization.*			proposed action minimizes disturbance to within 200'or less of the road to provide for public safety; this modification is minimal when compared to the vast extent of the roadless area that is not being modified. The road itself is an environmental modification on the landscape, this action may modify the natural environment surrounding the road slightly in the short term. In the long run the natural quality will return quickly once the openings created by removing hazard trees are revegetated. The tree removal is so minimal and adjacent to an existing road that the action will have little to no effect on scenic integrity and no effect to ROS as it is already a semi-primitive motorized environment.
Undeveloped This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation. In summary, w*ilderness is essentially without permanent improvements or modern human occupation.*	Yes	Degrading (short term) Stable/improving (long term)	The undeveloped quality for the area would remain consistent with that described in the Idaho Roadless Rule decision as described in the Opportunities for Experience. Activities would take place on existing forest Roads, which, through travel planning have been determined to be a desired part of the existing transportation system. There are no current or proposed plans to actively or passively decommission the road segments proposed for maintenance in this project. Roads generally do not occur inside wilderness areas except as "cherry stems" or where they form the boundary. Proposed timber cutting would create stumps and, depending on the number of trees cut, openings adjacent to existing roads. Activities would be confined to 200 *feet or less*, from the road depending on hazard tree locations. Stumps would be visible until they decayed, but generally only noticeable if a person were to be walking within areas where hazard trees were removed. It is unlikely that the casual observer or visitor driving through the area would notice either the stumps or openings for very long since the vegetative screening and regrowth of shrubs and trees would obscure the stumps within several years. Photo and plot monitoring of both chainsaw cut and burned areas in the Rackliff-Gedney and O-Hara-Falls Creek Roadless areas shows that shrub regrowth can attain heights of 10 or more feet within 3 years of either cutting or burning.

Effect to Wilderness Quality or Attributes for the following Falling and removing hazard trees would be as described in Chapter 2 of the EA. Hazard trees with 200' or less from Forest system roads would be identified and cut, followed by removal using conventional logging machinery (skidders, skylines). Locations within Idaho Roadless Areas where **felling and removal** of hazard trees are proposed are all designated as Backcountry Restoration. The following IRAs have falling and removal proposed; Bighorn-Weitas, Eldorado, Gospel Hump, Lochsa Face, Mallard, Mallard-Larkins, O'Hara-Falls Creek, Sneakfoot Meadows, West Meadow.				
Wilderness Quality or Attribute		**Is there an effect?**	**Which direction is the effect?**	**Description of the effect.**
				Additionally monitoring and follow up site visits by the IDT to the 2012 hazard tree removal project has shown that the hazard tree removal areas generally do not resemble commercial timber harvest units since the intermittent and "clumpy" nature of harvested areas is less uniform than if commercial timber harvest activities were proposed. Hazard tree designation would either be through written description or by marking "cut trees" (as opposed to leave tree) so residual paint would not be noticeable, further reducing the evidence of timber cutting adjacent to roads. Based on recent experiences with both fires and blowdown affecting roads (Indian Hill Road – Slims Fire; Forest road 500 Road blowdown), no action could ultimately lead to an increase in the evidence of timber cutting adjacent to the roads, either from firewood gatherers, the public maintaining access or Forest personnel needing to maintain administrative access. In both those examples, large numbers of dead trees across the road were sawed through, generally only wide enough to allow passage of a vehicle. The result was large numbers of sawn-off tree bole segments intruding onto the road. In that situation, the evidence of development would be greater than the proposed action, which would cut and remove the trees from the site. Although there would be immediate, short term effects to the undeveloped nature of the IRAs, their limited size and scope would not be significant. Roadless Areas. Additionally, the effects would not be substantially noticeable once brush and trees regrow in cut areas.
Outstanding opportunities for solitude or a primitive and unconfined type of recreation This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined	**Solitude -** Described as opportunities to experience solitude, or the isolation from the sights and sounds of management activities inside wilderness, the presence of others. . Solitude is measured by considering the presence of screening, distance	Yes	Degrading (short term) Improving (long term)	The Opportunities for Experience for each roadless area (App C) would remain consistent with that described in the Idaho Roadless Rule decision. Effects to opportunities for solitude or a primitive and unconfined type of recreation are described here in the context of *access to* these opportunities since it is extremely unlikely that a visitor would seek or find any of these opportunities within 200 feet or less from an existing Forest road.

Effect to Wilderness Quality or Attributes for the following Falling and removing hazard trees would be as described in Chapter 2 of the EA. Hazard trees with 200' or less from Forest system roads would be identified and cut, followed by removal using conventional logging machinery (skidders, skylines). Locations within Idaho Roadless Areas where **felling and removal** of hazard trees are proposed are all designated as Backcountry Restoration. The following IRAs have falling and removal proposed; Bighorn-Weitas, Eldorado, Gospel Hump, Lochsa Face, Mallard, Mallard-Larkins, O'Hara-Falls Creek, Sneakfoot Meadows, West Meadow.				
Wilderness Quality or Attribute		**Is there an effect?**	**Which direction is the effect?**	**Description of the effect.**
recreation in a wilderness setting, rather than monitoring visitor experiences *per se*.	from impacts to the rest of the area, mitigation measures such as the timing of disturbances.			The road segments proposed for maintenance and timber cutting do, however, provide access to trailheads or larger areas where these opportunities can be found. There would be a short term displacement of visitors during implementation of the project, since roads would likely be closed temporarily to allow for safe falling and removal of hazard trees. Duration of closures would likely be short and occur within the first field season following decision since timber removal would be confined to relatively small areas and expedited to allow for economic removal. In the long-term, opportunities for unconfined and primitive recreation experiences would remain stable or improve over conditions that could result if hazard trees were not removed. Removing hazard trees that have the potential to block road access maintains access to these experiences in IRAs. Due to the minimal activity a short term effect to primitive and semi primitive non-motorized ROS areas would occur only during felling and/or removal activities. In the long term, this action does not affect these experiences should the area be designated as wilderness.
	Opportunities for Primitive Recreation - A measure of the experiences available without the developments and to feel a part of nature, with a high degree of challenge and reliance on outdoor skills rather than facilities.	Yes	Degrading (short term) Stable/Improving (long term)	The Opportunities for Experience for each roadless area (App C) would remain consistent with that described in the Idaho Roadless Rule decision in the long term. The proposed action does not add or decommission developments within the roadless area (See also Unconfined Recreation and Solitude (above)
Special Features (Ecological, Geologic, Scientific, Educational, Scenic or Historical Values) An attribute that recognizes that wilderness may contain other values of ecological, geologic,		No	Stable	All of the Special Features listed in the Idaho Roadless Rule FEIS Appendix C for each area were reviewed against the proposed action. This was combined with first-hand knowledge of the IRA areas by IDT

Effect to Wilderness Quality or Attributes for the following Falling and removing hazard trees would be as described in Chapter 2 of the EA. Hazard trees with 200' or less from Forest system roads would be identified and cut, followed by removal using conventional logging machinery (skidders, skylines). Locations within Idaho Roadless Areas where **felling and removal** of hazard trees are proposed are all designated as Backcountry Restoration. The following IRAs have falling and removal proposed; Bighorn-Weitas, Eldorado, Gospel Hump, Lochsa Face, Mallard, Mallard-Larkins, O'Hara-Falls Creek, Sneakfoot Meadows, West Meadow.			
Wilderness Quality or Attribute	**Is there an effect?**	**Which direction is the effect?**	**Description of the effect.**
scientific, educational, scenic or historical or cultural significance. Unique fish and wildlife species, unique plants or plant communities, potential or existing research natural areas, outstanding landscape features, and significant cultural resource sites are considered as types of values that might exist.			members, Forest Staff and public comments in determining effects to an IRA's special features. Generally, there were no special feature or values that would be affected within 200 feet of an existing road, so there were no effects. In the Rackliff-Gedney and West Meadow IRAs, roads in the proximity of Selway Falls are adjacent but outside the Selway Wild and Scenic River corridor. Treating these segments has no effect on the Selway Wild and Scenic River ORVs; the scenic analysis for the area adjacent to the Wild and Scenic River corridor, uses FP standards and takes into consideration the scenic integrity of the Wild and Scenic River corridor. The exception was in the Bighorn-Weitas; Eldorado and North Lochsa Slope IRA's where historic roads and/or trails coincide with proposed activities. In these areas mitigation measures designed in consultation with the Idaho SHPO will be implemented that would result in no adverse effects to these special values. The Heritage specialist further determined that without maintenance, many of these values may be negatively affected. (See heritage report)
Manageability (as Wilderness) A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.	No	Stable	Cutting hazard trees from 200 feet or less next to existing forest roads would not significantly alter or impact the manageability of the any of the IRA's since only a fraction of a percent of any individual area would be affected by the proposed activity. There would be no changes to the size, shape, or access to the area and future wilderness designations would likely still utilize the road since, as described above, evidence of timber cutting would be substantially unnoticeable and would not change the age class/canopy structure of the area. (FSH 1909.12 Chapter 72.5)

Direct and Indirect Effects of Hazard tree Felling and Leaving, Followed by Fuel Reduction, Alternative 2.

Table Rd-3. Effects of Fell and Leave followed by fuel reduction

Effect to Wilderness Quality or Attributes

Fall and leave areas would have hazard trees cut, but left onsite. Fuel reduction activities such as bucking, lopping, scattering, chipping, masticating, hand piling, machine piling, pile/jackpot burning, or broadcast burning would occur to mitigate safety concerns on ingress/egress routes as well as other resource concerns. Fuel assessments would be conducted post-felling, so the exact level of activity would be difficult to address, however for the purposes of this report, the analysis will again assume a 200' maximum width. Additional information on the effects of fuel reduction activities is found in the Fire and Fuels/Air Quality specialist report.

Roadless Areas where hazard tree **fall and leave** activities are proposed: Bighorn Weitas*, East Meadow Creek, Eldorado*, Hoodoo*, John Day, Mallard*, Mallard-Larkins*, North Lochsa Slope, O'Hara-Falls Creek*, West Meadow*

* Indicates that the IRA will have both **fall *and remove*** AND **fall *and leave*** treatments. Effects of **fall *and remove*** treatments are documented in figure 2 above.

Wilderness Quality or Attribute(	Is there an effect?	Which direction is the effect?	Description of the effect.
Untrammeled This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems inside wilderness. In summary, *wilderness is essentially unhindered and free from modern human control or manipulation.*	Yes; Temporary	Slightly Degrading for a short period of time	The untrammeled quality of the roadless area would remain consistent with that described in the Idaho Roadless Rule decision in the long term. Proposed activities to fall and leave hazard trees with follow up fuels reduction as necessary would be similar to those described in the fall and remove table above with some small differences: Machine piling and/or mastication would require the same or similar machinery as in removal areas, so the effects would generally be the same except for the tree boles and fuels that would be left on site. The tree boles and larger fuels would bear evidence of chainsaw cutting. Hand crews are sometimes used to drag or "chain out" (hand from person to person) cut limbs to the road where a chipper is located and the limbs fed through the machine. Mastication or chipping could create small piles of accumulations of wood chips (similar to landscaping wood chips) depending on fuel loadings and operator skill at dispersing the chips as they exit the machine. Lop and scatter would increase activity within treatment areas because personnel would be required to process or remove and scatter the limbs from each tree in the woods with a chainsaw. Similar treatments in the past have required contract crews of as many as 20 sawyers who can generally accomplish 0.5-2 acres per person per day, depending on fuel loadings. Hand piling of limbs and fuels generally slows accomplishment to less than 0.5 acres per day and results in numerous visible slash piles, which are generally covered in water repellent paper to facilitate later burning. Burning is usually accomplished in the fall following treatment and requires another crew of personnel with drip torches to burn the piles. Burned areas are generally patrolled until a season ending rain event occurs in mid-late fall.

Effect to Wilderness Quality or Attributes

Fall and leave areas would have hazard trees cut, but left onsite. Fuel reduction activities such as bucking, lopping, scattering, chipping, masticating, hand piling, machine piling, pile/jackpot burning, or broadcast burning would occur to mitigate safety concerns on ingress/egress routes as well as other resource concerns. Fuel assessments would be conducted post-felling, so the exact level of activity would be difficult to address, however for the purposes of this report, the analysis will again assume a 200' maximum width. Additional information on the effects of fuel reduction activities is found in the Fire and Fuels/Air Quality specialist report.

Roadless Areas where hazard tree **fall and leave** activities are proposed: Bighorn Weitas*, East Meadow Creek, Eldorado*, Hoodoo*, John Day, Mallard*, Mallard-Larkins*, North Lochsa Slope, O'Hara-Falls Creek*, West Meadow*

* Indicates that the IRA will have both **fall *and remove*** AND **fall *and leave*** treatments. Effects of **fall *and remove*** treatments are documented in figure 2 above.

Wilderness Quality or Attribute(	**Is there an effect?**	**Which direction is the effect?**	**Description of the effect.**
			Jackpot (burning concentrated fuels only) or prescribed (broadcast) burning would be done by personnel on foot and would also generally be patrolled until a season ending rain event. The result of fuel reduction activities would be a short term increase in activity which would likely be more people intensive and longer duration than fall and remove, which would depend more on machinery. This would likely result in the appearance of more "trammeling" to visitors travelling through the area, although the scope and scale of the activities is not significant enough to cause long term effects to the untrammeled nature of the IRA's since the results of the activities would be largely unnoticeable within a short (1-3 year) timeframe. Fuel reduction activities would also help to facilitate site preparation for planting, which would hasten tree succession on treated areas. Activities target only hazard trees that occur immediately adjacent to existing Forest Roads which have been determined through a roads analysis to be part of the minimum transportation system and therefore to be maintained on the landscape.
Natural This quality monitors both intended and unintended effects of modern people on ecological systems inside wilderness since the time the area was designated. In summary, *wilderness ecological systems are substantially free from the effects of modern civilization.*	Yes	Improving Slightly Degrading in the short term;	Effects of fall and leave on the natural attributes of the IRAs would be the same as described in the fall and remove table above.
Undeveloped This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation. In summary, w*ilderness is essentially without permanent improvements or modern human occupation.*	Yes	Degrading (short term) Stable/improving (long term)	The undeveloped quality for the area would remain consistent with that described in the Idaho Roadless Rule decision as described in the Opportunities for Experience. In addition to the effects described under the fall and remove table and untrammeled section above, falling and leaving hazard trees, with follow-up fuel treatments would create more evidence of development, since chainsaw cut tree boles and larger limbs would be left on site. Fine fuels would either

Effect to Wilderness Quality or Attributes

Fall and leave areas would have hazard trees cut, but left onsite. Fuel reduction activities such as bucking, lopping, scattering, chipping, masticating, hand piling, machine piling, pile/jackpot burning, or broadcast burning would occur to mitigate safety concerns on ingress/egress routes as well as other resource concerns. Fuel assessments would be conducted post-felling, so the exact level of activity would be difficult to address, however for the purposes of this report, the analysis will again assume a 200' maximum width. Additional information on the effects of fuel reduction activities is found in the Fire and Fuels/Air Quality specialist report.

Roadless Areas where hazard tree **fall and leave** activities are proposed: Bighorn Weitas*, East Meadow Creek, Eldorado*, Hoodoo*, John Day, Mallard*, Mallard-Larkins*, North Lochsa Slope, O'Hara-Falls Creek*, West Meadow*

* Indicates that the IRA will have both **fall *and remove*** AND **fall *and leave*** treatments. Effects of **fall *and remove*** treatments are documented in figure 2 above.

Wilderness Quality or Attribute(	Is there an effect?	Which direction is the effect?	Description of the effect.
			decompose naturally or be consumed during burning (piles, jackpots or broadcast). Stumps and tree boles would be visible until they decayed, but generally only noticeable if a person were to be walking within areas where hazard trees were felled and fuels reduced. Jackpot or prescribed burning would not visibly change burned areas since evidence of the fires is still visible. Loping and scattering and other hand methods of reducing fuels would not be highly visible for reasons described below. Use of machinery to masticate or pile would result in the same or similar results as removing the trees. Neither activity would be expected to be visible as described below. It is unlikely that the casual observer or visitor driving through the area would notice either the stumps, fuel reduction activities or openings for very long since the vegetative screening and regrowth of shrubs and trees would obscure the stumps and tree boles within several years. Photo and plot monitoring of both chainsaw cut and burned areas in the Rackliff-Gedney and O-Hara-Falls Creek Roadless areas shows that shrub regrowth can attain heights of 10 or more feet within 3 years of either cutting or burning. Additionally monitoring and follow up site visits by the IDT to the 2012 hazard tree removal project has shown that the hazard tree removal areas generally do not resemble commercial timber harvest units since the intermittent and "clumpy" nature of hazard tree felling areas are not uniform. Hazard tree designation would either be through written description or by marking "cut trees" (as opposed to leave tree) so residual paint would not be noticeable, further reducing the evidence of timber cutting adjacent to roads. Based on recent experiences with both fires and blowdown affecting roads (Indian Hill Road – Slims Fire; Forest road 500 Road blowdown), no action could ultimately lead to an increase in the evidence of timber cutting adjacent to the roads, either from firewood gatherers, the public maintaining access or Forest personnel needing to maintain administrative access. In both those examples, large numbers of dead trees across the road were sawed through,

Effect to Wilderness Quality or Attributes

Fall and leave areas would have hazard trees cut, but left onsite. Fuel reduction activities such as bucking, lopping, scattering, chipping, masticating, hand piling, machine piling, pile/jackpot burning, or broadcast burning would occur to mitigate safety concerns on ingress/egress routes as well as other resource concerns. Fuel assessments would be conducted post-felling, so the exact level of activity would be difficult to address, however for the purposes of this report, the analysis will again assume a 200' maximum width. Additional information on the effects of fuel reduction activities is found in the Fire and Fuels/Air Quality specialist report.

Roadless Areas where hazard tree **fall and leave** activities are proposed: Bighorn Weitas*, East Meadow Creek, Eldorado*, Hoodoo*, John Day, Mallard*, Mallard-Larkins*, North Lochsa Slope, O'Hara-Falls Creek*, West Meadow*

* Indicates that the IRA will have both **fall *and remove*** AND **fall *and leave*** treatments. Effects of **fall *and remove*** treatments are documented in figure 2 above.

Wilderness Quality or Attribute(		**Is there an effect?**	**Which direction is the effect?**	**Description of the effect.**
				generally only wide enough to allow passage of a vehicle. The result was large numbers of sawn-off tree bole segments intruding into the road. In this situation the evidence of development would be greater than the proposed action, which would cut the hazard trees and break up large accumulations of fuel. Although there would be immediate, short term effects to the undeveloped nature of the IRAs, their limited size and scope would not be significant. Additionally, the effects would not be substantially noticeable once brush and trees regrow in cut areas.
Outstanding opportunities for solitude or a primitive and unconfined type of recreation This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation in a wilderness setting, rather than monitoring visitor experiences *per se*.	**Solitude -** Described as opportunities to experience solitude, or the isolation from the sights and sounds of management activities inside wilderness, the presence of others. .	Yes	Degrading (short term) Improving (long term)	The Opportunities for Experience for each roadless area would remain consistent with that described in the Idaho Roadless Rule decision. Effects to opportunities for solitude or a primitive and unconfined type of recreation are described here in the context of *access to* these opportunities since it is extremely unlikely that a visitor would seek or find any of these opportunities within 200 feet or less from an existing Forest road. The road segments proposed for maintenance and timber cutting do, however, provide access to trailheads or larger areas where these opportunities can be found. Short term displacement of visitors would occur during implementation of the project, since roads would likely be closed temporarily to allow for safe falling of hazard trees during the first implementation which would likely fall the majority of the hazard trees. Duration of closures would likely be short (shorter than cutting and removal) and subsequent falling of trees that die and become a hazard in the future would be not likely need a road closure since they would generally be single or small groups of trees that could be felled by administrative personnel and safety/brief road closures handled on-site when the tree(s) were brought down. In the long-term, opportunities for unconfined and primitive recreation experiences would remain stable or improve over conditions that could result if hazard trees were not removed. Removing hazard trees that have the potential to block road access maintains access to these experiences in IRAs.

Effect to Wilderness Quality or Attributes

Fall and leave areas would have hazard trees cut, but left onsite. Fuel reduction activities such as bucking, lopping, scattering, chipping, masticating, hand piling, machine piling, pile/jackpot burning, or broadcast burning would occur to mitigate safety concerns on ingress/egress routes as well as other resource concerns. Fuel assessments would be conducted post-felling, so the exact level of activity would be difficult to address, however for the purposes of this report, the analysis will again assume a 200' maximum width. Additional information on the effects of fuel reduction activities is found in the Fire and Fuels/Air Quality specialist report.

Roadless Areas where hazard tree **fall and leave** activities are proposed: Bighorn Weitas*, East Meadow Creek, Eldorado*, Hoodoo*, John Day, Mallard*, Mallard-Larkins*, North Lochsa Slope, O'Hara-Falls Creek*, West Meadow*

* Indicates that the IRA will have both **fall *and remove*** AND **fall *and leave*** treatments. Effects of **fall *and remove*** treatments are documented in figure 2 above.

Wilderness Quality or Attribute(		**Is there an effect?**	**Which direction is the effect?**	**Description of the effect.**
				Due to the minimal activity a short term effect to primitive and semi primitive non-motorized ROS areas would occur only during felling and/or removal activities. In the long term, this action does not affect these experiences should the area be designated as wilderness.
	Opportunities for Primitive Recreation -A measure of the experiences available without the developments and to feel a part of nature, with a high degree of challenge and reliance on outdoor skills rather than facilities.	Yes	Degrading (short term) Stable/Improving (long term)	The Opportunities for Experience for each roadless area would remain consistent with that described in the Idaho Roadless Rule decision in the long term. The proposed action does not add or decommission developments within the roadless area (See also Unconfined Recreation and Solitude above).
Special Features (Ecological, Geologic, Scientific, Educational, Scenic or Historical Values) An attribute that recognizes that wilderness may contain other values of ecological, geologic, scientific, educational, scenic or historical or cultural significance.		No	Stable	Falling and leaving hazard trees with follow-up fuel reduction would not have any additional effect to these values beyond what is described in the fall and remove table. All heritage resources are protected by design and mitigation measures. All scenic resources in the Selway Wild and Scenic River and areas of high visual concern would be protected by design measures.
Manageability (as Wilderness) A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above. Changes in the shape of the Inventoried Roadless Area may		No	Stable	Cutting and leaving hazard trees and reducing fuels would have the same effects as described in the fall and remove section in the table above. There would be no effects to the manageability of the IRAs as a result of cutting and leaving hazard trees.

Effect to Wilderness Quality or Attributes			
Fall and leave areas would have hazard trees cut, but left onsite. Fuel reduction activities such as bucking, lopping, scattering, chipping, masticating, hand piling, machine piling, pile/jackpot burning, or broadcast burning would occur to mitigate safety concerns on ingress/egress routes as well as other resource concerns. Fuel assessments would be conducted post-felling, so the exact level of activity would be difficult to address, however for the purposes of this report, the analysis will again assume a 200' maximum width. Additional information on the effects of fuel reduction activities is found in the Fire and Fuels/Air Quality specialist report. Roadless Areas where hazard tree **fall and leave** activities are proposed: Bighorn Weitas*, East Meadow Creek, Eldorado*, Hoodoo*, John Day, Mallard*, Mallard-Larkins*, North Lochsa Slope, O'Hara-Falls Creek*, West Meadow* * Indicates that the IRA will have both **fall *and remove*** AND **fall *and leave*** treatments. Effects of **fall *and remove*** treatments are documented in figure 2 above.			
Wilderness Quality or Attribute(	**Is there an effect?**	**Which direction is the effect?**	**Description of the effect.**
have significant consequences to its wilderness potential.			

Table Rd-4. Proposed Action effects to wilderness quality or attributes of Idaho roadless areas

Effect to Roadless Characteristics			
Roadless Characteristics	**Is There an Effect?**	**Which Direction Is the Effect?**	**Describe the Actual Effect.**
High quality soil, water and air	Yes	Slightly degrading short term then Stable	Timber removal using skidders or skylines would generally have the greatest impact to soil or water resources, however, design and mitigation measures would protect these values both in and out of the IRAs, including where roads in the Rackliff-Gedney and West Meadow IRAs are adjacent to the Selway Wild and Scenic River corridor; and there were no effects unique or cumulatively significant as a result of inclusion of IRAs within the treatment areas. A few miles of roads in the Rackliff-Gedney and West Meadow IRAs in the area of Selway Falls are adjacent to the Selway Wild and Scenic River corridor, but project activities would not affect the Wild and Scenic River ORVs.
Sources of public drinking water	No	Stable	Municipal Watersheds – The project area is not located within any municipal watersheds or source protection zones.
Diversity of plant and animal communities	No	Stable	See Wildlife Biologist and Botany specialist reports for discussion of plant and animal communities. There would not be any significant effects to the diversity of plant and animal communities of any of the individual IRAs. Further, the effects determinations would not change as a result of inclusion (or exclusion) of the IRAs in the proposed action, directly, specifically or cumulatively. The wildlife specialist determinations are found in the wildlife report, chapter 3 of the EA starting on page 126. A copy of the BA is available in the project file. The aquatics (fisheries) specialist determinations for TES species is located in the aquatics report, chapter 3, starting on page 21. A copy of the BA is located in the project file.

Effect to Roadless Characteristics			
Roadless Characteristics	**Is There an Effect?**	**Which Direction Is the Effect?**	**Describe the Actual Effect.**
Habitat for TES, proposed, candidate and species dependent on large undisturbed areas of land	Yes	Stable	Please see the wildlife and fisheries reports for a complete discussion of effects to TES species. The proposal to include hazard tree falling and removal from 200' or less from existing forest roads within IRAs would not change the direct, indirect or cumulative effects determinations on TES resources. The wildlife specialist report for this project does not identify any specific or unique resources in any of the 14 IRAs that are part of the project; therefore the project would not have any significant effects to the diversity of plant and animal communities of the IRAs.
Primitive and semi-primitive non-motorized and semi-primitive motorized classes of recreation	No	Stable	The Recreation Opportunity Spectrum (ROS) is not changed as the result of the proposed activities as the activities are within "sight and sound" of an open road corridor. While the IRA may be described as Primitive or Semi Primitive motorized; the ROS for the road corridor will always be a motorized ROS regardless of tree falling or removal activities. There may be a short term effect to solitude from the increased traffic and sawing activities but that does not change the ROS designation.
Reference landscapes	No	Stable	The project incorporates design and mitigation measures to minimize visual impacts of the project and is consistent with the Forest Plan Visual Quality Objectives of each area. Project activities are planned on a few road miles in two IRAs that are adjacent to the Selway Wild and Scenic River corridor. Visual quality design measures would be used to reduce the effects of the proposed activities in areas adjacent to the Wild and Scenic River.
Natural appearing landscapes with high scenic quality	No	Stable	Changes to the naturally appearing landscape are largely the result of the fires, which were natural events. The proposed action to cut hazard trees from 200' or less from existing roads would not contribute significant additional visual impacts to the natural appearing landscapes within the IRAs. Since the activities would generally occur within the first field season following a decision, any disturbance associated with the removal of hazard trees would be expected to become revegetated along approximately the same timelines as uncut areas. Additionally, as described above, the clumpy nature of the tree removal and likelihood for vegetation regrowth screen the cut areas will further reduce any visual impacts to naturally appearing landscapes. For more information see visual quality analysis, section 3.13.
Traditional cultural properties and sacred sites	No	Stable	Historic resources are specifically an ORV on the Selway Wild and Scenic River corridor; two IRAs have roads adjacent to the Wild and Scenic River corridor. Mitigation measures would be applied to avoid adverse effects to Historic Road and Trail Corridors within the IRAs. For more detail see Heritage, section 3.7, or this EA.
Other locally unique characteristics	No	Stable	No known locally unique characteristics.

Summary

While there may be some short duration effects, they are generally limited to the actual implementation activities (e.g.-hazard tree falling, machinery on roads, etc.) rather than the results of the activity (e.g.-stumps following timber cutting and removal). The treatment areas are extremely small in size and scope, occurring on less than 1 percent of any given IRA's area and 200 feet or less from existing forest roads. On-the-ground results of similar Forest activities has generally resulted in "clumpy" removal of trees and not extensive, linear 200 foot wide clearcuts. Post fire mortality site evaluations by the IDT indicate that this project would be expected to yield similar results. The proposed activities are not expected to be substantially noticeable due both to their limited size and scope, as well as the likelihood that vegetation regrowth will quickly screen evidence of hazard tree removal such as stumps or openings.

The proposed activities within the effects documented in the Idaho Roadless Rule FEIS Ch. 3.4: "*Road Maintenance*. None of the alternatives would restrict or limit road maintenance. In general, those activities needed to maintain a road's current design standard, maintenance level, or traffic service level would be permitted. Maintenance activities needed to meet new environmental or safety requirements resulting from law, regulation, or policy would also be permitted". (Idaho Roadless Rule FEIS, chap. 3.4, p. 154).

The proposed activities are consistent with the Idaho Roadless Rule and have been evaluated for consistency by the Idaho Roadless Commission. Proposed activities will not significantly affect the potential for any of the 14 IRAs within the project area to be considered for wilderness future wilderness evaluation. Table Rd-4 describes effects of both fall and remove as well as fall and leave activities. Generally the effects are the same except as noted.

C. Cumulative Effects:

The cumulative effects boundary for this analysis is the individual IRA boundaries for each of the 14 IRAs that would be affected by the proposed action. The timeframe for the cumulative effects analysis is difficult to measure, considering the proposed action is for maintenance of an existing development (road) within or adjacent to each of the IRAs. There are no current plans to remove any of the roads (regardless of maintenance level) from the system and the effects of ongoing road maintenance to IRAs, including cumulative effects were analyzed and disclosed in Chapter 3 of the Idaho Roadless Rule FEIS (citation).

Routine maintenance of transportation systems is expected to occur within each of the IRAs, commensurate with funding levels. Existing access designations would remain as prescribed in travel management decisions and would not change as a result of this project.

To the extent that the proposed action could be considered an additional incursion, entry, or site specific action causing localized specific effects is documented in the tables above. By definition, Roadless Areas and Wilderness Areas generally do not contain roads, except where they form the boundaries or as "cherry stems" into the area. Cumulatively, the proposed activities would not cause significant effects to any of the Roadless Area characteristics or preclude wilderness designations in the future because they occur within 200 feet or less from existing roads. It is further unlikely that the proposed action would lead to the need for future boundary adjustments, either as an IRA or as a result of future wilderness designation. The limited effects that would occur (such as road closures or visible evidence of timber cutting/removal) would be short in duration as documented above. It is conceivable that the proposed action would cumulatively improve some Roadless characteristics by facilitating opportunities for solitude and unconfined recreation by maintaining access to trailheads or more remote areas of the IRA.

Proposed actions cannot logically be conceived as irreversible or irretrievable since they are again, extremely limited in scope and scale, and associated with maintenance of existing roads.

Other projects were considered in developing the scope of the cumulative effects analysis, however they were not analyzed in detail because cumulatively since they did not have any significant direct or indirect bearing on the effects to any of the IRAs contained in this proposal nor would they cumulatively change the wilderness capability of any of the 14 IRAs. Additional projects that were considered were:

- *Travel Management Decisions*. Clearwater Travel Plan and Nez Perce DRAMVU) – The Road, Administrative and Recreation Site Maintenance Project does not decommission, designate, override or otherwise change any access prescriptions in either Travel Planning Documents. The Clearwater Travel Plan decision was remanded to the Forest for further analysis and the Nez Perce DRAMVU is currently in the objections process.

- Lolo Insect and Disease Project – This project has timber harvest proposed within the Eldorado IRA. The scoping letter, sent in April of 2013 indicates 340 acres of the IRA were proposed for harvest to maintain or improve ecosystem composition and improve roadless character by increasing the diversity of native plant (white pine in this case) communities. A draft EIS with alternatives was never released to the public, and since scoping, several events occurred (2015 fires, lynx mapping) that are requiring the Forests to reevaluate the proposed activities for that project. It is unclear at this time what alternatives would be developed and if harvest within the IRA would remain as proposed or as one of the alternatives. It is clear from this analysis that the Roadside Maintenance project would not contribute significant effects to the Eldorado IRA, however it is difficult or impossible to speculate what the direct, indirect or cumulative effects to that IRA would be if as a result of implementation of both projects since there is no longer a firm proposal. Regardless, the Roadside Maintenance project would become part of the baseline for the cumulative effects analysis for the Lolo Insects and Disease project if IRA activities remain in that proposal.

- *State and Private timber harvest in the Selway*. The recent harvest in the Lower Selway on State and Private Lands does not contribute any significant effects to Idaho Roadless Areas or this project since those activities were located on private ground and not adjacent to any IRAs.

- *Johnson Bar Salvage Project*. The Johnson Bar Salvage project would not contribute any effects to IRAs since it is not located within an IRA nor would proposed haul routes or helicopter landings be in or adjacent to an IRA. The Johnson Bar project had harvest planned in a former Forest Plan Roadless area; however activities in that area were dropped from the decision due to economic feasibility coupled with commenter concerns. The Johnson bar project was enjoined by An Idaho District Court on May 12th, 2016 and work activities will not proceed until a final decision is rendered allowing the project to go forward.

- *Other Salvage projects*. None of the other salvage projects currently being analyzed have timber cutting, sale or removal proposed within an IRA. These "area" salvage projects are located in management areas that are consistent with the Forest Plan(s) and do not have additional designations. Some of these projects have proposed units that are adjacent to the Road, Administrative and Recreation Site Maintenance Project, but not within IRAs. The effects of those projects, including cumulative effects are documented within each of the respective decision documents, however, since they are all located outside of IRAs, they were not considered here.

- *Other timber harvest on the Forest*. The effects of ongoing timber harvest were not considered in the cumulative effects of the Road, Administrative and Recreation Site Maintenance Project since, like above, they occur outside IRAs and do not contribute effects to IRAs. The exception is the Orogrande Community Protection Project (signed decision awaiting implementation) and Lowell WUI (proposed, currently under analysis) projects where timber harvest was authorized or proposed within an IRA. Both of those projects are located in discreet Community Protection

Zones, where timber harvest is explicitly allowed by the Idaho Roadless Rule. The Orogrande project will not contribute significant direct indirect or cumulative effects to the IRA values of the Road, Administrative and Recreation Site Maintenance Project since it is not located in any of the 14 IRAs and that project was found to have no significant impacts (FONSI). The Lowell WUI project has not had a decision issued yet, however preliminary analysis has indicted that the Lowell WUI project is unlikely to have significant impacts. The Road, Administrative and Recreation Site Maintenance Project will become part of the baseline for analysis purposes of direct, indirect and cumulative effects to the Rackliff-Gedney IRA in that project and final decision. It is also worth noting that the Rackliff-Gedney IRA is expansive, at over 90,000 acres and proposed activities for the Lowell WUI project and Road, Administrative and Recreation Site Maintenance Project are minute (less than 0.5% of the IRA combined) and not located even remotely close to each other. It is highly unlikely that cumulatively the projects could result in negative effects to the IRA or wilderness capability of that area.

- *Additional future roadside maintenance*. It is conceivable that large scale or multiple fires in the future would create additional need for the same roadside maintenance as proposed in the Road, Administrative and Recreation Site Maintenance Project. Indeed this project builds onto the framework of the Nez Perce-Clearwater's 2012 Roadside Hazard Tree Project. It would be difficult to speculate on the future effects to IRAs since the inclusion of these areas in the Road, Administrative and Recreation Site Maintenance Project was based on site specific evaluation of need instead of blanket inclusion. Further it would be logical to conclude that inclusion of IRAs into future roadside maintenance projects would be diminishing because of the juxtaposition of remaining roads in IRAs that can still be affected by fire. Implementation of this project would address the need for road maintenance on a large portion of the Forest's IRAs that have "roads within" or "roads adjacent to" them. Regardless, the scope and sale of the Road, Administrative and Recreation Site Maintenance Project is small in context and intensity, and the results predictable and demonstrably minimal. For that reason, there is no foreseen cumulative impacts that would diminish wilderness capability or attributes of the 14 IRAs within this proposal or any additional IRAs in future maintenance activities.

- *Other IRA projects*. This reviewer is unaware of any other past present or reasonably foreseeable projects that would result in cumulative effects that would lead to diminishment of the attributes or wilderness capability of any of the 14 IRAs within this proposal. There are certainly other projects within the IRAs, however their scope and effects are is dissimilar enough to not warrant inclusion in this analysis. Examples of those type projects could include prescribed fire, minor special uses or on-going work such as trail maintenance. Each of those projects are reviewed independently and their effects to IRAs analyzed. Additionally, since inception of the e Idaho Roadless Rule, all IRA projects are reviewed periodically by the Idaho Governor's Roadless Commission for consistency to the rule and to ensure due diligence to the Final Idaho Rule is maintained.

The 14 IRAs affected by the proposed action are part of a larger landscape proposed for wilderness designation under the Northern Rockies Ecosystem Protection Act, H.R. 996, which was has been introduced to the House in the 114th session of Congress. The Northern Rockies Ecosystem Protection Act has been introduced into numerous previous sessions of Congress, but never enacted. As described above, the project would not affect the wilderness capability of any of the 14 IRAs within the project area and would not lead to the need for boundary modifications in the future if the Northern Rockies Ecosystem Protection Act or other wilderness designations were to occur.

3.12 Botany

3.12.1 Affected Environment

Threatened and endangered species are designated under the Endangered Species Act. It is the policy of Congress that all Federal departments shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of this purpose (ESA 1531.2b). Three plant species are listed as threatened potentially occur on lands administered by the Nez Perce – Clearwater National Forest. These are Macfarlane's four-o'clock (*Mirabilis macfarlanei*), water howellia (*Howellia aquatilis*), and Spalding's catchfly (*Silene spaldingii*). In addition, whitebark pine (*Pinus albicaulis*) is a candidate for listing. Current direction from the U.S. Fish and Wildlife Service directs Macfarlane's four-o'clock and Spalding's catchfly need to be addressed for projects in Idaho County. Existing knowledge and earlier, more precise determinations and direction from the FWS clarify that these species only occur in parts of the Salmon River Canyon on the Nez Perce unit of the forest.

Sensitive species are defined in the Forest Service Manual (FSM 2670.5) as "those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species/existing distribution." In FSM 2670.22, management direction for sensitive species is in part, to ensure that species do not become threatened or endangered, because of Forest Service actions and to maintain viable populations of all native species. The most recent update to the sensitive species list became effective in May 2011. The Forest Service must evaluate impacts to sensitive species through a biological evaluation.

3.12.2 Environmental Consequences

No Action

The No Action alternative would not disturb native plants as a result of this project. No impacts would occur, beneficial or negative. Plant species would continue to follow their life history patterns following wildfire and additional disturbance to their habitat would not occur.

Proposed Action

There will be no cause-effect relationship for many of the plant species of concern simply because habitat is not present or a species' local range is not included. However, there are several known occurrences and potential habitat for others species as outlined in the Determinations table included in this report. The wildfire provided significant change to these species and potential habitats and has resulted in a current condition that in many cases may have eliminated or greatly reduced them. The direct effects to what remains would primarily be provided through mechanical disturbances from the proposed actions. For some species, this effect could be detrimental to existing plants or habitats that remained intact after the fire. For other species the new baseline condition has resulted in improved habitat conditions. These also may be mechanically impacted in a detrimental manner; however, physical disturbance of the site can benefit or maintain the species and suitable habitat into the future. The primary indirect effect would be the coming weed influx that will result from the fire, but be potentially exasperated by the disturbance of the proposed activities.

Botanists have reviewed this project, used available information on species distributions and habitat (using one or more of the following: topo maps, aerial photos, field reconnaissance, previous surveys, habitat modeling), and then assessed the potential for impacts for all federal listed and Region 1 sensitive species. If the project was determined to have **no effect** or **no impact**, this determination was based on one or more of these criteria:

- Habitat for the species is not present in the project area;
- Habitat for the species is present but the species does not occur in this area;
- Habitat for the species is present, the species occurs or may occur in the project area, but the project would not have any direct, indirect or cumulative effects on this species.

Sensitive species with a **may impact** determination may be affected by the project, but those effects would not cause any concern for overall species viability. This is generally due to the overall secure nature of other occurrences or habitat or the species may be benefited by the activity.

Table B-1. Species Determinations

Plant Species	Cat.*	Species Presence	Habitat Presence	Species Potentially Affected?	Habitat Potentially Affected?	Determination **
Water howellia *Howellia aquatilis*	T	No	No	No	No	NE
MacFarlane's four-o'clock *Mirabilis macfarlanei*	T	No	No	No	No	NE
Spalding's catchfly *Silene Spaldingii*	T	No	No	No	No	NE
Whitebark pine *Pinus albicaulis*	C	No	No	No	No	NE
Maidenhair spleenwort *Asplenium trichomanes*	S	No	No	No	No	NI
Payson's milkvetch *Astragalus paysonii*	S	Yes	Yes	Yes	Yes	**MI/BI**
Deerfern *Blechnum spicant*	S	Yes	Yes	Yes	Yes	**MI**
Crenulate moonwort *Botrychium crenulatum*	S	Potential	Yes	Yes	Yes	**MI**
Lance-leaf moonwort *Botrychium lanceolatum* var. *lanceolatum*	S	Potential	Yes	Yes	Yes	**MI**
Slender moonwort *Botrychium lineare*	S	No	No	No	No	NI
Mingan moonwort *Botrychium minganense*	S	Yes	Yes	Yes	Yes	**MI**
Mountain moonwort *Botrychium montanum*	S	Potential	Yes	Yes	Yes	**MI**
Northern moonwort *Botrychium pinnatum*	S	Yes	Yes	Yes	Yes	**MI**
Least moonwort *Botrychium simplex*	S	No	No	No	No	NI
Bug-on-a-stick *Buxbaumia aphylla*	S	Yes	Yes	Yes	Yes	**MI/BI**

Plant Species	Cat.*	Species Presence	Habitat Presence	Species Potentially Affected?	Habitat Potentially Affected?	Determination **
Green bug-on-a-stick *Buxbaumia viridis*	S	Yes	Yes	Yes	Yes	**MI**
Broadfruit mariposa *Calochortus nitidus*	S	No	No	No	No	NI
Contance's bittercress *Cardamine constancei*	S	Yes	Yes	Yes	Yes	**MI/BI**
Buxbaum's sedge *Carex buxbaumii*	S	No	No	No	No	NI
Bristle-stalked sedge *Carex leptalea*	S	No	No	No	No	NI
Many headed sedge *Carex sychnocephala*	S	No	No	No	No	NI
Anderegg's cladonia *Cladonia andereggii*	S	No	No	No	No	NI
Pacific dogwood *Cornus nuttallii*	S	Yes	Yes	Yes	Yes	**MI**
Clustered lady's slipper *Cypripedium fasciculatum*	S	Yes	Yes	Yes	Yes	**MI**
Dasynotus *Dasynotus daubenmirei*	S	Yes	Yes	Yes	Yes	**MI/BI**
Idaho douglasia *Douglasia idahoensis*	S	No	No	No	No	NI
Giant helleborine *Epipactis gigantea*	S	No	No	No	No	NI
Puzzling halimolobos *Halimolobos perplexa* var. *perplexa*	S	Yes	Yes	Yes	Yes	**MI/BI**
Sticky goldenweed *Haplopappus hirtus* var. *sonchifolius*	S	No	No	No	No	NI
Light hookeria *Hookeria lucens*	S	Yes	Yes	Yes	Yes	**MI**
Salmon-flowered desert-parsley *Lomatium salmoniflorum*	S	No	No	No	No	NI
Chickweed monkeyflower *Mimulus alsinoides*	S	No	No	No	No	NI
Spacious monkeyflower *Mimulus ampliatus*	S	No	No	No	No	NI

Plant Species	Cat.*	Species Presence	Habitat Presence	Species Potentially Affected?	Habitat Potentially Affected?	Determination **
Thin sepal monkeyflower *Mimulus hymenophyllus*	S	No	No	No	No	NI
Gold-back fern *Pentagramma triangularis* var. *triangularis*	S	No	No	No	No	NI
Sweet coltsfoot *Petasites frigidus* var. *palmatus*	S	No	No	No	No	NI
Licorice fern *Polypodium glycyrrhiza*	S	No	No	No	No	NI
Naked-stem rhizomnium *Rhizomnium nudum*	S	Yes	Yes	Yes	Yes	**MI**
Mendocino sphagnum *Sphagnum mendocinum*	S	No	No	No	No	NI
Evergreen kittentail *Synthyris platycarpa*	S	Yes	Yes	Yes	Yes	**MI/BI**
Sierra wood-fern *Thelypteris nevadensis*	S	No	No	No	No	NI
Short-style sticky tofieldia *Triantha occidentalis* ssp. *brevistyla*	S	No	No	No	No	NI
Douglas clover *Trifolium douglasii*	S	No	No	No	No	NI
Plumed clover *Trifolium plumosum* var. *amplifolium*	S	No	No	No	No	NI
Idaho barren strawberry *Waldsteinia idahoensis*	S	Potential	Yes	Yes	Yes	**MI/BI**

***Category: T** = Threatened; **E** = Endangered; **P** = Proposed; **C** = Candidate; **S** = Sensitive
****Federally listed (Threatened) Species Determination: NE** = No Effect; **BE** = Beneficial Effect; **NL** = Not likely to adversely affect; **LT** = Likely to adversely affect. **Sensitive Species Determination: NI** = No Impact; **BI** = Beneficial Impact; **MI** = May impact individuals or habitat but not likely to cause trend toward federal listing or reduce viability for the population or species; **LI** = Likely to impact individuals or habitat with the consequence that the action may contribute towards federal listing or result in reduced viability for the population or species.

Well established existing information along with earlier determinations and more precise direction from the FWS clarify that the threatened and endangered species only occur in parts of the Salmon River Canyon on the Nez Perce unit of the forest. Only the Teepee Springs fire is found in the Salmon River Canyon. Field recon and past surveys existing knowledge indicates that no occurrences or habitat for either of these species is present within areas to be managed by this project. Elevations in the burn areas generally do not reach suitable elevations to support whitebark pine and in the few places they do roadside maintenance does not occur. Water howellia is known to be limited to the Palouse basin in the extreme northern portion of the forest. Thus this project will have **no effect** on any of these species.

There are fourteen R1 sensitive plant species documented to occur along the roadsides that will be involved in the proposed actions. Some of the involved species occur at a single location in areas of proposed management, while others have several occurrences. Suitable habitat is difficult to determine as areas of potential habitat for most sensitive species have been rendered unsuitable by the preceding wildfires; however, there may be small inclusions that are subjected to maintenance that did not burn or did not burn with intensity sufficient to completely compromise the habitat. For other species, the future habitat suitability may have increased due to the fires.

The species that require intact, mid to late seral forests likely did not survive the burn, but it is possible that some small areas survived and could be impacted by the proposed activities. Species known to occur or previously occurring along the roads in question that fall under this category include Mingan moonwort, deerfern, clustered lady's slipper, naked rhizomnium, light moss, green bug-on-a-stick, and existing Pacific dogwood in a shrub or small tree form. Occurrences of these mesic forest species in areas of road maintenance are primarily in fire areas north of the Middle Fork Clearwater River. Northern moonwort has a reported occurrence along the roadside within the area of the Wash Fire. However, the typical suitable habitat does not occur and the area has undergone three substantial burns since 2003. Thus is considered highly unlikely that the occurrence is present.

Other species that were present before the burn require or withstand disturbance such as that provided by the wildfire. Such populations were likely impacted by the fire, but overall the preferred habitat would have been rejuvenated and increases in these species could occur into the future. Species in this category that are in areas potentially affected by the proposed management activities include: Dasynotus, Constances' bittercress, evergreen kittentail, Payson's milkvetch, puzzling halimolobos, and bug-on-a-stick.

All species in this second group may be mechanically impacted by the proposed activities of this project; however, despite the physical impacts to some individual plants, the scarification of soil along with any activity that promotes open conditions at occupied sites is beneficial in the long term. The response to disturbance for Dasynotus, Constances' bittercress, evergreen kittentail has been well documented by Crawford (1980) and through field observations by Mousseaux (1995) and others. Succession has been noted as a threat to Payson's milkvetch (Lorain 1990) and the species is frequently observed to increase in clearcuts and along open roadsides. While Pacific dogwood occurs under shaded canopies, it appears well adapted for a role in secondary succession due to vigorous resprouting from the root crown following disturbance (Lichthardt 1999). Puzzling halimolobos and bug-on-a-stick moss are limited to the Salmon River within the Teepee Springs Fire area. Both occur along roadsides to be managed and both have been noted to increase or maintain with disturbance that sets or maintains earlier seral conditions by Hanson 1996, and Hancock and Brassard 1974 respectively.

In addition potentially suitable habitat also occurs for Idaho barren strawberry and some other moonwort species. The former occurs in the Jay Point fire area, but despite the presence of suitable habitat, it has not been found along any of the road sides involved in this project. This species is documented to withstand and perhaps increase after disturbance such as fire or management activities that may open habitats and provide some soil scarification (Crawford 1980). The moonworts may occur in older, mesic forests in the northern fire areas and if present could be similarly impacted as the previously mentioned Mingan moonwort.

Invasive species that are anticipated to increase after the fires and ground disturbing activities provide the primary indirect threat to sensitive plant species. Due to the elevation and potential habitats present, the weed influx is unlikely to be heavy or at least not expected to occur long term in the more mesic forests of the northern fires areas. In such cases thistles would be expected to be the primary invasive species; however, observations of fires and even aged management have shown this increase is often short term and other native increaser species and shrubs outcompeting them within a few years. There is some potential for sensitive plant species that respond well to open conditions could be suppressed or excluded

by such invasive plants for a time. Of greater concern would be the weed influx in the drier forests found on the Salmon face in the Teepee Springs Fire area. In addition to thistles, other invasive species, notably rush skeleton weed and Dalmatian toadflax, may invade and persist in the open forest and grassland habitats. The increase of such weeds is highly likely after the fire, but any ground disturbance through road maintenance activities may increase opportunity for further establishment of these undesirable plants.

Cumulative Effects

Discussion of cumulative effects for rare plants is addressed through the general trend of the suitable habitat required by these species as a result of past, present and future management actions. It generally is not possible to directly quantify effects of specific activities that are several years or decades old on species of concern today. The status and occurrence of rare plants was completely unknown for much of the management history of the watershed. Historically the changes in condition and abundance of specific habitats important to these species are also largely unknown. Therefore the effects of these past projects can only be qualified through general discussions. However, the results of past projects contribute to the current condition, which can be used to discuss and quantify effects of proposed activities on rare plant species.

The preceding wildfire has greatly reduced later-seral plants of concern, generally to the point of removal, thus the proposed actions would have no effects or cumulative effects for the most part. However, where road maintenance may occur in unburned or lightly burned pockets, there is potential for the proposed activities to further reduce or degrade occurrences or habitat. Such a downward trend in habitat quality would not lead to concerns for overall population viability, since these habitats are common in much of the forest that did not burn and will not undergo disturbance associated with this or other foreseeable projects. Recovery of suitable habitat in the treatment areas could vary from a few years to several decades depending upon the species and state of the new, post-fire baseline condition. For early seral sensitive species, the post-fire baseline condition is one of habitat initiation or improvement and the proposed actions would have a similar, but small effect to help maintain or reset the habitat for the future.

3.13 Visual Quality

3.13.1 Affected Environment

Resource Concern

The landscape encompassing the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project area stretches across most of the Nez Perce – Clearwater National Forest. The project is grouped into nine areas: Baldy, Crown Noble, Deadwood, Jay Boulder, Larkin Complex, Motorway North, Motorway South, Slide Wash and Teepee Springs. Three of the project areas are located on the Red River Ranger District. Baldy is located east of Elk City near Newsome work center site. Crown Noble is located south of Red River Ranger Station near the Big Mallard Creek Trailhead. Deadwood is located to the southwest of Elk City. Within the boundaries of the Lochsa/Powell Ranger District there are three separate groups of roadways. The Jay Boulder is located to the north and south of Powell Ranger Station. The Jay Point portion of the project is located on the main access to Tom Beale Trailhead. The Boulder portion of the project is located near the Montana border, just to the west of Granite Pass. The Motorway North and the Motorway South areas stretch from the Lolo Trail Corridor to U.S. Highway 12. Many of these roadways are within or adjacent to roads that have been identified as important for scenery. There is one project area within the North Fork Ranger District. The Larkin Complex is located to the northwest of the North Fork of the Clearwater River near Lost Ridge Trailhead. And finally there is one project within the Salmon River Ranger District. The Teepee area is located just to the north of Allison Creek Picnic Area on the Salmon River.

Of greatest concern for scenic quality are the views from various roads and trails found within the Lolo Trail Historic Landmark Corridor, the Salmon River Road and River, U.S. Highway 12 and the Middle Fork of the Clearwater River, the Selway River Road and Selway Wild and Scenic River. There are scattered dispersed sites found within the project area, but there are no fully developed camping or picnicking areas within or immediately adjacent to proposed harvest areas. There are several trailheads and one picnic area, Allison Creek on the Salmon River that are within ½ mile of proposed hazard tree activity areas. The project proposes to perform maintenance activities designed to protect the health and safety of the public, workers, and private citizens and to reforest portions of the landscape deforested by the 2015 area fires.

Planned activities would be visible in the foreground viewshed of numerous forest roads. Some of these roads have a high concern for scenery while other have moderate to low concern. This report analyzes the visual impacts of proposed management activities to determine whether the activities would meet forest plan standards for scenic quality. Numerous viewpoints were reviewed to determine the short and long term impacts to scenery within the resource area.

Overview of Issues Addressed

General direction for scenery management is provided in Forest Service Manual 2380 (Landscape Management). Specific visual resource management direction is provided by the 1987 Clearwater National Forest Plan and the 1987 Nez Perce National Forest Plan. Visual resource management is described in terms of visual quality objectives (VQO). Forest plan VQO standards and guidelines were based on the Visual Management System described in Agriculture Handbook Number 462, National Forest Landscape Management, Volume 2 (PF-Doc. PI-R02). The visual management system was revised in 1995, and is now known as the Scenery Management System. The revised guidelines are provided in Agricultural Handbook 701, Landscape Aesthetics: A Handbook for Scenery Management (USDA Forest Service 1995; PF Doc. VIS-R01). While the terminology of the VQO system will be used to describe the project the techniques and methodologies described in the Scenery Management System will also be used to analyze the project.

Issue Indicators

VQOs provide measurable standards for scenery management in conjunction with demands for goods and services from the forest. Visual resource management is integral to all management areas and implied in all management goals. The forest plan standard relevant to the project area for the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project area visual resources are:

1. Meet adopted visual quality objectives (VQOs). Exceptions occur in unusual situations: these are identified through the project planning process involving an interdisciplinary team. Mitigation measures should be developed for areas when VQOs are not met.

2. The visual resource has been evaluated based on visual sensitivity levels assigned to travel routes, use areas and water bodies in and adjacent to the Nez Perce - Clearwater National Forests. Adjustments in the VQO boundaries based on project level analysis would conform to principles in FSM 2380.

The analysis considers the character and appearance of the surrounding natural landscape and the VQOs of areas proposed for treatments as assigned under the current forest plan. VQOs are a desired level of scenic quality and diversity of natural features based on physiological and sociological characteristics of an area, and refers to the degree of acceptable alterations of the landscape. Management activities such as commercial timber harvest and road construction can alter the scenic character of the landscape.

Effects to the visual resource are discussed in general terms; however, the indicator used to measure effects is whether or not VQOs are achieved. Visual quality objectives for the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project are listed in Table VQ-1. Below is a brief description of each objective level.

- ***Preservation***: In general, human activities are not detectable to the visitor.
- ***Retention***: Human activities are not evident to the casual Forest visitor.
- ***Partial Retention***: Human activities may be evident, but must remain subordinate to the character of the landscape.
- ***Modification***: Human activities may dominate the characteristic of the landscape but must, at the same time, utilize naturally established form, line, color, and texture.
- ***Maximum Modification***: Human activity may dominate the characteristic landscape, but should appear as natural occurrences when viewed as background.

Cumulative Effects Area

The geographic scope of the scenery analysis for the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project includes areas visible from key locations both within and outside the area of interest. The spatial context for this project takes in just the area within the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project area of interest which includes areas across the forest affected by the 2015 fire. Critical viewsheds affected by this event include: the western end of the Lolo Trail National Historic Landmark corridor, areas near the Mallard Larkins Pioneer Area, Salmon, Middle Fork of the Clearwater, and Selway Wild and Scenic Rivers, and the U. S. Highway 12 Scenic Byway. Table VQ-1 shows all key viewpoints or viewing corridors and their sensitivity levels identified in the 1987 Clearwater National Forest Plan and 1987 Nez Perce National Forest Plan that are relevant to the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project scenic quality analysis. Direct and indirect effects analysis focuses on the Post Fire Roadside, Administrative Site and

Recreation Site Maintenance and Hazard Tree Mitigation Project viewshed and viewpoints from which the proposed activities can be seen, and the extent proposed treatment units affect the visual quality objectives assigned to that piece of ground. The cumulative effects area is similar to that for the direct and indirect effects. The temporal scope of the analysis is limited to the 20 to 30 years following harvest activities. This time period is the length of time openings created by regeneration harvest are likely to be evident given the growing conditions of the area. Some of the project area will be viewed in the foreground viewshed of individual roads, the time may be shorter as new trees can provide screening in the foreground when they reach 5 to 10 feet in height, which might take as short as 5 years in some areas. This will be dependent on aspect, fire intensity and success of revegetation efforts. Areas viewed in the middle and background view would take longer as harvesting viewed from a distance would appear as an opening until the trees have reached 20 to 30 feet in height.

Methodology

Although the Visual Management System (PF Doc. VIS-R02) has been replaced by the Scenery Management System (PF Doc. VIS-R01), this analysis uses terminology used in the forest plan which was developed and written under the former. A crosswalk between the two systems is found in Agricultural Handbook 701, Appendix A (PF Doc. VIS-R01). Visual quality objectives (VQOs) are based on the area seen from sensitive viewpoints such as travel corridors, urban areas where the forest background scenery is important and other features where there may be a high visual sensitivity level. These visually sensitive viewpoints are outlined in the 1987 Clearwater National Forest Plan and 1987 Nez Perce National Forest Plan. A variety of tools were used in the visual resource analysis including analyzing VQO maps, field visits and reviewing photography from the roadways.

Using ArcMap 10.2 (ESRI Inc., 1999-2009), GIS shapefiles of harvest units were overlaid on spatially rectified VQO displaying scenic variety class, distance zones and sensitivity levels, and quality objectives across the area of interest. Original VOQ maps were prepared for the 1987 forest plans using the process outlined in the Agriculture Handbook Number 462 (1976; PF Doc. VIS-R02).

Treatment units and their associated VQOs were evaluated in relation to visually sensitive viewpoints identified in the forest plan to determine the extent to which proposed activities would likely be seen, and the likelihood that those activities would adversely affect VQOs. VQO maps prepared under the forest plan are very general in nature. Scenic class and sensitivity level can provide a general understanding; however, the maps can't always illustrate how visible specific treatments would be from locations of concern, or the extent to which treatments are likely to stand out or blend with existing scenic features.

Figure VQ_1. Fire effected area near Pete Forks Junction, near several dispersed camping sites. This is part of the Motorway North area and is along Rd 500.

Initial field reconnaissance was done to further assess the visibility of potential treatments in the context of the current landscape. Maintenance areas were observed from roadside viewpoints to determine the severity of the existing fire damage and the potential effects of hazard removal. Proposed hazard removal activities are found most in the foreground viewing zone when viewed from key roadways, but may also be visible in the middleground viewing zone from critical viewpoints adjacent to activity areas.

Hazard maintenance areas were viewed from ground level at a variety of representative sensitive locations, including: Motorway North and South - Rd 500, Rd 104, U.S. Highway 12 and Middle Fork of the Clearwater Wild and Scenic River (Woodrat Area); Slide – Selway Road and Wild and Scenic River; Teepee – Salmon River Road and Wild and Scenic River, and Rd 221.

After establishing relative sensitivity of affected areas when viewed from key viewpoints, Agricultural Handbooks 462 and 701 were used as references to determine if proposed activities were likely to modify the landscape to the extent that visual quality objectives could not be met.

Existing Condition

The Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project has components that are spread across most areas of the Nez Perce – Clearwater National Forests. The analysis area is part of the Bitterroot Mountain range and has road segments that occur from the broad river canyons of the Middle Fork of the Clearwater River and Salmon Rivers to the alpine areas near the Mallard Larkins pioneer area and the Great Burn area near the Boulder portion of the project.

Figure VQ-2. Area of mixed severity with some sections showing little fire damage to others with severe fire effects.

Figure VQ-3. Rd. 221 above the Salmon River has many areas of severe fire activity.

The landscape varies from steep canyon breaklands to rolling uplands, but in general all the areas being considered are covered with coniferous vegetation. Each of the areas was affected by the 2015 fires, with fire severities ranging from low to high. Areas being designated for hazard tree removal are generally secondary roads with moderate to low concern for scenery. There are some area that do have a higher concern for scenery such as the Salmon Grangeville Road 221 and the Lolo Motorway Rd. 500. While there are few distinctive landscape features within the project area it does have some roads adjacent to the Lolo Trail Historic Landmark Corridor which is known for its cultural importance. This ridgeline area has seen several eras of human passage such as the Lewis and Clark Expedition of 1804-5, the Nee Me Poo Flight of 1877 and the Bird Truax Wagon Road. There are some project areas that are adjacent to roadless areas, the Selway, Salmon and Middle Fork of the Clearwater Wild and Scenic Rivers, and U.S. Highway 12 Scenic Byway.

Most of the areas being analyzed are rolling uplands which are only visible to the viewer traveling the interior roads and reflect a landscape character that is commonly found in the Bitterroot Mountains. Many of the river corridors and much of the lower elevation areas have significant populations of western redcedar. Other mixed conifers, composed mostly of grand fir and Douglas fir, are found across the rolling hills adjacent

Figure VQ-4. Area along Rd. 9550 in the Crown Noble area shows minimal damage from fire in this area of lodgepole pine forest.

to the streams. The drier river breaklands near Woodrat, Teepee and Chair Point also have a significant component of ponderosa pine. Within the upland areas lodgepole pine will be found, which in some areas has some pockets of insect and disease activity. While most of the hillsides have a continuous canopy of coniferous vegetation there are areas of open grass, rock outcrops and patches of deciduous shrubbery along the steeper hillsides.

Recreation users visiting the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project area participate in wide variety of recreation pursuits including dispersed recreation activities such as berry-picking, dispersed camping, driving for pleasure and enjoying the various summer and winter trails. Trail use related to exploring the historic events along the Lolo Trail is especially popular in the Motorway North and South areas. Being on the western end of the Lolo Trail Corridor and having access mostly by paved road, this section of the trail is very popular with day users and overnight visitors. River users and overnight camping is popular along the Salmon River Road, Selway River, and US Highway 12 near the Motorway South, Wash and Teepee areas.

There is evidence of past harvest activities within the project boundary with openings in various stages of revegetation found throughout the area. Some of these past harvest activities are still visible, but have vegetated to the point that they don't appear as distinctive openings. Some openings are still evident and in some areas do tend to dominate the existing landscape character. These openings are in various stages of regeneration but most would take at least 10 to 20 years to appear as only natural timber stands without man-made openings.

During the summer of 2015 a portion of all of these designated areas were affected by wildfire. This area was hard hit with numerous fires burning over the space of a few weeks. Significant areas have also been affected by insect and disease activity. There is also evidence in some of these areas such as the Boundary Junction area of Motorway North and the Slide Wash area of fires from previous years.

Figure VQ-6. Nee Me Poo Trail #40 near Camp Martin prior to the 2016 fire. This area along Rd 104 has been affected by severe fire activity and is found in the Motorway North area.

Figure VQ-7. Close up view of burned area near Pete Forks Junction in the Motorway North area.

The project area is divided into nine general areas: Baldy, Crown Noble, Deadwood, Jay Boulder, Larkin Complex, Motorway North, Motorway South, Slide Wash, and Teepee Springs. Viewpoints are mostly found along the roads and trails encompassed within the project area, but some of which are identified as sensitive travel corridors in the Forest Plan. Although there are currently harvest units that appear as openings they do not dominate the existing landscape character of the area.

Figure VQ-8. View of burned trees in the foreground below Hemlock Butte Lookout and Rd 535 A.

Desired Condition

The desired condition for scenic quality within the area of interest would be to retain the existing landscape character and maintain the designated visual quality objectives for travel corridors and use areas. The following table outlines the visual quality objectives listed in the 1987 Clearwater National Forest Plan and 1987 Nez Perce National Forest Plan for corridors in this area.

Table VQ-1. Listing of key viewpoints, their sensitivity level and visual quality objectives found within the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project area. Viewpoints or viewing corridors come from the 1987 Clearwater National Forest plan.

View Point or Viewing Corridor	Sensitivity Level	Foreground 0 – ¼ mi.	Middleground ¼ mi. – 3 mi.	Background 3 mi. – 5+ mi.
Salmon Grangeville Rd. 221	1	Modification	Modification	Modification
U.S. Highway 12	1	Retention	Partial Retention	Modification
FR 500 – Lolo Motorway	1	Retention	Modification	Modification
Salmon River Road 1614	1	Retention	Modification	Modification
Berg Ranch Rd 9900	1	Retention	Modification	Modification
Middle Fork of the Clearwater	1	Retention	Partial Retention	Modification
Chair Point Rd. 2007	1	Retention	Modification	Modification
Selway River	1	Retention	Partial Retention	Modification
Salmon River	1	Retention	Partial Retention	Modification
FR 104 – Pierce – Lochsa Rd	1	Retention	Modification	Modification
FR 535 – Hemlock Rd*	2	Modification	Modification	Maximum Modification
Hemlock Butte Lookout	3	Modification	Modification	Maximum Modification
Boundary Ridge Rd. 464	2	Retention	Modification	Maximum Modification
Big Mallard Rd. 421	2	Partial Retention	Modification	Maximum Modification
Tom Beal Park Rd. 362	1	Partial Retention	Modification	Maximum Modification
Coolwater Ridge Rd. 317	1	Partial Retention	Modification	Maximum Modification
Fog Mountain Rd. 319	1	Partial Retention	Modification	Maximum Modification
American River – Selway Rd. 443	1	Modification	Modification	Maximum Modification
O'Hara, Selway Falls, Slim's Camp, Indian Hill, Van Creek, Spring Bar Campgrounds and Allison Creek Picnic Area. (Drop and Leave only)	1	Retention	Modification	Maximum Modification

**While not currently in the Forest Plan a sensitivity level of 2 and 3 with a corresponding VQOs of Partial Retention and Modification in the foreground viewing zone, Modification in the middleground and Maximum Modification in the background viewing zone from these corridors is appropriate for these roads and trails.*

Proposed hazard management areas within the project area have VQOs that range from *Retention* to *Maximum Modification* VQOs. There are proposed hazard management areas immediately adjacent roads with *Retention* or *Partial Retention* VQOs. The majority of units being proposed for activity are within

the *Modification* and *Maximum Modification* VQOs which forms the middleground and background viewing areas from all the sensitivity viewing areas. (See VQO maps for each area in the project file.)

3.13.2 Environmental Effects

3.13.2.1 Alternative 1 – No Action

A. Direct and Indirect Effects

With no hazard mitigation activity occurring under Alternative 1 (no action) there would be no direct or short-term effects to the scenic condition of the area. The openings in forest cover that are visible as a result of past forest management would continue to recover tree growth, and over time would fill in unnatural appearing openings. Areas of hazard to forest visitors and workers would continue. Trees would continue to deteriorate over time and would eventually fall to the ground. Some of these would enter the road or other administrative and recreational facilities. Processes affecting forest dynamics would continue, including continuing insect and disease. Dead and dying trees will be found throughout the area as a result of the 2015 fire. This may increase further risk of wildfire as the amount of dead and dying vegetation increases.

B. Cumulative Effects

There would be no man-made change in the scenic quality of the area of interest in Alternative 1 in the short term. The existing man-made openings would continue to re-vegetate and within 20 to 30 years would no longer appear as distinctly as openings. Alternative 1 would not change the existing landscape character of the geographic area encompassed within the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project area of interest but the hazard posed by roadside dead and dying trees would continue.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project area currently meets the 1987 forest plan visual quality objectives of Retention, Partial Retention, Modification and Maximum Modification in the foreground, middleground and background viewing zones from all identified viewpoints and viewing corridors. These viewpoints are mostly found along the roads encompassed within the project area, but some areas may be viewed from sensitive travel corridors in the Forest Plan.

Summary of Effects

The effect on the scenic resource in Alternative 1 in the long (30-40) and short term (less than five years) would be that of the changes related to revegetation of existing openings and the natural processes after a fire. These changes would include a continued deterioration of the fire affected vegetation adjacent to the outlined roads, administrative facilities and recreation sites. This will continue to pose a hazard for visitors. Openings created by the fire would remain a part of the landscape character for 30 to 40 years.

3.13.2.2 Alternative 2 – Proposed Action

A. Direct and Indirect Effects

This analysis is mainly concerned with the landscape that can be observed from viewpoints identified in the forest plan. (See Table VQ-1) Proposed activities that are blocked from these viewpoints by terrain are considered to be in compliance with VQOs.

Transportation System. All road maintenance items listed such as drainage maintenance, blading, slide and road repairs, rock and stump removal, signs and access control maintenance, brush cutting, trail maintenance and administrative and recreation site maintenance will have little overall effect on the scenic resource. These activities would present minor evidence of disturbance in the short term and they will no longer be apparent within one year.

Site Preparation and Reforestation. Some areas of tree felling will be prepared for reforestation and then replanted with appropriate coniferous species. In addition to harvest areas, some areas that burned in the 2015 fire, but are not proposed for harvest will also be revegetation. These activities will have a positive long term effect on the area because it accelerates the process of revegetation.

Tree Felling and Timber Removal. Much of the area included in the proposed activities have moderate to low concern for scenery. These are listed with a concern level of 3. The impacts of the timber removal within these road corridors will be relatively minor in the long term. The changes caused by the fire are considered a natural event and the resulting modifications to the landscape are within the dynamic evolution of the landscape.

There are some corridors where the concern for scenery is much higher and many of these travel ways provide the setting for visitors' recreation experience. Within areas where the Visual Quality Objectives are *Retention or Partial Retention*, design measures are outlined in Table 2 – 4 Project Design Features by Resource Area that will reduce the impact of the man-made appearance of those changes on the landscape. These areas include corridors within and adjacent to the Lolo Trail National Historic Landmark, U.S. Highway 12 and the Middle Fork of the Clearwater, Selway and the Salmon Wild and Scenic Rivers. A detailed list of design features by roadway is included in the project file.

Within the Motorway North area the greatest area of concern would be along portions of FR 104 and FR 500 where the VQO is *Retention*. All portions of the project within the Lolo Trail National Historic Landmark boundary have been deferred, but some sections of FR 104 and FR 500 are proposed for either Drop and Leave or Removal that are outside of the designated corridor. Tree removal areas will be within the immediate foreground of the roadway. Design measures to minimize visual impacts of stumps and logging activities, maintaining natural appearing opening edges and retention of any live trees would be needed to maintain the VQO of *Retention* and *Partial Retention* in the foreground. Within the Teepee area there are middle and background views of proposed tree removal areas from the Salmon Wild and Scenic River and the Salmon River Road. Design measures to feather the edges of the openings and retain live trees along the road corridor would be needed to maintain the VQO of *Partial Retention* and *Modification* from the travel corridors with a high concern for scenery. The Motorway South area encompasses the area to the north and west of the community of Syringa. Design measures to retain stand structure and feather the edges of any openings will be needed to maintain the VQO of Partial Retention as viewed from U.S. Highway 12 and the Middlefork Clearwater Wild and Scenic River. There will also be harvest units from the proposed Woodrat Salvage Project that will be evident in this same area and which will need to be considered when feathering the edges of the units. For the Slide – Wash area, sections of the Wash area are within the viewshed of the Selway Wild and Scenic River. Design measures needed to reduce the visual impact of the tree removal within the viewshed of the Selway Road and River include minimize visibility of stumps in the immediate foreground.

B. Cumulative Effects

Past harvest activities are visible throughout the area of interest and are viewed from most roads and trails. Past harvest projects include both regeneration harvest and commercial thinning. Most activities have revegetated to the point that they are no longer perceived as an opening. Past harvest projects that may still be visible include Big Smith Creek, Bridge Creek Salvage, Interface Fuels 1 and 2, Powerline Salvage. Currently active projects include Relaskop Creek, Alder Stewardship, Snyde-Ape Stewardship,

Swede Stewardship and White-White Stewardship. All these projects were designed to meet the VQOs for the area and therefore should not impact the long term visual quality of the area.

Future harvest projects include Little Slate, Ten Mile Fuels, Starbucky, Crooked River Meanders, American Crooked, Orogrande Community Protection, Otter Wing, Wapiti, Lunch Creek, Lolo Insect and Disease, Lowell WUI, North Side Powell, Yakus, Powell Divide, and French Larch Projects. These project have been designed to meet the VQOs for that area. While openings will be observed in many of these projects, design measures would be used to create openings that emulate natural openings. In addition to roadside maintenance activities listed in this proposal several of the fire effected areas will also have salvage harvest proposed within the area of the fire. These projects would be developed using design measures that create openings that meet Visual Quality Objectives for the area. Future harvest projects include Woodrat Fire Salvage, Upper Lolo Fire Salvage, Teepee Springs Fire Salvage, Deadwood Fire Salvage, Jay - Boulder, Big Hill, Lost Hat – Snowy Summit and Johnson Bar Fire Salvage. These projects have been designed to meet the Forest Plan VQOs for the area. These projects will be also be visible to some extent from the road, trails and recreation sites within the area of interest, but the impact will be within the visual quality guidelines. Openings will be visible but will reflect the size and shape of natural fire activity as viewed in the foreground, middleground and background viewing zones as specified for Retention, Partial Retention, Modification and Maximum Modification. Design measures to reduce the visual impact of tree felling and tree harvesting activities have been designated for areas that have the Retention and Partial Retention VQO.

There are Idaho Department of Lands and private timber harvest on fire effected lands near the Woodrat area, the Salmon River area and along the Selway River. These activities are evident, but are limited in scope. The impacts, while visible would not change the existing landscape character of the area. Within 5-10 years these openings will appear similar to openings created by natural fire events.

There are areas within the fire perimeters that are not planned for tree felling or tree removal where tree planting will occur. This will speed up the recover process and the areas will return to a continuous coniferous landscape character more quickly. Species planned for these planting areas will also promote a more diverse and resilient species mix.

Given the aspect and growing history of the area and the extent of the fire activity that will not be harvested, the openings created by this proposal would no long appear as openings within 30 to 35 years. Due to the extent of the wildfire events the vegetation in the area will appear changed. These changes will have the appearance of a natural fire event over time and are in keeping with the landscape character of the area. These openings would appear as an area that has experienced the natural process of wildfire rather than appear as man-made, geometric openings.

Regulatory Framework: Compliance with Forest Plan and Other Relevant Laws, Regulations, and Policies

This alternative would meet the forest plan Visual Quality Objectives found in Table VQ-1 of the Scenic Quality report.

Forest Plan Consistency

Timber removal may have an effect on the appearance of the landscape in the short (less than 5 years) and long term (greater than 25 years). Changes created by removal of the timber along the roadway may modify the landscape character if evidence of the timber harvesting are evident. Design measures to reduce the appearance of man-made activities such as low cut stumps, removal of slash and feathering opening edges help the activity appear to be a natural event rather than a man-made opening in areas where the VQO is *Retention*. In areas where the VQO is *Partial Retention* harvest activities can be apparent, but must be subordinate to the existing landscape character. Areas where the VQO is

Modification or *Maximum Modification,* the harvest activities must appear as a natural opening in the middle and background viewing zones.

Harvest activities proposed for this project would be visible from several viewpoints (Table VQ-1) but would be designed to emulate the openings created by natural processes within the area when viewed in the foreground, middleground and background viewing zones. Openings would be designed to appear natural with feathered edges, natural shaped openings and retention of stand structure commensurate with the requirements for the VQOs of *Retention*, *Partial Retention*, *Modification* and *Maximum Modification*.

Long term, the openings will improve the safety of these publically used routes and would improve the health and resilience of the forest. While the openings would be apparent and in some cases will dominate the existing landscape character of the area especially in the foreground viewing zone it will meet the overall VQOs of *Retention*, *Partial Retention*, *Modification* and *Maximum Modification* designated in the forest plan for these areas. Given the design measures outlined for all designated routes, Alternative 2 would meet the forest plan visual quality objectives.

C. Summary of Direct and Indirect Effects for both Alternatives

Table VQ-2. Summary of effects for the Post Fire Roadside, Administrative Site and Recreation Site Maintenance and Hazard Tree Mitigation Project.

Meet Forest Plan VQOs	Would meet VQO. Existing man-made openings would continue to re-vegetate. These openings would no long appear as openings within 20 – 30 years the fire occurred would continue to evolve. Dead trees would eventually fall down creating openings and would eventually be replaced by young trees. Road side hazard trees will continue to deteriorate over time and many will fall, some within the road corridor.	Although activities would be visible from roads, the hazard mitigation proposal would meet the VQOs of *Retention*, Partial Retention, *Modification* and *Maximum Modification* designated for these areas. Hazard mitigation areas within the viewshed of the Lolo Trail National Historic Landmark, U.S. Highway 12 and the Middle F Fork of the Clearwater, Selway and the Salmon Wild and Scenic Rivers and other roads with a high concern level for scenery (Level 1) would have design measures that would reduce the visual impact of the tree felling and removal and would be designed to emulate the natural patterns of fires in the area. Long term goals of a more healthy and resilient forest would also improve the scenic character over time.

Appendix A. Agencies and Persons Consulted

The Forest Service consulted the following individuals, Federal, State, tribal, and local agencies during the development of this environmental assessment:

Federal, State, and Local Agencies:

- National Marine Fisheries Service (NOAA Fisheries)
- US Fish and Wildlife Service
- Idaho Department of Fish and Game
- Idaho County Commissioners
- Clearwater County Commissioners
- Idaho State Historic Preservation Office
- Bureau of Land Management
- Bureau of Indian Affairs
- Idaho Departments of Lands
- Idaho Department of Parks and Recreation
- Idaho Roadless Commission
- USFS Washington Office
- USFS Northern Region Office
- Idaho Panhandle National Forest
- Flathead National Forest
- Bitterroot National Forest
- Payette National Forest

Tribes:

- Nez Perce Tribe

Others:

- Clearwater Basin Collaborative

Scoping Commenters:

The following Tribe, Agencies, Organizations and Individuals Commented on the Scoping Notice in December, 2015:

- Nez Perce Tribe
- Clearwater County Commissioners
- Idaho County Commissioners
- Backcountry Horsemen
- Dennis Baird
- Ellen McKenzie
- Eric Jensen
- Friends of the Clearwater
- George Wuerthner
- Henry Jageman
- Idaho Conservation League
- Jeff Juel
- Kevin Proescholdt
- Lynne Haagensen
- Natalie Shapiro
- Robb Briggs
- Rod Parks
- Ted Scherff
- The Wilderness Society
- William Beck

The following Tribe, Agencies, Organizations and Individuals commented on the Proposed Action for 30-day Notice and Comment during the comment period which began with the publishing of a legal notice in the Lewiston Tribune on March 29, 2016:

- Nez Perce Tribe
- Idaho County Commissioners
- Idaho Conservation League
- Friends of the Clearwater
- Harry Jageman
- Cynthia Nichols

Appendix B. Maps

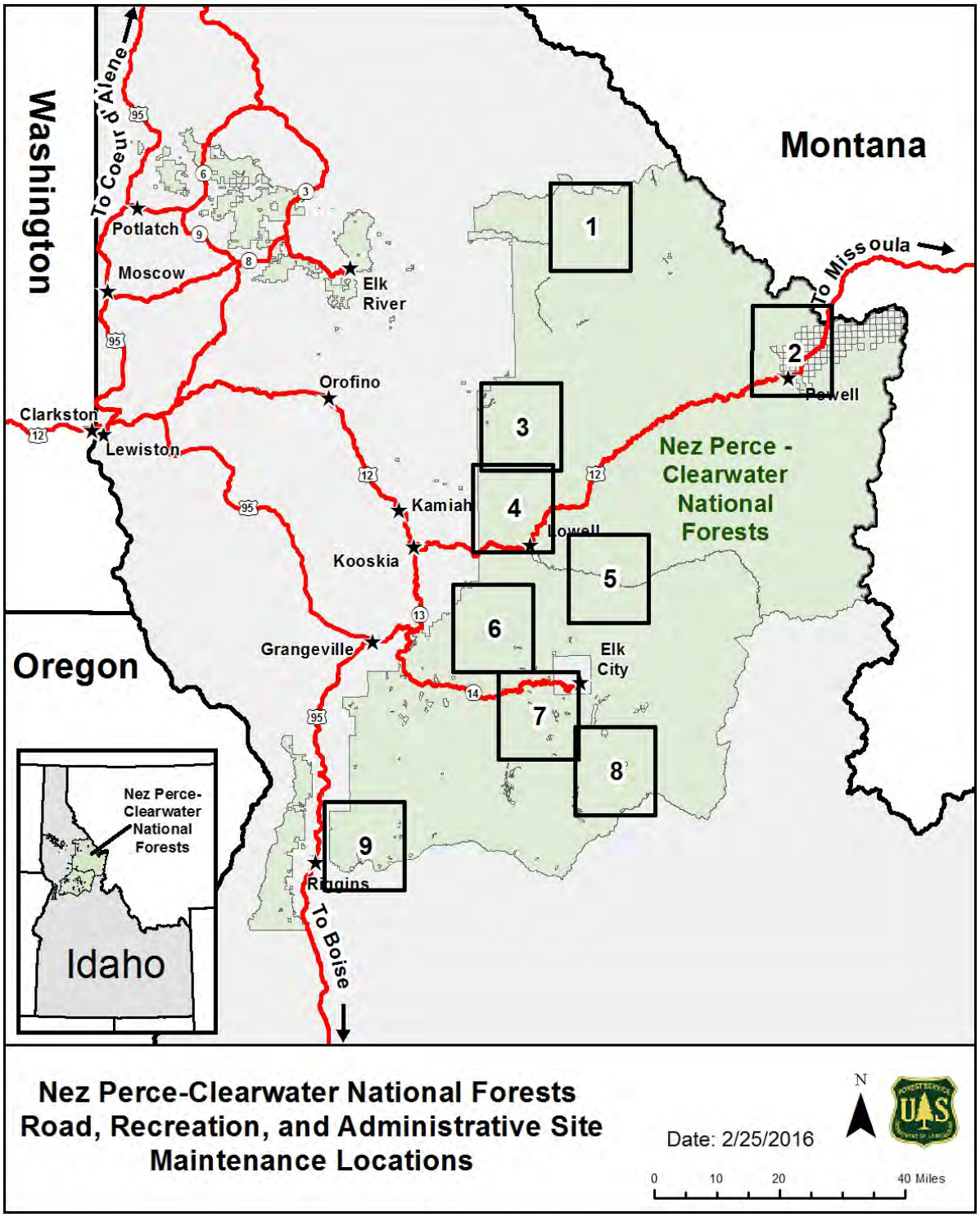

Figure M-1. Vicinity Map.

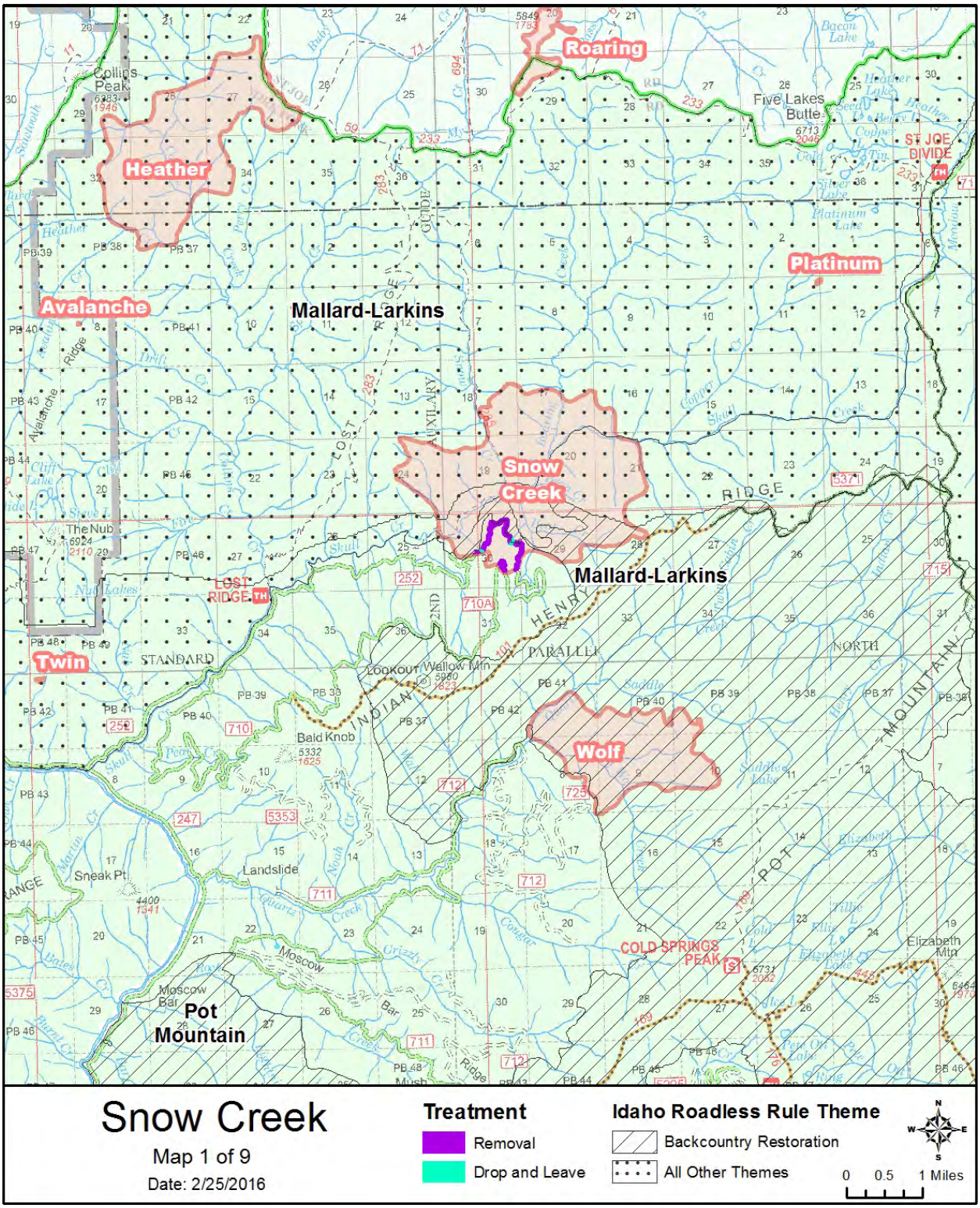

Figure M-2. Snow Creek Fire Area.

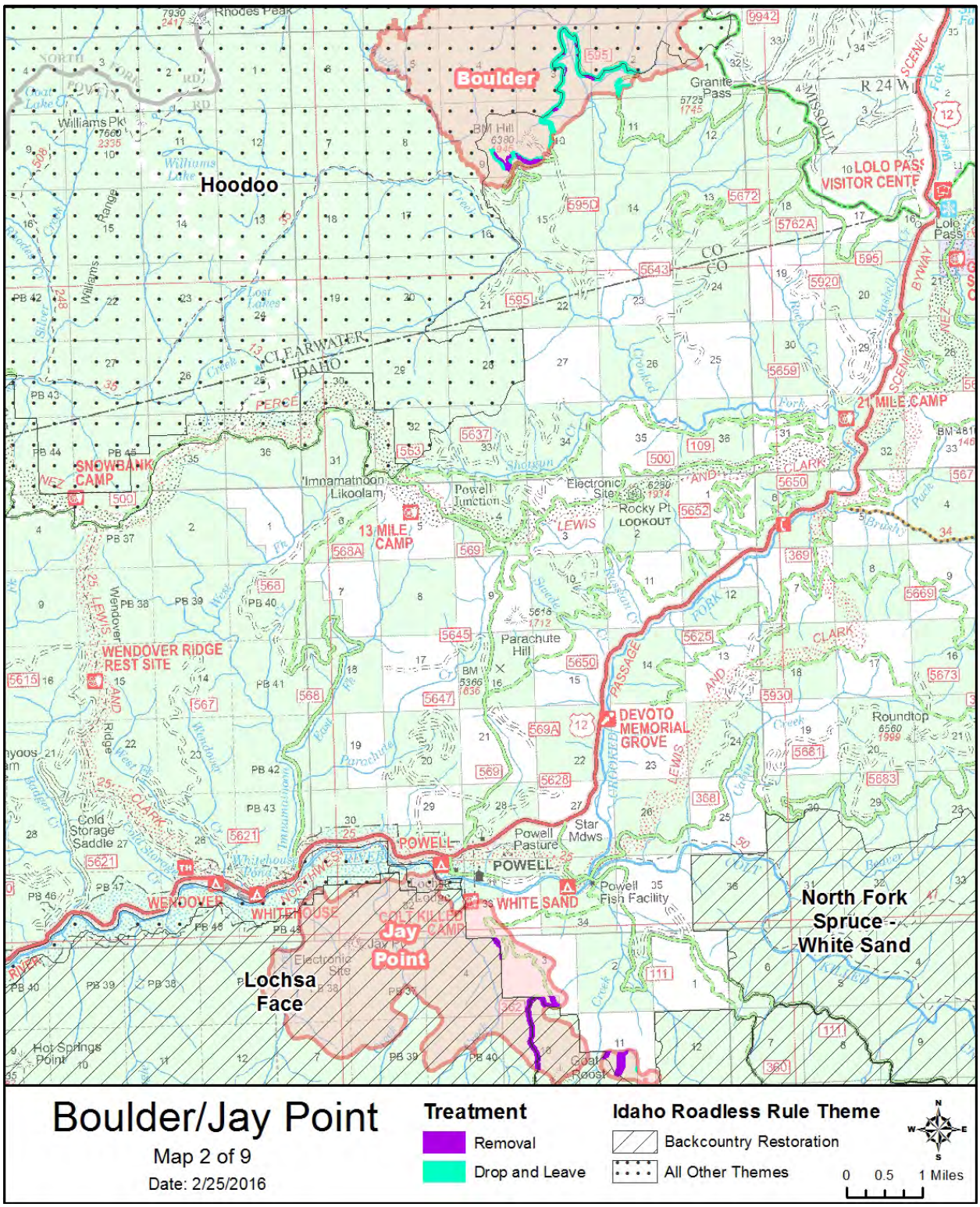

Figure M-3. Boulder and Jay Point Fire Areas

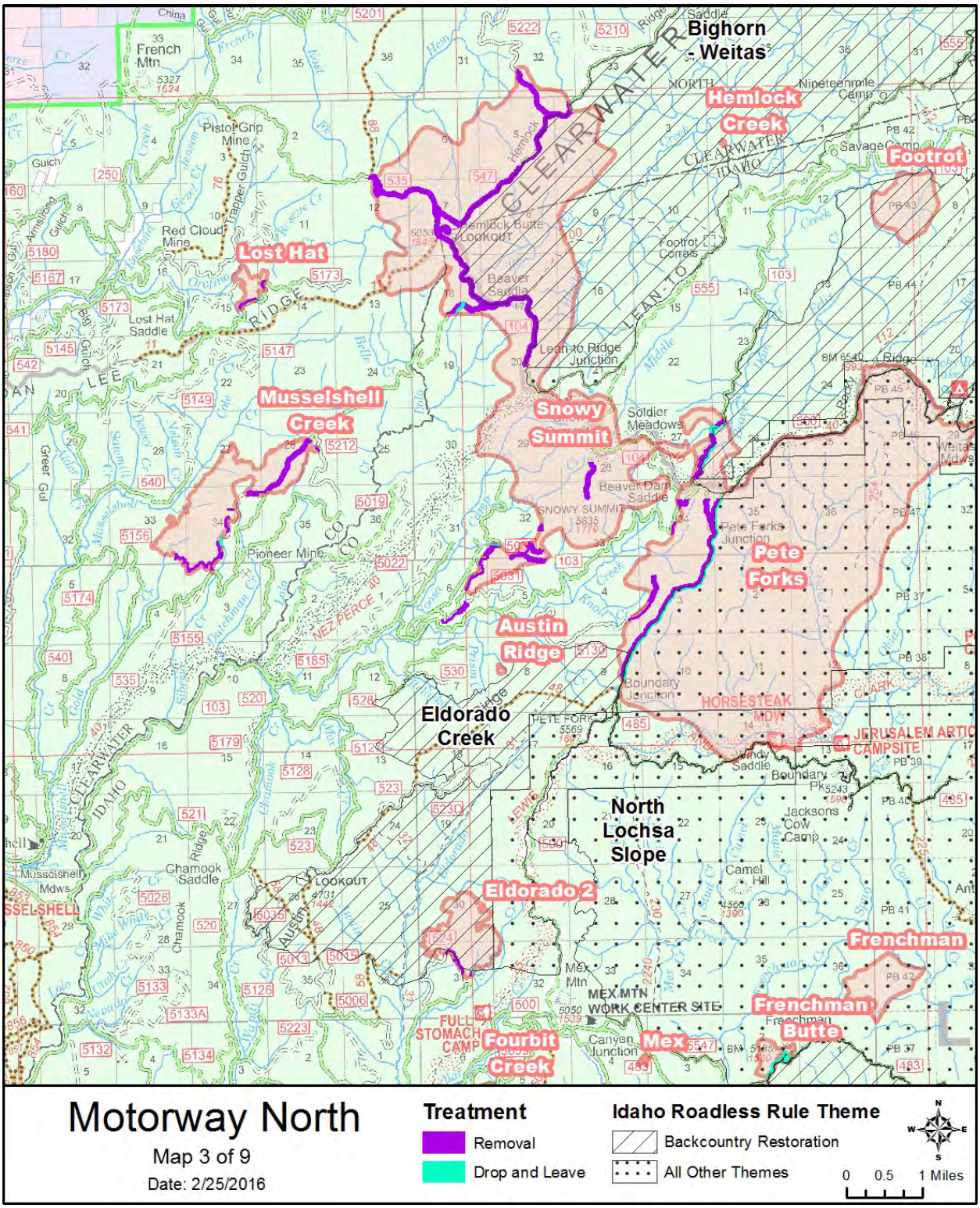

Figure M-4. Motorway North Fire Area.

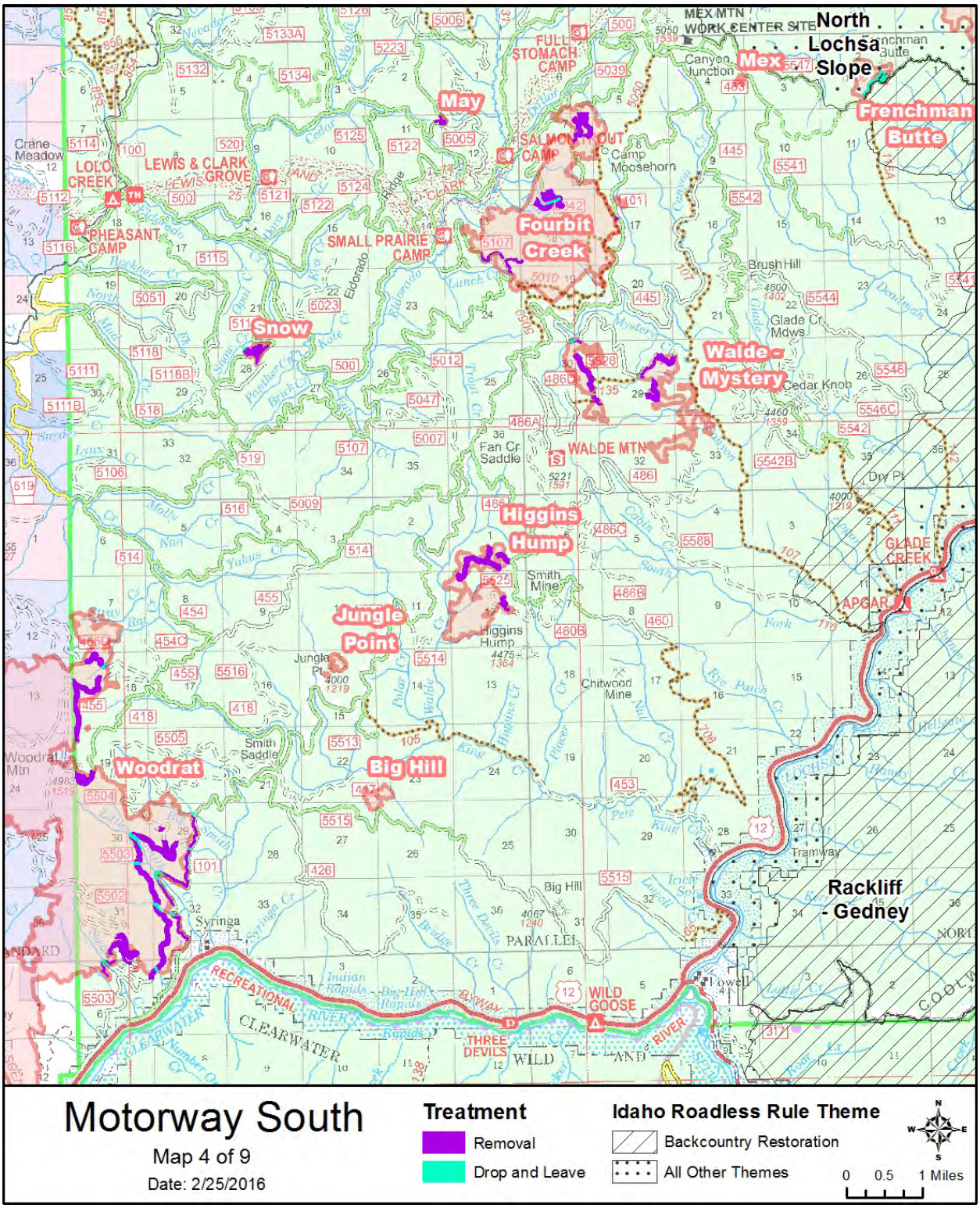

Figure M-5. Motorway South Fire Area.

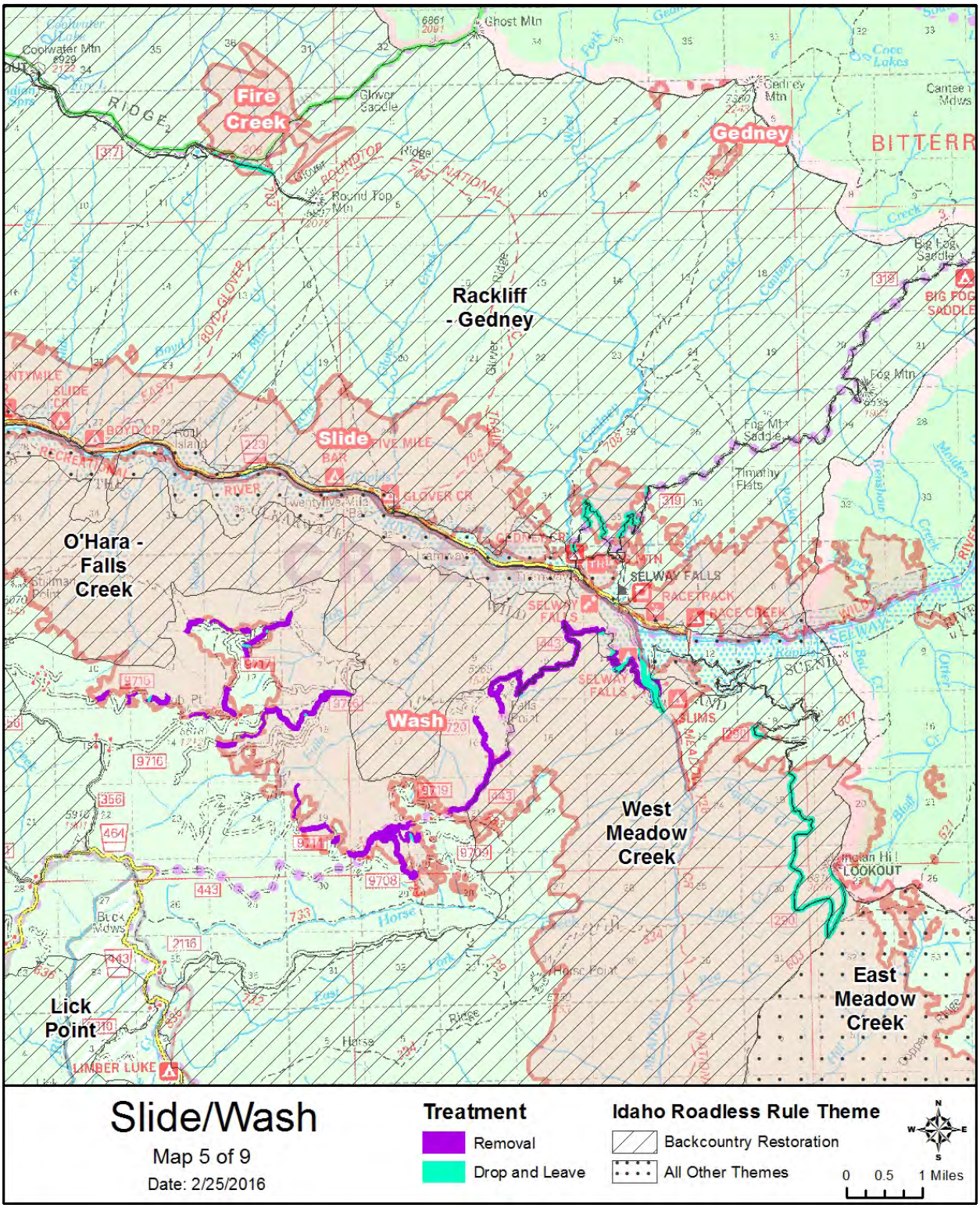

Figure M-6. Slide/Wash Fire Area.

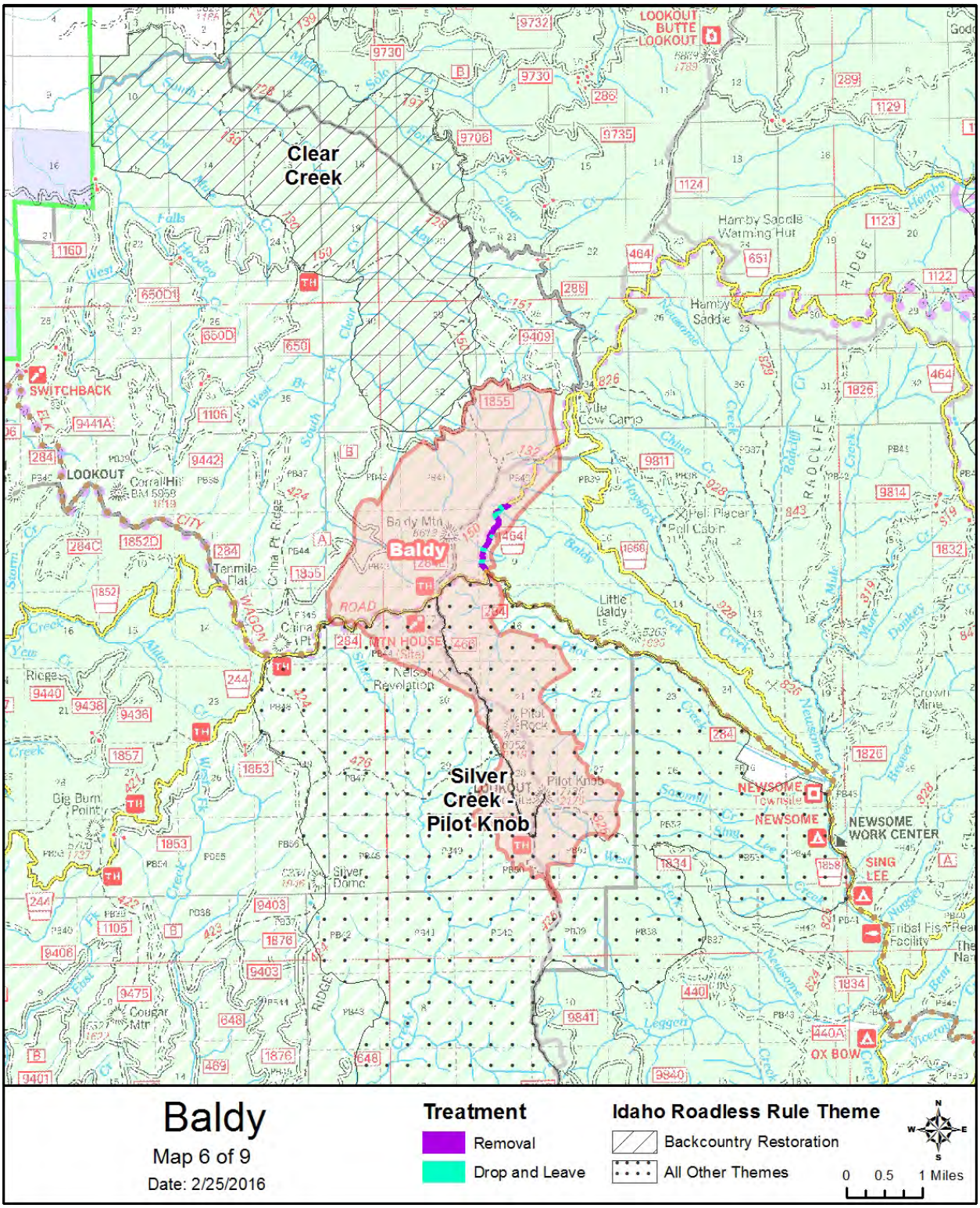

Figure M-7. Baldy Fire Area.

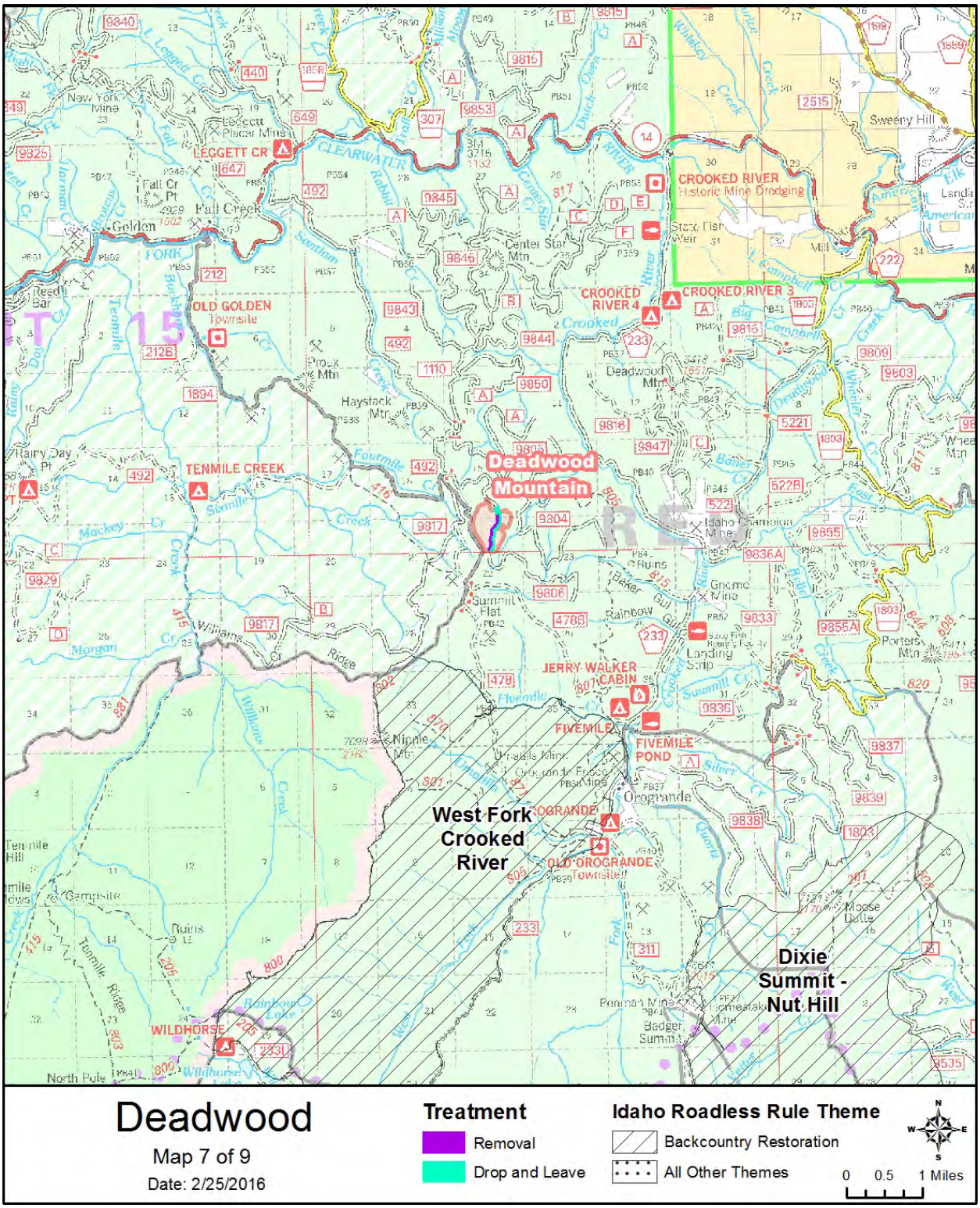

Figure M-8. Deadwood Fire Area.

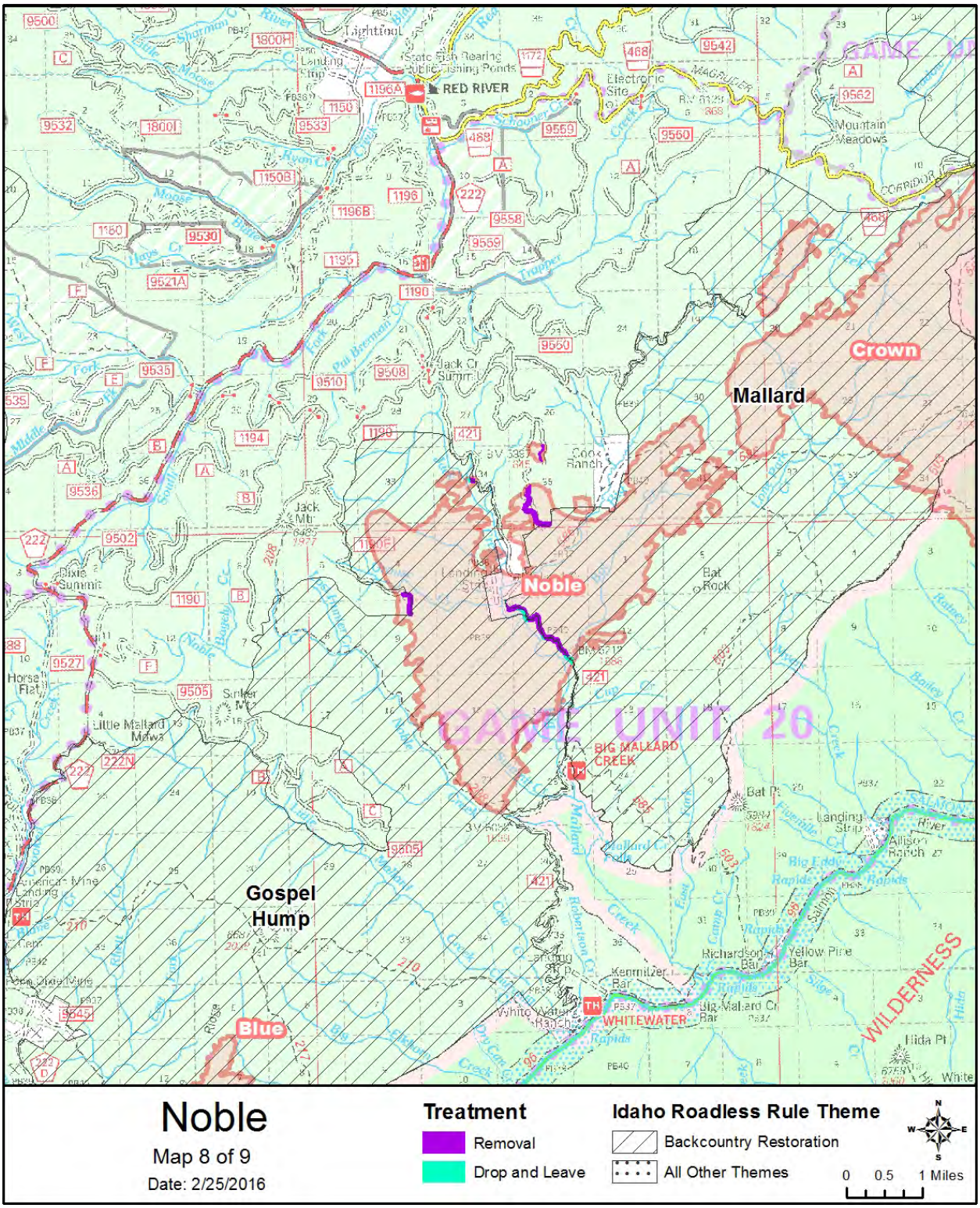

Figure M-9. Noble Fire Area.

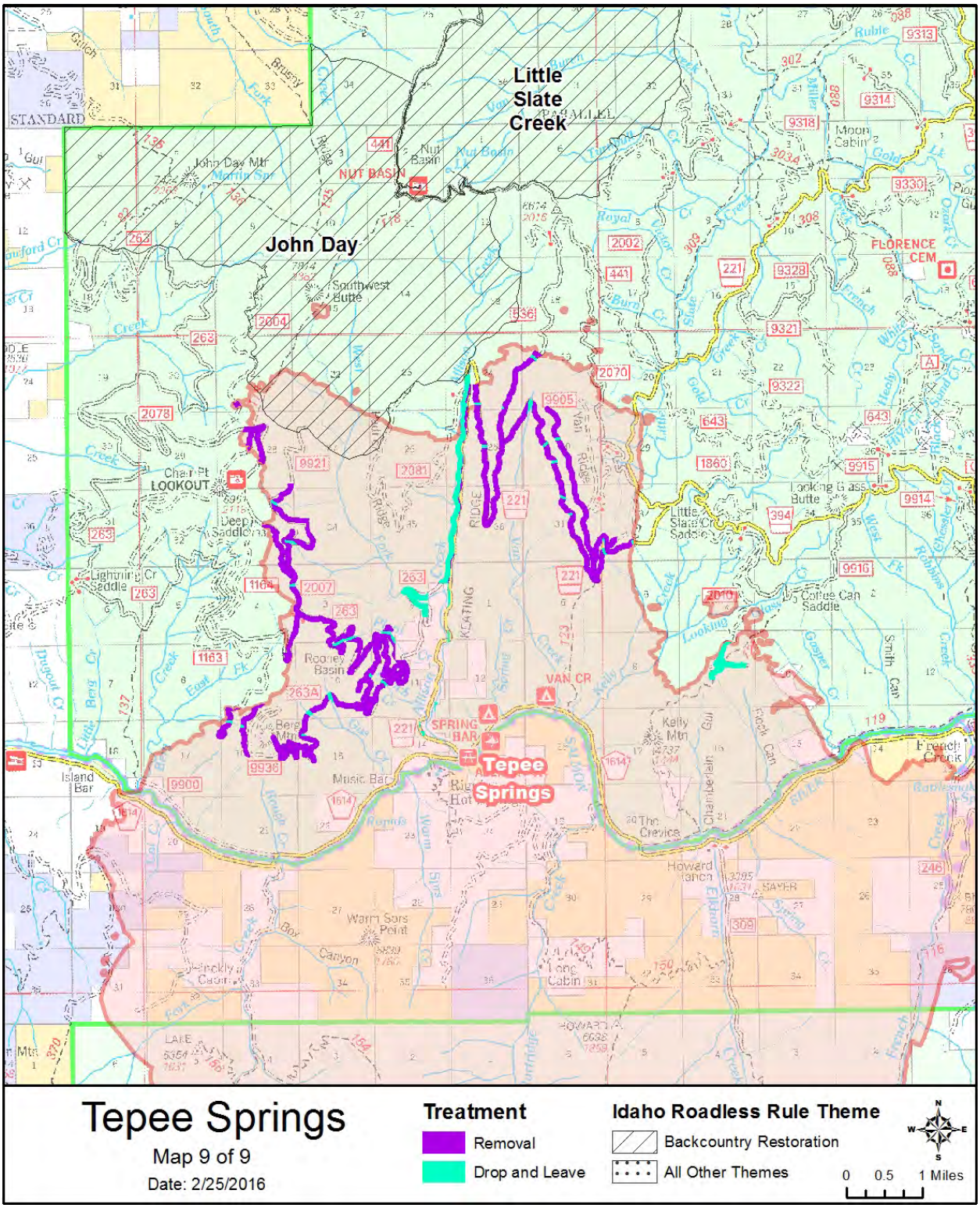

Figure M-10. Teepee Springs Fire Area

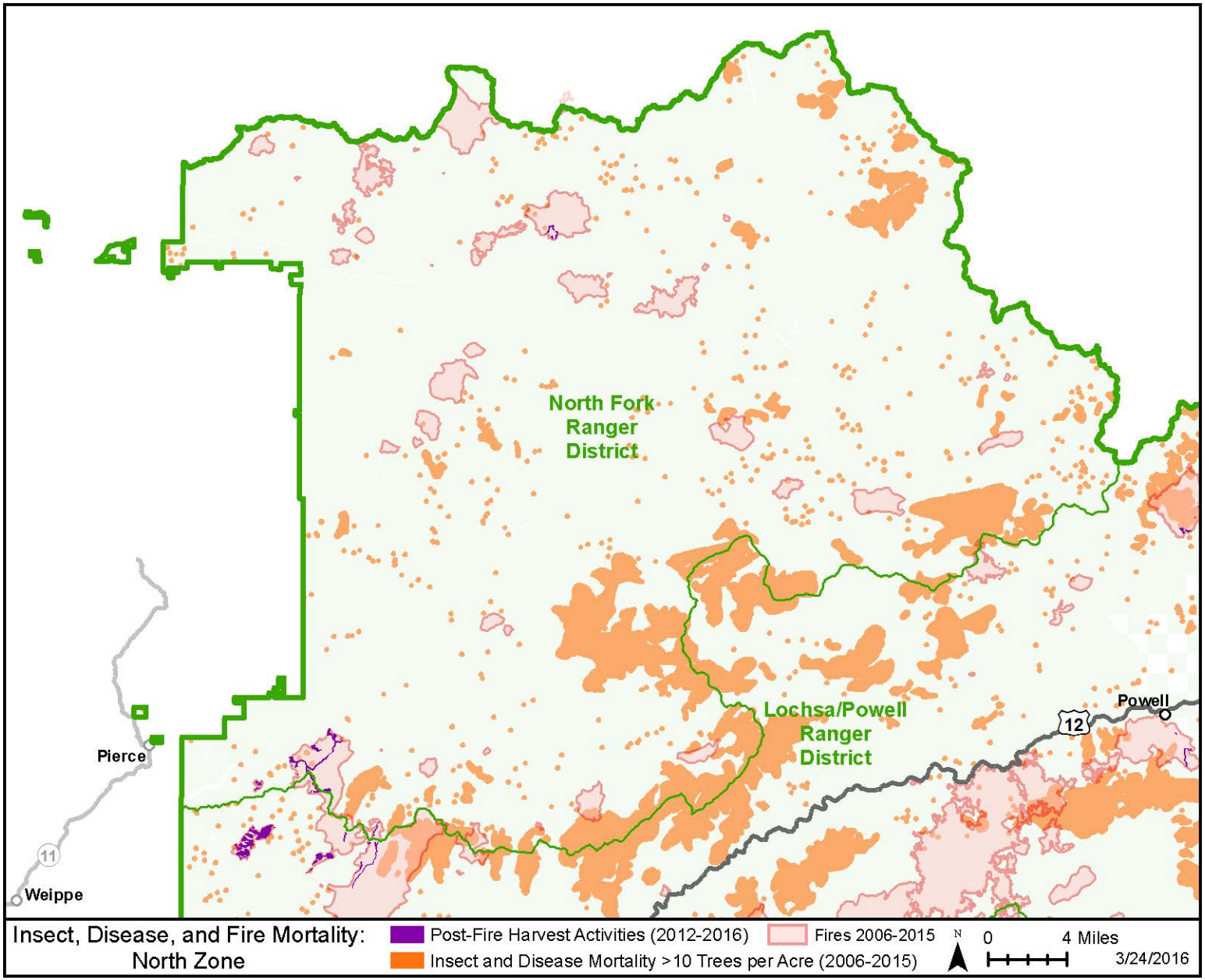

Figure M-11. North Zone Insect, Disease and Fire Mortality

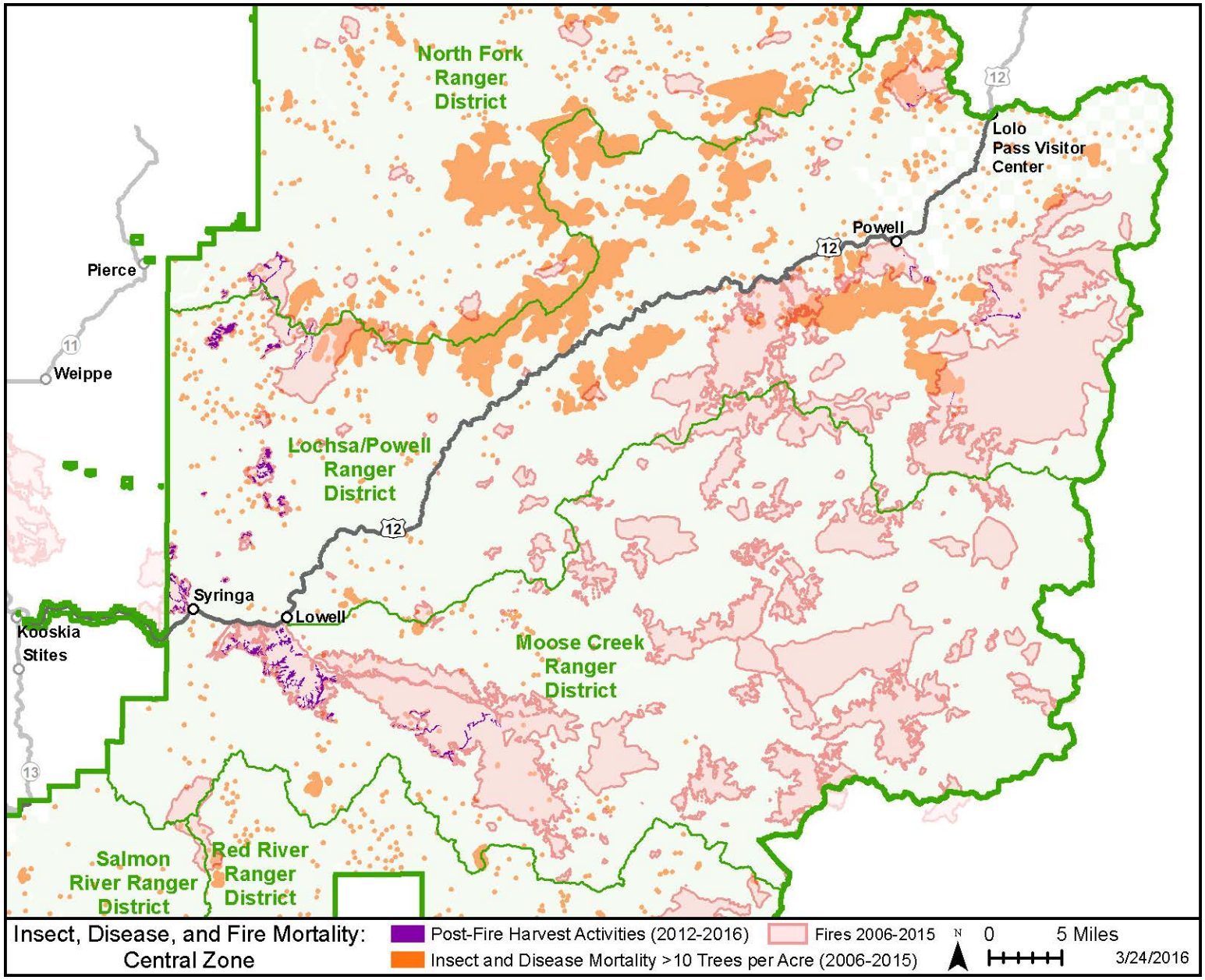

Figure M-12. Central Zone Insect, Disease and Fire Mortality

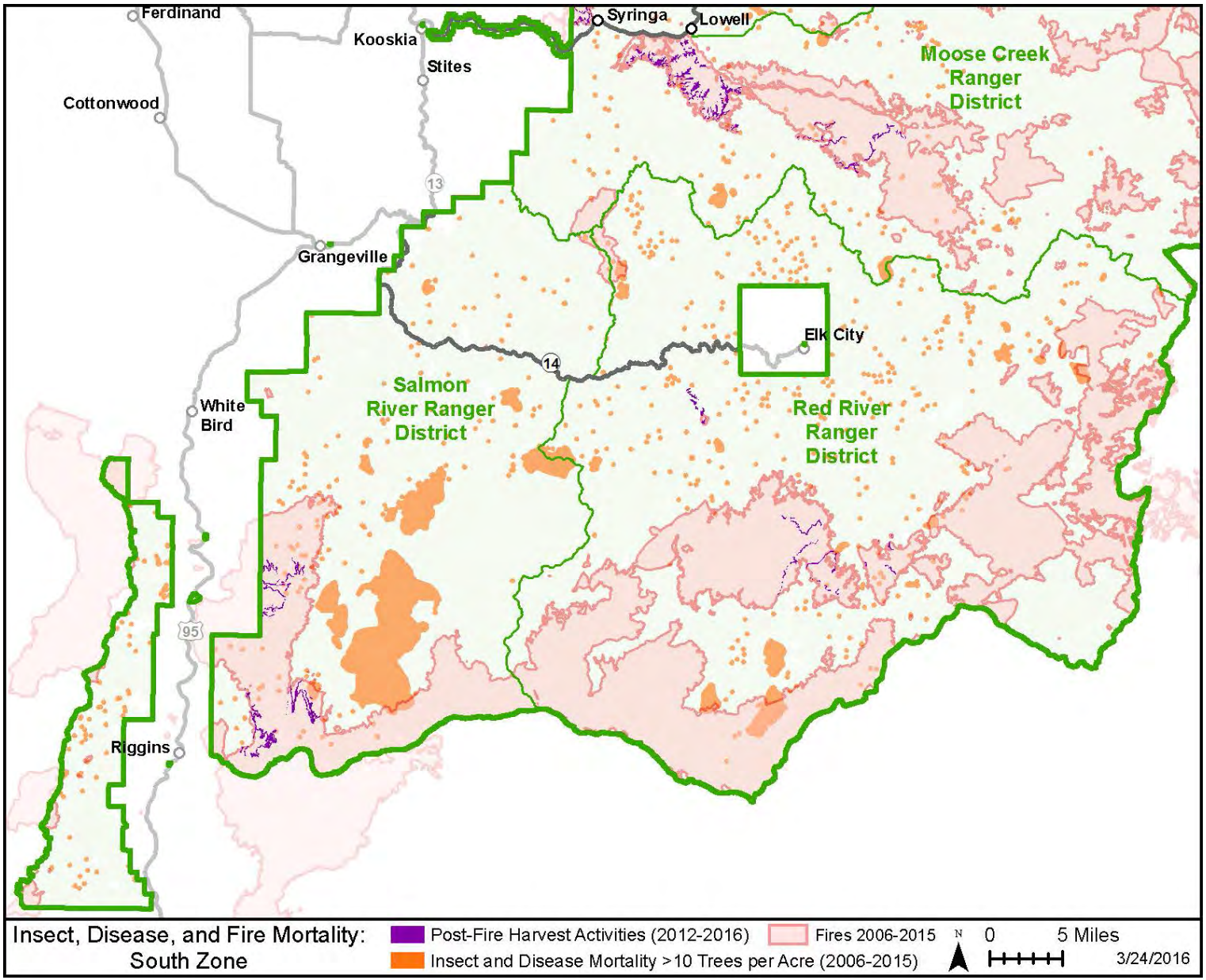

Figure M-13. South Zone Insect, Disease and Fire Mortality

Appendix C. Projects that May Contribute to Cumulative Effects

Past and present actions analyzed under this project for possible cumulative effects include fire suppression, wildfires, past timber harvest, fuels reduction, timber stand improvements, grazing, special uses, and travel management. Most of the fire areas considered under this proposal have experienced commercial harvest in the past 20 years, but there is almost no overlap between past harvest areas and proposed hazard tree removal corridors.

Table 1 lists specific reasonably foreseeable future projects that the Forests plan to implement in the cumulative effects analysis areas over the next several years. Past, present, and reasonably foreseeable future actions associated with this project are analyzed individually and collectively in Chapter 3 under the relevant resource sections of this EA (see 36 CFR 220.4(f).

Appendix Table 1. Reasonably Foreseeable Projects Analyzed for Potential Cumulative Effects.

Fire Name	Project Name	Type of Project & Miles/Acres	Proposed Timeline	Road Access/Haul Routes coinciding in Time
Big Hill	Big Hill	Fire Salvage (47 acres)	2016-2017	426 to 101 to Hwy 12 toward Kamiah
Boulder	Boulder Roadside, Admin/Rec Site	Roadside Maintenance (6.8 miles); Roadside Drop & Leave (4.95 miles); Roadside Commercial Removal (1.86 miles) Trail Maintenance (4.65 miles)	2016-2017	595 to Hwy 12 to MT
Boulder	Boulder	Fire Salvage 59 acres	2016-2017	595 to Hwy 12 to MT
Boulder	Powell Divide	Timber sale	2016-2017	595 to Hwy 12 to MT
Boulder	Northside Powell	Timber Sale 4.0 MMBF Regeneration harvest	2018	NA
Lost Hat	Lost Hat Roadside, Admin/Rec Site	Roadside Maintenance 0.41 miles. Roadside Commercial Removal 0.41 miles Trail Maintenance .34 miles	2016-2017	5173 to 542 toward Weippe
Lost Hat	Lost Hat/Snowy Summit	Fire Salvage 46 acres	2016-2017	5173 to 542 toward Weippe
Lost Hat	Musselshell Decks	Sale of logs decked as a result of fireline construction: 1 Load	Finish June 2016	5170 to 5173 to 250
Snowy Summit (Includes Yoosa Fire)	Snowy Summit Roadside, Admin/Rec Site	Roadside Maintenance 12.80 miles; Roadside Drop & Leave 0.21 miles; Roadside Commercial Removal 12.58 miles Trail Maintenance 6.34 miles	2016-2017	Split Haul: 547 to 250 or 535 to 100
Snowy Summit	Lost Hat/Snowy Summit	Fire Salvage 238 acres	2016-2017	Split Haul: 547 to 250 or 535 to 100
Snowy Summit (Includes Yoosa Fire)	French Larch	Regeneration harvest 1,989 ac Commercial thinning 334 ac Precommercial thinning 645 ac Temp Road Construction 10 miles Long Term Road Storage 10 miles Decommissioned Road 9 miles	2019	Rd 547 & 535
Teepee	Teepee Decks	Sale of logs decked as a result of fireline construction: 1.0 MMBF	Current	221
Woodrat	Woodrat Roadside, Admin/Rec Site	Roadside Maintenance 12.01 miles; Roadside Drop & Leave 1.26 miles; Roadside Commercial Removal 10.74 miles	2016-2017	5503 and 101 to Hwy 12

Fire Name	Project Name	Type of Project & Miles/Acres	Proposed Timeline	Road Access/Haul Routes coinciding in Time
Woodrat	Woodrat	Fire Salvage 30 Acres	2016-2017	5503 and 101 to Hwy 12
Woodrat	Woodrat Deck Sale	Sale of logs decked as a result of fireline construction: 45 Loads	June 2016	Rd 101 to Hwy 12
Woodrat	Smith/Swan Deck Sale	Sale of logs decked as a result of fireline construction: 18 Loads	June 2016	Rds 5502 & 5503 to Hwy 12
Woodrat	Lyon's Deck Sale	Sale of logs decked as a result of fireline construction: 1Load	June 2016	Rd 5503 to Hwy 12
NA	Upper Lolo Insect and Disease	Regen harvest, road improvements and decommissioning, meadow restoration	On Hold	NA
NA	Wapiti	Commercial Thin 213 acres	2018	RD 520, 500 & 100
NA	Snowmobile Routes		2010?-Future	RDS: 100, 101,103,104,250,284,362,421,443,468,500,514,519,520,535,547,595,1190, 5173
NA	Musselshell Grazing Allotment	Cattle Grazing	Annual	NA
NA	Yakus- Pete King Allotment	Cattle Grazing	Annual	NA

Appendix D. Aquatics Reference Tables

Appendix Table 2. Threatened, Endangered, and Sensitive Species Summary of Effects.

LATIN NAME	Common Name	Cat.	ALT 1	ALT 2
Oncorhynchus mykiss gairdneri	Snake River steelhead trout	T	NE	NLAA
Oncorhynchus tshawytcha	Snake River spring/ summer Chinook salmon	S(T*)	NI	NLAA, MIIH
Oncorhynchus tshawytcha	Snake River fall Chinook salmon	T	NE	NLAA
Oncorhynchus nerka	Snake River sockeye salmon	E	NE	NE
Salvelinus confluentus	Bull trout	T	NE	NLAA
Oncorhynchus clarki lewisi	Westslope cutthroat trout	S	NI	MIIH
Oncorhynchus mykiss gairdneri (landlocked)	Redband trout	S	NI	MIIH
Lampetra tridentata	Pacific lamprey	S	NI	MIIH
Margatifera falcate	Western pearlshell mussel	S	NI	MIIH

Federally listed (Threatened -- T, Endangered -- E) Species Determination: NE = No Effect; NLAA = Not likely to adversely affect; LAA = Likely to adversely affect, NLJE = Not Likely to Jeopardize the Continued Existence.

Sensitive (S) Species Determination: NI = No Impact; BI = Beneficial Impact; MIIH = May impact individuals or habitat but not likely to cause trend toward federal listing or reduce viability for the population or species; LI = Likely to impact individuals or habitat with the consequence that the action may contribute towards federal listing or result in reduced viability for the population or species.

*Spring/summer Chinook salmon are Sensitive in most of the project area, but are ESA-listed as Threatened in the Salmon River drainage

Appendix Table 3. Proposed project subwatersheds by subbasin, ESA effects category, 2015 fire perimeter acreage, and project activity acreage.

Subwatershed name cells highlighted in green include no ESA-listed fish critical habitat (CH); subwatershed name cells highlighted in yellow include CH, project activity areas would not be within 1,000 feet; subwatershed name cells highlighted in orange include CH, and non-paved timber haul routes would be within 1,000 of some of that CH; and subwatershed name cells highlighted in pink include project activity areas within 1,000 feet of CH. Percentage figures colored yellow or red identify subwatersheds where wildfire acreage or project activity areas are notable.

Subbasin	Subwatershed	Total HUC6 Acres	Acres w/in 2015 Fires	%	Proposed Cut & Remove	%	Proposed Cut & Leave	%
Lower Salmon	Allison Creek	12900	7122	55	707	5.48	210	1.63
	Berg Creek-Salmon River	18722	8723	47	242	1.29	11	<1
	Fiddle Creek-Salmon River	24694	76	<1	10	<1	-	-
	Kelly Creek-Salmon River	24436	12663	52	366	1.50	65	<1
Middle Salmon-Chamberlain	Big Mallard Creek	36531	10602	29	122	<1	14	<1
SF Clearwater	EF American	11396	-	-	-	-	-	-
	Elk Creek	16309	-	-	-	-	-	-
	Leggett-SFCR	15380	-	-	-	-	-	-
	Lower American	15615	-	-	-	-	-	-
	Lower Crooked River	16979	116	1	12	<1	19	<1
	Lower Newsome Creek	18048	367	2	-	-	-	-
	Lower Red River	23923	-	-	-	-	-	-
	Middle Red River	23120	-	-	-	-	-	-
	SF Red River	24139	-	-	-	-	-	-
	Upper Red River	32001	-	-	-	-	-	-
	Upper American	15259	-	-	-	-	-	-
	Upper Newsome Creek	24522	2410	10	37	<1	15	<1
	Whiskey-SFCR	14556	-	-	-	-	-	-
Selway	Gedney Creek	30836	1017	3	-	-	88	<1
	Glover Creek-Selway River	29031	16948	58	445	1.53	9	<1
	Horse Creek	9622	1164	12	118	1.23	3	<1
	Lower Meadow Creek	31605	15855	50	159	<1	284	<1
	O'Hara Creek	37899	166	<1	-	-	1	<1
	Otter Creek	10520	399	4	-	-	1	<1
	Pinchot Creek-Selway River	31841	2219	7	-	-	3	<1
	Rackliff Creek-Selway River	17873	5888	33	-	-	28	<1

Appendix Table 3, continued.

MF Clearwater	Big Smith Creek-MF Clearwater R	28891	2580	9	296	1.02	29	<1
	Maggie Creek	16831	1148	7	<1	<1	-	-
	South Fork Clear Creek	16536	2642	16	<1	<1	-	-
Lochsa	Boulder Creek-Crooked Fork	16032	1463	9	37	<1	23	<1
	Canyon Creek	12583	366	3	87	<1	3	<1
	Deadman Creek	12716	5	<1	1	<1	6	<1
	Hungery Creek	22687	7426	33	7	<1	36	<1
	Lower Colt Killed Creek	21055	0	-	-	-	-	-
	Lower Crooked Fork Creek	21097	0	-	-	-	-	-
	Pete King Creek	17630	406	2	87	<1	-	-
	Upper Crooked Fork Creek	19449	3536	18	9	<1	184	1
	Upper Fish Creek	23251	362	2	1	<1	9	<1
	Walton Creek-Lochsa River	18820	3434	18	105	<1	1	<1
Clearwater	Eldorado Creek	27214	1954	7	148	<1	8	<1
	Middle Lolo Creek	29520	293	1	53	<1	2	<1
	Musselshell Creek	35354	696	2	49	<1	-	-
	Upper Lolo Creek	26831	3620	13	407	1.52	38	<1
	Upper Orofino Creek	27960	525	2	88	<1	1	<1
UNF Clearwater	French Creek	16886	1347	8	119	<1	-	-
	Hemlock Creek	21431	2220	10	110	<1	-	-
	Middle Creek	15250	1597	10	34	<1	16	<1
	Lower Skull Ck	17510	832	5	84	<1	5	<1
	Sneak Creek-North Fork Clearwater River	20382	2	<1	-	-	-	-

Appendix Table 4. Proposed project subwatersheds by ESA effects category, subbasin, 2015 fire perimeter proportion of subwatershed, and project activity proportion acreage.

Also displayed is distance of nearest project activity area to steelhead or bull trout designated CH or known occupancy, both by aerial kilometers and stream channel kilometers (N/A = project activities do not intersect with any NHD-drawn stream channels). Final column discloses whether any of the proposed project activities (except log haul) is proposed within any National Hydrography Database (NHD) RHCA. Percentage figures colored yellow or red identify subwatersheds where wildfire acreage or project activity areas are notable.

Subbasin	Subwatershed	2015 Fire Perimeter%	Proposed Cut & Remove %	Proposed Cut & Leave %	Aerial Dst Distance to CH/fish (km)	Stream Distance to CH/fish (km)	Any non-haul activity w/in RHCA?
Clearwater	Upper Orofino Creek	2	<1	<1	39	>39	Y
M Salmon-Chamberlain	Big Mallard Creek	29	<1	<1	7	>7	Y
Selway	Horse Creek	12	1.23	<1	5	>5	Y
UNF Clearwater	French Creek	8	<1	-	8	>8	N
UNF Clearwater	Hemlock Creek	10	<1	-	13	>13	N
UNF Clearwater	Middle Creek	10	<1	<1	14	>14	Y
Clearwater	Middle Lolo Creek	1	<1	<1	3	4.6	Y
Lochsa	Boulder Creek-Crooked Fk	9	<1	<1	1	n/a	N
Lochsa	Canyon Creek	3	<1	<1	3	7.3	Y
Lochsa	Deadman Creek	<1	<1	<1	5	n/a	N
Lochsa	Hungery Creek	33	<1	<1	0.2*	n/a	N
Lochsa	Pete King Creek	2	<1	-	2	n/a	N
Lochsa	Upper Fish Creek	2	<1	<1	2	n/a	N
Lower Salmon	Berg Creek-Salmon River	47	1.29	<1	1	1.3	Y
Lower Salmon	Fiddle Creek-Salmon R	<1	<1	-	3	n/a	N
Lower Salmon	Kelly Creek-Salmon River	52	1.50	<1	2	4.6	Y
MF Clearwater	Maggie Creek	7	<1	-	2	n/a	N
MF Clearwater	South Fork Clear Creek	16	<1	-	3	n/a	N
Selway	Glover Creek-Selway River	58	1.53	<1	2	3.1	Y
Selway	Otter Creek	4	-	-	5	n/a	N
Selway	Pinchot Creek-Selway R	7	-	<1	2	n/a	N
Selway	Rackliff Creek-Selway R	33	-	<1	6	n/a	N
SF Clearwater	Lower Crooked River	1	<1	<1	2	n/a	N

Appendix Table 4, continued.

Subbasin	Subwatershed	2015 Fire Perimeter%	Proposed Cut & Remove %	Proposed Cut & Leave %	Aerial Dst Distance to CH/fish (km)	Stream Distance to CH/fish (km)	Any non-haul activity w/in RHCA?
Clearwater	Eldorado Creek	7	<1	<1	0	0	Y
Clearwater	Musselshell Creek	2	<1	-	0	0	Y
Lochsa	Lower Colt Killed Creek	-	-	-	0	0	N
Lochsa	Lower Crooked Fork Creek	-	-	-	0	0	N
MF Clearwater	Big Smith Creek-MFCR	9	1.02	<1	0.1	0.1	Y
SF Clearwater	EF American	-	-	-	3	3.5	N
SF Clearwater	Elk Creek	-	-	-	0.4	0.6	N
SF Clearwater	Leggett-SFCR	-	-	-	0	0	Y
SF Clearwater	Lower American	-	-	-	0.1	n/a	N
SF Clearwater	Lower Newsome Creek	2	-	-	0	0	N
SF Clearwater	Lower Red River	-	-	-	0	0	N
SF Clearwater	Middle Red River	-	-	-	0.1	0.1	N
SF Clearwater	SF Red River	-	-	-	0	0	N
SF Clearwater	Upper Red River	-	-	-	0	0	N
SF Clearwater	Upper American	-	-	-	0	0	N
SF Clearwater	Whiskey-SFCR	-	-	-	0	0	N
UNF Clearwater	Lower Skull Ck	5	<1	<1	0	0	Y
UNF Clearwater	Sneak Creek-North Fork Clearwater River	<1	-	-	0.05	0.05	N
Clearwater	Upper Lolo Creek	13	1.52	<1	0.18	0.74	Y
Lochsa	Upper Crooked Fork Creek	18	<1	1	0	0	Y
Lochsa	Walton Creek-Lochsa R	18	<1	<1	0.12	n/a	N
Lower Salmon	Allison Creek	**55**	**5.48**	**1.63**	0	0	Y
Selway	Gedney Creek	3	-	<1	0.15	0.45	Y
Selway	Lower Meadow Creek	50	<1	1	0	0	Y
Selway	O'Hara Creek	<1	-	<1	0	0	Y
SF Clearwater	Upper Newsome Creek	10	<1	<1	0	0	Y

Appendix Table 5. ESA-listed fish or designated Critical Habitat presence in project subwatersheds and directly adjacent to project hazard tree treatments[1].

V. EXISTING CONDITION			Within HUC 6				Within Activity Areas		
Subbasin	**Subwatershed**	**Fire Names**	**Bull Trout Presence/CH**	**Steelhead Presence/CH**	**ESA Chinook, Sockeye Salmon Presence/CH**		**Bull Trout Presence/CH**	**Steelhead Presence/CH**	**ESA Chinook, Sockeye Salmon Presence/CH**
Lower Salmon	Allison Creek	Tepee Springs	N	Y	N**		N	Y	N
	Berg Creek-Salmon River	Tepee Springs	FMO*	Y	Y*		N	N	N
	Fiddle Creek-Salmon River	Tepee Springs	FMO*	Y	Y*		N	N	N
	Kelly Creek-Salmon River	Tepee Springs	FMO*	Y	Y*		N	N	N
Middle Salmon-Chamberlain	Big Mallard Creek	Noble	N	N	N		N	N	N
SF Clearwater	Lower Crooked River	Deadwood Mountain	SR, FMO	Y	N		N	N	N
	Upper Newsome Creek	Baldy	SR, FMO	Y	N		SR	N	N
Selway	Gedney Creek	Slide, Fire	SR, FMO	Y	N		N	N**	N
	Glover Creek-Selway River	Slide, Wash	FMO*	Y*	N		N	N	N
	Horse Creek	Wash	N	N	N		N	N	N
	Lower Meadow Creek	Slide, Wash	FMO	Y	N		FMO	Y	N
	O'Hara Creek	Wash	FMO	Y	N		FMO	Y	N
	Otter Creek	Wash	N	Y	N		N	N	N
	Pinchot Creek-Selway River	Slide, Wash	FMO*	Y	N		N	N	N
	Rackliff Creek-Selway R	Fire Creek, Slide, Wash	FMO*	Y	N		N	N	N
MF Clearwater	Big Smith Creek-Middle Fork Clearwater River	Woodrat	FMO*	Y	N		N	N**	N
	Maggie Creek	Woodrat	N	Y	N		N	N	N
	South Fork Clear Creek	Baldy	N	Y	N		N	N	N

[1]Subwatersheds for which the only activity is haul on paved or well-maintained gravel roads should have little to no potential to affect ESA-listed individuals or CH or essential fish habitat, and are not included in this table.

*Designated Critical Habitat Present only in mainstem river and substantial distance from activity areas

**Critical Habitat not designated in subwatershed or activity area, but presence of a few individuals cannot be ruled out with existing data

Appendix Table 5, continued.

EXISTING CONDITION	Within HUC 6		Within HUC 6				Within Activity Areas		
Subbasin	Subwatershed	Fire Names	Bull Trout Presence/CH	Steelhead Presence/CH	ESA Chinook, Sockeye Salmon Presence/CH		Bull Trout Presence/CH	Steelhead Presence/CH	ESA Chinook, Sockeye Salmon Presence/CH
Lochsa	Boulder Creek-Crooked Fork Creek	Boulder	SR	Y	N		N	N	N
	Canyon Creek	Fourbit Ck, Walde-Mystery	N	Y	N		N	N**	N
	Deadman Creek	Frenchman Butte	N	Y	N		N	N	N
	Hungery Creek	Green, Pete Forks	SR	Y	N		N	N	N
	Pete King Creek	Higgins Hump, Woodrat	N	Y	N		N	N	N
	Upper Crooked Fork Creek	Boulder	SR	Y	N		SR	N	N
	Upper Fish Creek	Frenchman Butte	SR	Y	N		N	N	N
	Walton Creek-Lochsa River	Jay Point	SR, FMO*	Y	N		N	N	N
Clearwater	Eldorado Creek	May, Eldorado 2, Fourbit Ck, Snow	N	Y	N		N	N	N
	Middle Lolo Creek	Woodrat	N	Y	N		N	N	N
	Musselshell Creek	Musselshell Ck	N	Y	N		N	N	N
	Upper Lolo Creek	Austin Rdg, Musselshell Ck, Pete Forks, Snowy Summit	N	Y	N		N	N	N
	Upper Orofino Creek	Lost Hat, Snowy Summit	N	N	N		N	N	N
UNF Clearwater	French Creek	Snowy Summit	N	N	N		N	N	N
	Hemlock Creek	Snowy Summit	N	N	N		N	N	N
	Middle Creek	Pete Forks, Snowy Summit	N	N	N		N	N	N
	Lower Skull Creek	Snow Creek	SR	N	N		N	N	N

[1]Subwatersheds for which the only activity is haul on paved or well-maintained gravel roads should have little to no potential to affect ESA-listed individuals or CH or essential fish habitat, and are not included in this table.

*Designated Critical Habitat Present only in mainstem river and substantial distance from activity areas

**Critical Habitat not designated in subwatershed or activity area, but presence of a few individuals cannot be ruled out with existing data

Appendix E. Response to Comments

Road, Administrative and Recreation Site Maintenance Project Response to Comments

Comments that were received for the Road, Administrative and Recreation Site Maintenance Project are summarized below, with bulleted example statements, followed by the Interdisciplinary Team's responses.

Much of the literature cited by commenters addresses a variety of resources, topics, or issues. The Interdisciplinary Team (IDT) considered the general principles and recommendations in the cited literature. Some articles and reports were not applicable to these projects. Others provided general or background information and were consistent with the project analysis. Some articles provided opposing views to the proposed project, and are discussed following the comment responses below.

Comment Topics:

1. PUBLIC INVOLVEMENT AND PUBLIC PARTICIPATION IN THE PLANNING PROCESS

- The public was not given enough opportunity to make meaningful comments on the proposed project and analysis. The potential elimination of the objection process and not making a final EA available for comment has limited the public involvement opportunities.
- The effects of the project have not been adequately described.
- The scope of the project is sufficiently large to warrant additional consideration and public review.

Response:

Public participation formally began in December 2015 with scoping of the project. At that time the project was being scoped as a categorical exclusion. Scoping notices were mailed to the Forests mailing lists and posted on the website under the Schedule of Proposed Actions (SOPA). The project was revamped in response to public comment received during this time period and the project transitioned to an Environmental Assessment. A 30 day notice and comment period on the proposed action began with the publication of a legal notice in the newspaper of record on March 29th, 2016. The proposed action document for comment included details regarding the proposed action and a summary of anticipated environmental impacts to allow the public meaningful opportunity to comment. As a result of this comment period, six comments totaling 41 pages (excluding appendices) of detailed comments were received. Those comments, which are responded to here, helped to shape this final environmental assessment and decision.

In addition to the request for written comment during the initial CE scoping and the EA 30-day comment periods, Nez Perce Clearwater Forests employees engaged in numerous conversations with dozens of groups, agencies and individuals since the project planning began. Forest personnel gave formal presentations and had individual conversations with Nez Perce Tribal staff and the Nez Perce Tribe Executive Council, Idaho County Commissioners, Clearwater County Commissioners, Grangeville City Council, representatives of the Idaho congressional delegation, the Governor's Idaho Roadless Commission, Clearwater Basin Collaborative working group, Clearwater Basin Collaborative landscape health and recreation subcommittees, Idaho Department of Fish and Game, Rocky Mountain Elk Foundation, Wild Turkey Federation, Trout Unlimited, Friends of the Clearwater, Idaho Conservation League and many others, as documented in the project record. The Forests also responded to one Freedom of Information Act request.

In response to requests for additional review of the draft environmental assessment and a more in-depth effects analysis, the Forests posted an early draft of the EA to the Forests' website on May 3, 2016. Emails were sent to all interested parties that previously responded either to the scoping notice or the EA comment period, notifying them of the availability of the document on the public website. The Forests specifically requested feedback relating to areas where commenters might feel the documentation did not support analysis conclusions or places where relevant information was overlooked. While no comment period was specified, the e-mail indicated that if commenters wanted to provide additional information or comment, it would be most helpful to have that information by May 11th, 2016. The draft EA remained on the public website and comments were accepted up until the time a decision is ready to be made.

The Nez Perce-Clearwater Forests supervisor requested an Emergency Situation Determination (ESD) in order to respond to the time sensitive urgency of the project, as provided for in 36 CFR 218.21. The Chief of the Forest Service agreed this project met the requirements of an ESD and that expediency was critical to successful implementation of the project.

2. SCOPE AND SCALE OF THE PROJECT

- The proposed extent and width of treatment is unclear.

- A 200 foot buffer on both sides of roads or recreation sites is too large and arbitrary.
- What is the acreage associated with the administrative and recreation site portions of the project?
- The EA should consider an alternative that only removes hazard trees on the uphill side of the road.

Response:

Language has been added to the EA to clarify the extent and width of treatment. These changes indicate that 200 feet is the maximum treatment area, and the average width in most places would be less. Only trees that meet the criteria listed in Section 2.4.2.1, Nez Perce-Clearwater National Forests Tree Mortality and Hazard Tree Guidelines would be felled. Live, health trees that do not pose a danger people or property would be retained. In general treatment width would be less than 200 feet in areas where there are few trees that meet this criteria, or where slope and other factors indicate the danger to the public would be low.

The Forests believe a 200 foot treatment maximum width is necessary to protect public safety and achieve the purpose and need of the project. Experience with past projects, such as the 2012 Nez Perce Clearwater Roadside Hazard Tree Project on the Salmon River, Red River and Powell ranger districts (which used a 200 foot average treatment width), shows that even after project implementation some trees not fitting the criteria will weaken, die and continue to fall on Forest roads for years to come.

Generally, hazard trees meeting the mortality guidelines within one tree length of the road or site would be felled. On the downhill side of steeper slopes, the distance would be reduced to only the distance in which trees would likely impact the road. On the uphill side of steep slopes, the extent may be extended to up two tree lengths (maximum extent 200 feet). The majority of the area would be treated to one tree length. Actual width will be based on the likelihood of a tree becoming a hazard to the road, recreation site or administrative site or users of the road/sites and will be determined during layout and implementation.

The acreage treated under this project will depend on on-site conditions and tree mortality at the time of implementation (summer of 2016). The maximum acreage allowed to be treated under this decision would in theory be the 133 miles of road proposed for treatment times the 400 foot maximum width treatment area (200 feet on either side of the road). Under the prescriptions for Alternative 2, 1,110 acres are proposed for drop and leave, and 3,938 acres are proposed for timber removal. In practice the treated acreage would be much less, because only a portion of the trees within the 200 foot buffer would fall under the mortality and hazard tree guidelines, and thus be felled.

Treatment widths on the downslope side of the roads will in general be less, depending on location, burn severity, and vegetation type. Many burned trees on the downslope side of the road have an uphill lean or overhanging branches and should be felled.

3. SEGMENTATION/ NEPA ANALYSIS

- The interrelated nature of the post-fire projects requires an analysis of all projects in an EIS to avoid segmentation of NEPA.

Response:

Several commenters responded to requests for public input with statements regarding segmentation of NEPA, cumulative impacts, and connected actions. Each of these concerns is examined below, using information provided in the Post Fire Selection Process documentation contained in each project record.

Connected Actions

None of the projects are connected actions, as defined by 40 CFR 1508.25. "Connected actions" are connected if they automatically trigger other actions; cannot or will not proceed unless other actions are taken; and are interdependent parts of a larger action and depend on the larger action for their justification.

The fire recovery CE projects include the Snowy Summit/Lost Hat, Big Hill, Boulder, Deadwood, Van Keating, and Chair Point projects. Each of the proposed CEs EA's and the Roadside, Administrative, and Recreation Site Maintenance project environmental assessment can and would proceed regardless of whether or not the other ones proceed; each individual project is not an interdependent part of a larger action and do not depend upon the larger action for their justification; and each individual project does not automatically trigger other actions. As such each of the individual projects are not "connected actions"; and therefore, do not require analysis in the same NEPA document for this reason.

Segmented Actions

On September 10th and 15th, 2015, a team of staff and resource specialists met and initiated a rapid assessment to help guide the Forests' post-fire recovery and to identify needed restoration activities and salvage opportunities across the Forests from over 250 individual fire events. Core members of this team included hydrologists, a soils scientist, silviculturists, foresters, geographic information specialists, and the Forests' environmental coordinator. Two Forest level staff officers attended these meetings and represented the Forests' leadership. The rapid assessment followed two paths, one to identify salvage opportunities and the other to determine post-fire recovery and restoration needs for road maintenance and hazard tree removal along roads and within administrative and recreation sites for the safety of staff and the visiting public and to maintain access for future fire suppression activities.

The purpose of the rapid assessment salvage strategy was to identify the process and necessary steps for timber salvage opportunities following fires that occur on the forest and to achieve timely decisions, including identification of those opportunities foregone. The process offers a consistent approach across the forest, and recognizes the importance of promptness in the planning and implementation processes.

Phase I of the rapid assessment process was a broad level review (coarse filter) and screening process using sideboards/criteria to identify any obvious negative resource issues within or adjacent to the affected areas. If an area cleared the coarse filter screening process it was brought forward as a salvage opportunity. Subsequently, any potential salvage areas were then looked at through a fine filter for vegetative and landscape characteristics. All sideboards were vetted through the forest supervisor and the team completed the GIS-based screening process and had the results ready to present to the upcoming Forest Leadership Team (FLT) during their September 16, 2015 meeting.

During the course filter assessment, each fire was looked at individually. While many of these fires were a part of one or more fire management complexes during the summer of 2015, they are all individual fires with unique fire effects, coming from different ignitions and are separate in geographic area. All fires have the potential to have unique characteristics, opportunities and potential issues.

On October 6, 2015, the FLT met again and the district rangers presented the information gathered during the fine filter screening process and made recommendations on whether or not to move forward with salvage opportunities within their zones/districts. The recommendations included the appropriate level of NEPA analysis (i.e., CEs including the following categories: 250 acre salvage CEs, Farm Bill CEs, sanitation CEs; EAs, EIS, etc.), potential for grouping fires into a single analysis based upon geographic locations, hydrologic areas, similarity of known or suspected resources issues, or conversely to conduct stand-alone analyses based upon these same criteria. Up until this meeting, each fire was examined individually as an individual event on the Nez Perce-Clearwater National Forests. At this meeting, phase 2 results were discussed and the potential for direct or indirect resource impacts from one project overlapping with direct or indirect resource impacts from another project were taken into account. While most fire areas were distinct geographically and would not have overlapping direct or indirect effects, several project areas were located in similar areas with similar resource concerns and were thus grouped into larger projects.

Four separate interdisciplinary teams (IDTs) were formed and assigned projects (color coded): the Green Team was assigned the Road, Administrative and Recreation Site Maintenance project; the Blue Team was

assigned the Tepee Springs and Deadwood projects; the Red Team was assigned the Boulder, Lost Hat/Snowy Summit, and the Woodrat projects, and the Silver Team was assigned the Upper Lolo project (complex of Yoosa, Four Bit, Musselshell, and Mystery fires). A project initiation letter was given to each of the teams by the responsible official which documented the fires and anticipated level of NEPA analysis for each of the projects.

It was anticipated that the scope and scale of these projects would or could change as more field reconnaissance occurred, additional data was collected, and analyses were conducted. Additional changes that were made to any of the fire salvage projects are addressed and explained in the individual NEPA analysis documents.

Similar Actions

Each of the post-fire projects was developed to respond to an individual fire event or events. Each project looked at actions necessary to meet the purpose and need for that project. Field reconnaissance and analysis was conducted to develop the proposed action for each fire and/or project. Projects that had overlapping direct or indirect effects were grouped together for analysis (i.e. Upper Lolo project). Actions for each of the projects were developed separately and all included the use of the best available scientific information. The use of best available scientific information led to many consistent attributed of the proposed actions. For instance, the scientific and peer reviewed hazard tree guidelines and mortality guidelines were used for each of the projects. Design features that were found in the past to have been successful at reducing negative impacts were brought forward for each of the proposed projects. In addition to these consistencies, however, each project was designed as a unique project and any site-specific modifications needed to best reduce impacts while meeting the purpose and need for action were considered and adopted.

While at first glance there appear to be many similarities between these projects, these similarities are a function of applying best management practices, best available science and design features that have been shown to be successful in the past at reducing impacts. Each project was developed individually and assessed separately starting from individual fire events in distinctly separate geographic areas with different fire ignitions, burn patterns and impacts to resources as a result of the fire itself.

Cumulative Actions

Each of the interdisciplinary teams were directed to analyze all relevant past, present and reasonably foreseeable actions as part of their analysis for cumulative effects (Project Initiation Letters, 2015). Cumulative effects spatial and temporal boundaries were identified by the resource specialists so that impacts which may be insignificant on their own but could be potentially significant impacts when combined with other actions could be properly analyzed. Cumulative effects study areas were determined by looking at where the majority of impacts would occur (in time and space) as documented in the specialist reports. In most cases, a cumulative effects study area that is too large (the entire forest for instance), results in effects that become diluted due to the scale of the analysis. Conversely, a study area that is too narrow may not take into account all the potential interactions of impacts from various projects.

Cumulative analysis was conducted for each of the CE and EA projects and those findings are documented in the NEPA documentation and decision document, if applicable.

Many of the proposed projects were separated by great geographic distances and the post-fire projects did not contribute any cumulative impacts for the majority of resources. Individual fires that were most likely to have cumulative impacts were analyzed as one project from the onset as described in the Post Fire Selection Process.

4. ALTERNATIVES

- The Forest Service should analyze other alternatives to the 200 foot treatment width

- The Forest Service should include an alternative that only removes hazard trees above the road
- The Forest Service should analyze an alternative that decommissions some project area roads
- The Forest Service should analyze an alternative that does not harvest within Idaho Roadless Areas

Response:

Five alternatives considered by the ID team but not analyzed in detail are listed in section 2.3 of this EA. These alternatives were not analyzed because they do not meet the purpose and need for the project as described in the EA, section 2.3.

The 200 foot width and the hazard and mortality guidelines are described above and in EA section 2.4.2.1. These guidelines ae related to the probability of a hazard tree endangering Forest travelers, not the absolute distance from the road. The 200 foot width is the maximum; an alternative with a narrower maximum treatment width would not meet the purpose and need for this project because under the proposed action, trees would only be felled on the outskirts of the buffered area, when they pose a realistic threat to users of the road or the road itself.

Hazard trees below the road pose a threat to the road and users of the road in many circumstances. Hazard trees in very close proximity to the road, below the road but on gentle slopes, or leaning towards the road are several examples. Trees below the road can and do pose a threat to users of Forest roads. In most cases, treatment width on the downhill side of a road will be much narrower than above the road for the reasons described in the commenter's letter. These reasons include steep side slopes making it more likely for trees to fall downhill away from the road, trees leaning away from the road and trees of insufficient height to affect the road.

Decommissioning roads is outside the scope of this project and would not contribute toward meeting the purpose and need for action. Decisions about the Forests' road system will be made under separate NEPA analysis. This travel planning process on the Nez Perce portion of the forest is called DRAMVU (designated routes and areas for motor vehicle use), and is scheduled to be finalized in 2016. A Record of Decision on the Clearwater National Forest Travel Plan has not yet been issued.

The ID team did consider an alternative that excluded felling trees within Idaho roadless areas. This alternative was not carried forward and analyzed because the felled trees would not be removed, leaving hazard trees to endanger travelers on the Forest road not meet the purpose and need of the project. For more information see section 2.3, *Alternatives Considered but not Analyzed in Detail*.

5. HAZARD DEFINITION

- The hazard tree definition is unclear.
- What are the Northern Region Mortality Guidelines?
- Snags persist on the landscape for decades or longer post fire. Why do all snags need to be removed within the project area?
- Trees that exhibit scorch and are larger than 16" dbh should be retained

Response:

Hazard trees are defined as trees that pose a risk to infrastructure, access, and public and Forest worker safety. Trees that will be felled include dead trees and trees that are likely to die. While many trees were killed as a direct result of wildfire, many more trees were intolerably stressed and will die over a period of several years. Secondary effects of the wildfires, including increases in insect and disease activity within

burned stands of timber will continue to increase for a period of several years, resulting in ongoing threats to human safety and safe access.

The corrected name for the mortality guidelines are the "Nez Perce-Clearwater Mortality Guidelines." These guidelines describe how hazard trees will be selected for removal based on species-specific symptoms and criteria. The guidelines have been developed using research and guidance from various scientific sources such as Scott et al, the Region One Forest Health Protection Fire Survivability report, an others. Research papers and other documentation, including Wendover Fire Salvage of 2005, supporting the development of the "Nez Perce-Clearwater Tree Mortality and Hazard Tree Guidelines" is in the project record. Tree marking guides that incorporate this literature are also included in the project file (Clearwater NF Field observations, Wendover 2005).

Snags that meet the hazard tree definition and that pose a risk to infrastructure, access, and public and Forest worker safety will be removed. This is required to meet the purpose and need of the project and to mitigate the safety hazard posed by these trees. Any snags that do not meet the hazard tree definition have the potential to be retained.

Many trees, such as ponderosa pine and larch, are fire-adapted and can survive the effects of fire. The Nez Perce-Clearwater Mortality and Hazard Tree Guidelines (see EA section 2.4.2.1) will be used during project implementation to identify trees that have experienced fire effects such as bole scorch but are likely to survive. All live trees will be marked for retention. This could include trees over 16 inches as the comment suggests because larger trees often exhibit characteristics such as thick bark that would allow them to survive. However, depending on the species of the tree and the intensity of the fire, it is not guaranteed that all trees over 16 inches DBH will survive, so an all-encompassing DBH limit would not be appropriate. The Nez Perce-Clearwater Mortality and Hazard Tree Guidelines provide a scientific basis for making a species-specific decision which accounts for local fire effects.

6. SAFETY NEED

- The safety need of the project is over exaggerated and not commensurate with the risk.

Response:

The Nez Perce-Clearwater National Forests take very seriously the need to provide for the safety of the public and our employees. Not addressing the safety risk posed by trees injured post fire is not a risk we are willing to take. While not every safety risk can be or reasonably should be addressed, the safety of users in areas where we purposefully congregate the public (i.e. roads, recreation sites and administrative sites) does need to be addressed and cannot be exaggerated. A fatality of a forest employee during the summer of 2013 has heightened our awareness of the risk posed by fire injured trees. Since that time, we have spent great amounts of time educating ourselves on how to identify these risks and how to mitigate these risks. This project proposed to use scientific and peer reviewed science as the basis for hazard tree guidelines, augmented with site specific information accumulated since the time of the peer reviewed literature. Within the area of influence of the road, we do have an obligation to mitigate risks the best we can and a risk to human life in an area we ask the public to be is not acceptable.

7. IDAHO ROADLESS AREAS

- There should not be removal of timber in Idaho Roadless Areas.
- Incursion into Idaho Roadless Areas constitutes an irreversible and irretrievable commitment of resources that warrants development of an EIS.
- The Idaho Roadless Commission was not properly briefed on the proposed action.
- An unroaded analysis should be conducted

Response:

Cutting and removal of timber within the Backcountry Restoration theme is provided for in the Idaho Roadless Rule when incidental to other management activities. The proposed action is fully consistent with the Idaho Roadless Rule, as confirmed by the Governor's Idaho Roadless Rule Commission in November of 2015.

While the Idaho Roadless Rule does allow for the activities proposed, the commenters are correct in the assertion that just because the rule allows for an activity does not mean the activity would not have any impacts. As such, the impacts of the proposed action were analyzed in chapter 3, section 11 of the EA, including references to the analysis of hazard tree removal in the FEIS on the Idaho Roadless Rule. The analysis shows impacts to the roadless areas and the wilderness characteristics are not significant based on the context and intensity of the proposed action. Thus, an EIS is not required.

Since the time of the roadless commission briefing in November, hazard tree felling (without removal) in other IRR themes was added to the proposed action. This information came about following the roadless commission meeting in November. The topic is on the agenda for the May roadless commission meeting and the project will be presented in whole as it stands currently. Updated briefing papers were sent to the commission in April, far in advance of any decision being made on the project. However, it is clear that the added actions are provided for in the Idaho Roadless Rule.

An unroaded analysis is not warranted for several reasons. First and foremost, the Idaho Roadless Rule analyzed unroaded areas in Idaho and those that were found to have wilderness characteristics were included as Idaho Roadless Areas. Chapter 3 analyzed the impacts to these IRAs as a result of the proposed action. Other areas need not be considered. Furthermore, the project's purpose and need is directly tied to the road. Unroaded analysis is not logical when the purpose of the project is to maintain forest man-made infrastructure. Activities areas as based on the risk of trees negatively impacting the road or users of the road. The proposed action would only affect areas already highly influence by the road or other infrastructure (a maximum distance of 200 feet from the road).

8. CLOSED ROADS

- There is no need to mitigate hazards and/or remove timber along closed roads.
- The status of the Indian Hill Road is unclear.

Response:

Closed roads maintain an important part of the infrastructure on the Nez Perce-Clearwater. Roads identified in the proposed action include roads in administrative maintenance levels 1 through 5. A portion of the roads included in the proposed action are classified as maintenance level 1, closed roads. Many closed roads were removed from the proposed action as part of the fine filter process. However, roads that could be used for administrative use or roads that were likely to be used for recreation purposes remain in the proposed action as the safety of the users of the roads is needed to meet the purpose and need for action. Additionally, these roads remain part of the forest infrastructure and the forest is responsible for maintaining that infrastructure. Timely maintenance actions post-fire will help alleviate potential impacts to that infrastructure and other resources (e.g. sediment delivery, etc.). Without maintenance, over time these roads will either take an increasing amount of time, money, and risk to keep open as trees fall, or will not be travelable due to jackstrawed trees on the roadway. Should the road be needed for fire suppression or other administrative use, a significant delay and significant risk would be placed on those asked to open the road. These roads will begin to contribute additional sediment to nearby waterways as ditches and culverts become plugged, tree root wads fall into the road or take out a section of the road. In the worst case scenario, the plugged culverts, ditches and root wads become a gathering place for water which cause a landslide event.

As these roads are still part of the forest's road system, the obligation to maintain them for both emergency use and to reduce ecological impacts exists.

The Indian Hill road is proposed for drop and leave treatment only as clearly shown in both the proposed action for 30-day notice and comment and this EA. No removal of felled trees is being proposed for this road segment. The Indian Hill Road was facing a similar situation following the Slim's fire in 2003. The lack of timely action by the Forest Service created a safety hazard, fuels risk and ecological issue for years after the fire. In 2008 and 2009 the Forest Service determined action was necessary to mitigate the on-going hazard to the public. The cost of reducing this hazard several years following the fire was an order of magnitude greater than it would have been if the hazard was dealt with in a timely fashion. Additionally, unnecessary risk was placed on users of the road, sawyers repeatedly bucking logs from the road, and cut and fill slopes were unnecessarily impacted as falling logs and uprooted trees came down. Our lessons learned from this project have reaffirmed the purpose and need for action as a result of the 2015 wildfires.

9. WILDLIFE

- The effects of the proposed action on big game species were not analyzed in the draft EA.
- Effects to Lynx, fisher and grizzly bear were not analyzed.
- The FS should add an additional PDF stating that no roadside treatment would occur in areas where EHE (elk habitat effectiveness) ratings are below Forest Plan standards, or where projects activities would cause EHE to fall below Forest Plan standards.
- The FS should include additional drop and leave areas to protect habitat connectivity to uplands for big game in the northern portions of the Snowy summit and Wash treatment areas.

Response:

The Proposed Action for 30-day notice and comment document released to the public in March did not include a discussion of potential impacts to big game. An analysis has since been completed and can be found in this environmental assessment. Effects to lynx were included in the comment document, and more detail on effects to both lynx and fisher, as well as all other threatened and endangered, sensitive and MIS species is included in this EA.

Grizzly bear is a MIS species on the Nez Perce and Clearwater National Forests but at present there is no occupied habitat. Anecdotal and unverified sightings of grizzly bears on the Forests occur and Forest records have reports as often as every few years to a few every decade, but approximately 25 percent of black bears on the forest are not black-colored (Servheen and Shoemaker 2010), which can make accurate species identification difficult even for experienced observers. Until 2007, when a grizzly was killed in the northern Bitterroot ecosystem in Idaho, it was widely accepted that there were no grizzly bears in the Bitterroot ecosystem. DNA from the grizzly killed in 2007 show the bear was transient from the Selkirk ecosystem (Servheen and Shoemaker 2010). The Interagency grizzly Bear Committee states that the Bitterroot Recovery Zone in the Bitterroot Mountains of east-central Idaho and western Montana does not contain any grizzly bears (2010). There are no grizzly bear observation records within the Nez Perce-Clearwater NF in the Idaho Department of Fish and Game Species Diversity database. There would be no changes to road density or motorized access in the project area, and no changes to berry-producing foraging areas or possible denning areas. Therefore grizzly bear was eliminated from further analysis as they would not likely be affected by the proposed activities.

Habitat effectiveness is defined as the percentage of available habitat that is usable by elk outside the hunting season (Lyon and Christensen 1992). It is the measure of success in meeting elk needs for growth and welfare requirements on summer range. EHE can vary according to size, spacing, or type of roads and cover. Roads are undoubtedly the most significant consideration on elk summer range. The project area traverses

portions of elk summer range, but it would not change roads. The current condition of elk habitat was modified by the 2015 fires which reduced trees, shrubs, and therefore hiding cover across the project area. The action would cut dead and dying trees that may pose a hazard because they are expected to fall. Hiding cover reduction may be accelerated in the short-term alongside roads as a result of the action. However, those trees targeted for cutting are also those predicted to be subjected to the natural course of dead and dying tree falling in the short-term, so the cover aspect of EHE would naturally decrease in the short-term with no action. Additionally, the project design criteria minimizes the potential for project effects to EHE. The retention of live green trees and retention of dead and dying trees which do not pose a hazard to the road would maintain some EHE. Over time reforestation and natural regeneration would enhance EHE, or accelerate its rebound. Therefore, the Roadside, Recreation and Administrative site project has minimal short term potential to affect elk habitat effectiveness.

The current condition of big game habitat connectivity to uplands was modified by the 2015 fires which reduced trees, shrubs, and therefore hiding cover and forage across the project area. The project does not propose any treatments outside of burn areas and would retain live green trees as well as dead and dying trees that do not pose a hazard to the road prism. Additionally, in areas of drop and remove, hazard trees which are un-merchantable as a result of size (generally <8" in diameter) or defect will be dropped and left on site. Areas of verified landslide prone and RHCAs have also been prescribed for drop and leave. Therefore, the potential for affects to habitat connectivity to uplands for big game would be limited by the retention of or increase in levels of course woody debris and other aforementioned elements of project design.

10. AQUATICS

- How does widening of RHCA buffer mitigate transmission of logs through RHCAs?
- The project design features provide no measurable standards, thresholds or direction to guide or guarantee the RHCA buffer expansion.
- Project must meet water quality objective in Appendix A of the Nez Perce Plan.
- Project must schedule fishery habitat and watershed improvements in those streams where potential is below stated objective (upper trend).
- What are the impacts to the Plant Creek drainage on the Teepee Springs Fire?
- Is the Selway Biological Opinion being followed?
- PACFISH requires a 100 foot buffer on Landslide Prone areas.
- Aquatic monitoring language is vague and unclear.
- The EA should disclose what design features will be included to close RHCAs to firewood gathering.
- We encourage you to closely consult with the National Marine Fisheries Service and Fish and Wildlife Service.
- What is the extent and what are the effects of ground based harvest on high severity slopes?

No removal of trees would occur in default RHCAs, as defined in PACFISH and INFISH, and no yarding of material would occur (EA section 2.4.2 *Proposed Action*, and Table 2-4, pdf # 5). No harvest is proposed in default or expanded RHCAs (Table 2-4, project design feature #5 and 12).

All proposed salvage projects are designed to comply with Forest Plan Standards. Appendix A of the Nez Perce Forest Plan says for watersheds not meeting their fish/water quality objectives, timber harvest can proceed concurrent with improvement efforts as long as there is an improving trend in habitat carrying capacity. The 2011 implementation guide for Appendix A addresses this direction by stating the upward trend requirement is supposed to apply only to projects meeting the definition of an "entry." The definition of an entry starts on page 17 of the implementation guide states that:

"Small timber sales with units harvested from existing access and away from stream channels generally would not be considered an entry. Timber harvesting would be considered an entry if the activity results in appreciable ground disturbance, and/or is close enough to the channel system where sediment delivery is likely."

Therefore, the Forests does not consider the proposed project to be an "entry" because no new roads would be constructed and substantial efforts would be made to minimize ground disturbance and to eliminate or minimize sediment transmission to stream channels. In addition, the Soils Specialist Report for the project calculates no or very minor levels of increased sediment yield (which do not account for mitigation efforts described above) for all "prescription watersheds" except for the Plant creek drainage, which is very small and does not include a fishbearing stream.

Plant Creek, a small subwatershed tributary to Allison Creek, will experience the highest likelihood of measurable sedimentation from proposed project activities for both Roadside proposed tree removal and Area Salvage harvest. Although sediment yield from Plant Creek is estimated to be high, the quantity introduced to Allison Creek does not cause Allison Creek to exceed the Forest Plan threshold due to the relative size difference between Plant Creek and Allison Creek where Allison Creek has a greater capacity to route sediment.

In the National Marine Fisheries Service's 1998 Forest Plan/PACFISH Biological Opinion, the Forest Service and BLM consulted, across the range of listed Snake River steelhead, on the Land and Resource Management Plans as amended by PACFISH. In order to avoid a jeopardy determination, the FS and BLM added nine recommendations to the Biological Assessment that were ultimately adopted as part of the action that was being consulted on. One of these nine recommendations included special management considerations for the South Fork Salmon, Middle Fork Salmon, and Selway basins.

The recommendations that pertain to the proposed project are as categorized primarily under the Roads and Timber Management section (pgs. 85 and 86) and are:

- *"Do not widen roads by increasing cut and fill slope areas in order to accommodate more traffic and/or larger vehicles than can presently use the road. No roads are proposed for widening*
- *Do not open closed and revegetated roads for management purposes unless necessary to repair human-caused damage to steelhead habitat.*
- *Only use timber harvest methods (such as, helicopters, horses, etc.) that result in low levels of ground disturbance or that avoid adverse effects to steelhead. Some of the project activity areas would have more than low levels of ground disturbance under the proposed project, but project design features would be effective enough to eliminated or greatly reduce fine sediment transmission to streams to the point where the proposed project is "not likely to adversely affect" steelhead.*
- *Use only existing open roads, without construction of new landings."*

Some roads proposed for maintenance and adjacent tree harvest in the roadside project are gated and classified as closed to the public. However, these roads are used by Forests staff (and to some extent as a public ATV trail) however, and so maintenance of user safety and drainage features through implementation of the project is warranted, and the Forests does not consider these roads to be "closed" under the intent of the 1998 Biological Opinion. Logs would be yarded to existing roads or landings, and no new landings would be constructed in the Selway River subbasin under this project. Therefore, the project would avoid adverse effects to steelhead.

No timber harvest would occur in field-verified landslide prone areas (*Proposed Action*, section 2.4.2, pdf # 5, Table 2-4). More detailed language describing monitoring related to aquatic resources has been added to the EA (Table 2-4, Monitoring item #1).

Firewood gathering is not permitted on the Forests "within 150 feet of any running stream, pond, lake, marshy or wet area" (Forest Products Removal Permit condition # 7a). The EA does not contain an additional pdf that restricts firewood gathering in RHCAs.

Consultation is ongoing between the Nez Perce Clearwater Forests, the National Marine Fisheries Service, and the USDI Fish and Wildlife Service. The decision notice for this project will not be signed until the Forests receive letters of concurrence from these agencies.

Approximately 2.8 percent (110 acres) of the Roadside Hazzard tree removal would occur on severely burned soils where the slopes (35 percent or less) allow for ground-based methods. The fire perimeters where ground-based harvest may occur include Fourbit, Jay Point, Musselshell, Snowy Summit, Teepee Springs, Wash, and Woodrat. Ground-based harvest on severely burned soils can increase erosion and increase potential for longer term impacts to recovery of soil productivity. The ID team established project design criteria to prevent longer term impacts with an emphasis on reducing erosion. Especially important for protecting higher severity soils from increase erosion and loss of productivity is pdf #12, "In units with high burn severity, trees would be processed on-site and activity generated slash (tops and limbs) scattered on site to add organic material and reduce surface erosion sufficiently to ensure the coarse woody debris guidelines above are met" (section 2.4.2.2, Table 2-4).

11. BOTANY

- An analysis of non-forest vegetation specific to ESA, sensitive and MIS plants was not provided

Response:

While an analysis of plants was not included in the Proposed Action for 30-day Notice and Comment, an analysis was conducted and included in the draft EA that was available to the public beginning May 3, 2016. This Final EA includes that analysis.

12. INVASIVE\WEEDS

- The proposed action may exacerbate the spread and establishment of noxious weeds.
- An analysis of invasive species was not provided.
- The requirement to remove all mud, soil, and plant parts from road equipment should be expanded to include off-road equipment (feller bunchers, skidders, etc.) as well.

Response:

A discussion of invasive weeds is included in the EA under section 3.12, Botany. The analysis acknowledges that invasive weed are anticipated to increase after the fires and that ground disturbing activities can provide an indirect threat to sensitive plant species. The analysis concludes that sensitive species with a "may impact" determination may be affected by the project, but those effects would be limited in scope and would not cause any concern for overall species viability. A table listing Forest sensitive and candidate plant species and their determinations can be found in the EA (section 3.12.2, Environmental Consequences, Table B-1.).

PDF # 23 (cleaning equipment to prevent the spread of invasive weeds) requires "both off road equipment and equipment being used for road maintenance" to be cleaned off-Forest before being moved into the project area.

13. ECOLOGICAL EFFECTS OF POST-FIRE LOGGING

Response:

Cumulative effects of fire followed by logging can be difficult to separate and measure (McIver and Starr 2001[cited in Page-Dumroese, Jurgensen, Abbott, Rice, Tirocke, Farley, and DeHart, 2006]).

Our study shows that post-fire logging can serve as an effective tool for managing fuel loadings in forests regenerating after high severity wildfires. By strategically applying and varying post-fire logging treatments within landscapes, post-fire logging could reduce woody fuels and help reduce threats to human health, property, and ecosystem services from unacceptable future wildfire behavior and effects. If applied using best management practices and with consideration for possible environmental impacts and meeting other management objectives, post-fire logging could serve as an effective option – along with mechanical thinning, prescribed fire, and managed low to mixed severity wildfires – for reducing fuels and restoring low and mixed severity fire regimes in dry coniferous forests of western North America and other fire-prone forest types. (Petersen, David W., Dodson, Erich, k., Harrod, Richy J.; 2015 "Post Fire Logging Reduces Surface Woody Fuels up to Four Decades Following Wildfire." Forest Ecology and Management 338 (2015) 84–91).

14. CUMULATIVE EFFECTS

- The interrelated nature of this project with the Upper Lolo, Woodrat and other Categorical Exclusion (CE) Salvage projects requires a thorough cumulative effects analysis

Response:

Cumulative Effects were analyzed in this project as documented in this EA, the specialist reports and in the project record. Additionally, the other proposed post-fire project also analyzed cumulative effects in each of their respective NEPA documents. This project has a different purpose and need than the other area salvage projects and thus is analyzed separately. Cumulative impacts have been analyzed.

The effects analysis in the EAs considered the direct, indirect, and cumulative effects of the 2015 fires, other salvage proposals, past management actions, and adjacent state and private land. Documentation of the effects analyses, including the cumulative effects analyses, are included in the EAs and the project records.

Each of the interdisciplinary teams were directed to analyze all relevant past, present and reasonably foreseeable actions as part of their analysis for cumulative effects (Project Initiation Letters, 2015). Cumulative effects spatial and temporal boundaries were identified by the resource specialists so that impacts which may be insignificant on their own but could be potentially significant impacts when combined with other actions could be properly analyzed. Cumulative effects study areas were determined by looking at where the majority of impacts would occur (in time and space) as documented in the specialist reports. In most cases, a cumulative effects study area that is too large (the entire forest for instance), results in effects that become diluted due to the scale of the analysis. Conversely, a study area that is too narrow may not take into account all the potential interactions of impacts from various projects.

Cumulative analysis was conducted for each of the CE and EA projects and those findings are documented in the NEPA documentation and decision document, if applicable.

Many of the proposed projects were separated by great geographic distances and the post-fire projects did not contribute any cumulative impacts for the majority of resources. Individual fires that were most likely to have cumulative impacts were analyzed as one project from the onset as described in the Post Fire Selection Process.

15. ROADS ANALYSIS

- A roads analysis for the project was not provided

Response:

The Forest is in the process of completing travel management plans for both forests. The Travel Analysis Process (TAP) Subpart A has been submitted to the Washington Office for review and comment.

16. TREATY RIGHTS AND TRUST RESPONSIBILITIES

The Forest has a trust responsibility to ensure that its actions are fully consistent with the 1855 Treaty, executive orders, departmental regulations, and other Federal laws implicating the United States' unique relationship with the Tribe.

Response:

Additional language discussing tribal rights and responsibilities has been added to the EA section 1.10, Regulatory Framework and Consistency. The Roadside, Administrative and Recreation Site Maintenance project area is located within ceded lands of the Nez Perce Tribe. Ceded lands are federal lands on which the federal government recognizes that a tribe has certain inherent rights reserved by treaty. In Article 3 of the Nez Perce Treaty of 1855, the United States of America and the Nez Perce Tribe mutually agreed that the Nez Perce retain the following rights:

…taking fish at all usual and accustomed places in common with citizens of the Territory [of Idaho]; and of creating temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing horses and cattle…

The Nez Perce-Clearwater National Forest is committed to fulfilling the Forest Service's trust responsibilities to Native Americans, to honoring rights reserved in the Nez Perce Treaty of 1855, and to strengthening our government-to-government relationship with the Nez Perce Tribe. The Forest Service manages and provides access to ecosystems that support Tribal traditional practices. This project will maintain and enhance these opportunities over the long term.

In order to ensure early and frequent opportunities for meaningful and timely input by tribal officials, Forest Service staff began communicating with Nez Perce Tribal staff and the Nez Perce Tribal Executive Committee before the fires on the Nez Perce-Clearwater National Forests were fully contained in the fall of 2015. The first formal staff meeting to introduce fire-related projects was held December 16, 2015. Subsequent meetings were held January 22 and March 17. These staff-to-staff conversations helped shape the project design to protect important tribal resources such as healthy populations of fish, wildlife and botanical species.

Nez Perce Tribe staffs asked us to pay particular attention to fish and wildlife habitat and were particularly interested in minimizing soil disturbance, controlling invasive weed species and retaining reasonable elk cover. We determined if there were no negative impacts on the aquatic and terrestrial species of concern to the Tribe, then there would likewise be no negative impacts on treaty-reserved rights. Likewise, any benefits to these resources would be benefits to treaty-reserved rights.

Forest leadership also met with the Nez Perce Tribal Executive Committee on April 12, 2016 for formal government to government consultation. No outstanding issues were identified at this meeting.

Opposing Science Review

Donato et al. 2006

Donato et al. 2006 published a report in Sciencexpress and in the journal Science regarding post-fire logging hindering regeneration and increasing fire risk in the Biscuit Fire project area. Baird 2006 completed an analysis of the Donato et al. methodology and determined that there may be serious flaws in regards to the study and its design, including statistical analysis of the data presented. The IDT reviewed the report and determined the report provided background information in regards to salvage harvesting activities; however, the report is not applicable in many ways. The Biscuit salvage activities occurred several years after the actual fire. The Road, Administrative and Recreation Site Maintenance Project activities are expected to occur following a shorter time separation.

Johnson et al. 2007

One study, Effects of Salvage Logging and Pile and Burn on Fuel Loading, Fire Behavior, and Emissions (Johnson et al., 2007) was compiled from data gathered from a windthrow event in central Oregon. The authors hypothesized that fuels would increase after logging and decrease after treatment. From site-specific data the authors concluded the treatment "…clearly reduced fuel loadings, fuel-bed depth, and simulated smoke emissions…" but "…did not produce unequivocal evidence…" of a significant reduction in fire behavior (p. 767). The study does note that the fuel levels were low to begin with and "…it is possible…" that greater effects would occur with a higher fuel loading (p. 767).

From this, the authors compare their results with other researcher's work based on post-wildfire salvage and surmise that the fuel loadings would be greater. But the study also notes that "…fire managers have less concern about coarse woody fuel because these fuels do not influence fire rate-of-spread and flame length" (P.764). Furthermore, the study states that there is usually an immediate reduction in fuels following a wildfire, but over time fuel loadings may increase above pre-fire loadings as fire-killed snags fall (P. 758). This increase in fuel loadings may increase soil heating (P. 764). As the study does not actually draw a conclusion from data based on wildfires, and instead supports the analysis, Johnson et al. 2007 was not considered.

Karr et al. 2004

Karr et al. 2004 published a peer-reviewed report in the journal BioScience regarding the effects of salvage logging aquatic ecosystems and presented recommendations very similar to the ones proposed by Beschta et al. 1995 and 2004. The IDT reviewed the report and determined that the completed analysis utilized the most recent literature available and sources within the range of cited scientific literature. Effects to aquatic species were analyzed in the Road, Administrative and Recreation Site Maintenance Project EA, and Design Features and BMPs would be incorporated into the proposed project in order to minimize adverse effects.

Lindenmayer et al. 2004

Lindenmayer et al. 2004 published an opinion or editorial piece in the journal Science regarding salvage harvesting. The IDT reviewed the report and determined that the project included an alternative that incorporated the report's findings, namely Alternative 1 – No Action. The proposed project action alternatives also incorporate Design Features and BMPs in order to minimize adverse effects to resources.

Noss et al. 2006

Noss et al. published an opinion or editorial piece in Society for Conservation Biology that reviewed ecological science pertaining to fire management fires on forests in the western United States. The article did not incorporate literature citations, making it difficult to determine if the analysis is based upon scientific fact or to determine the veracity of the findings. The IDT reviewed the report and determined that the

proposed project addresses the report's findings through the various alternatives, including the No Action alternative, or components of the various alternatives, including incorporating natural regeneration when applicable.

Open Letter to Members of Congress from 250 Scientists Concerned about Post-fire Logging

One commenter referenced an opinion letter to members of Congress from 250 scientists, who were concerned about post-disturbance legislation addressed in HR 1526 and the over-riding of environmental laws proposed in HR 3188. While the Road, Administrative and Recreation Site Maintenance Project is a post-fire salvage project, it does not propose any changes to existing legislation. The letter also discusses the ecological importance of post-fire landscapes and the amount of studies documenting cumulative effects of post-fire logging. The EA for the Road, Administrative and Recreation Site Maintenance Project analyzes direct, indirect, and cumulative effects as a result of the action alternative.

Appendix F. References

Adams, P. W., & Froehlich, H. A. 1981. Compaction of forest soils. [Corvallis, Or.]: Oregon State University Extension Service.

Adult Technical Team. 2012. Nez Perce Tribe Nacó'x (Chinook salmon) and Héeyey (steelhead) adult escapement and spawning ground survey. 2011 summary report, April 2012. Nez Perce Tribe, Department of Fisheries Resources Management, Lapwai, ID. 29pp. (earlier reports also cited).

Agee, J., and C. Skinner. 2005. Basic principles of forest fuel reduction treatments. Forest Ecology and Management 211 (2005) 83-96.

Agee, J., and M. Lolley. 2006. Thinning and prescribed fire effects on fuels and potential fire behavior in an eastern Cascades forest, Washington, USA. Fire Ecology 2(2):142-158.

Al-Chokhachy, R., Black, T.A., Thomas, C., Luce, C.H., Rieman, B., Cissel, R., Carlson, A., Hendrickson, S., Archer, E.K. and Kershner, J.L., 2016. Linkages between unpaved forest roads and streambed sediment: why context matters in directing road restoration. Restoration Ecology.

Alexander, E. B., & Poff, R. 1985. Soil disturbance and compaction in wildland management (Vol. 8). USDA Forest Service, Pacific Southwest Region.

Anderson, H. 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. NFES 1574, USDA General Technical Report INT-122, April 1982. 22p.

Appelboom, T. W, G. M. Chescheir, R. W. Skaggs, and D. L. Hesterberg. 2002. Management practices for sediment reduction from forest roads in the coastal plains. Transactions of the ASAE, Vol. 45(2): 337–344.

Archer, V. 2008. Clearwater Soil Monitoring: Soils Report. Orofino, ID.

Arnsberg, B., P. Groves, F. Mullins, D. Milks. 2016. 2015 Snake River fall Chinook salmon spawning summary. Nez Perce Tribe, Idaho Power Company, U.S. Fish and Wildlife Service, and Washington Department of Fish and Wildlife. January 2016, 6 pp. (earlier reports also cited)

Aubry, K. B., and C. M. Raley. 2002. The pileated woodpecker as keystone habitat modifier in the Pacific Northwest. Gen. Tech. Rep. PSW-GTR-181. Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests. US Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, CA.

Balda, R. P., W. S. Gaud, and J. D. Brawn. 1983. Predictive models for snag nesting birds. Gen. Tech. Rep. RM 99:216-222. Pages 216–222 in. USDA Forest Service, Rocky Mountain Research Station.

Barber, J., R. Bush, and D. Berglund. 2011. The Region 1 Existing Vegetation classification system and its relationship to Region 1 Inventory Data and map products. USDA Forest Service, Region 1, Missoula, Montana.

Baumgardt, J. A., and J. D. Sauder. 2012. Middle Fork Clearwater CFLRP Nongame Inventory Project: a preliminary analysis of bat transect survey data. Idaho Department of Fish and Game (IDFG), Lewiston, Idaho.

BehavePlus5 Fire Behavior http://www.firemodels.org and http://www.firemodels.org/index.php/national-systems/behaveplus

Behnke, R. J. 1992. Native trout of western North America. American Fisheries Society Monograph 6.

Beschta, R.L., Rhodes, J.J., Kauffman, J.B., Greswell, R.E., Minshall, G.W., Karr, J.R., Perry, D.A., Hauer, F.R., Frissell, C.A., 2004. Postfire management on forested public lands of the western United States. Conserv. Biol. 18, 957–967.

Bilby, R.E., B.R. Fransen, J.K.Walter, C.J. Cederholm, and W.J. Scarlett. 2001. Preliminary evaluation of nitrogen stable isotope ratios to establish escapement levels for Pacific Salmon. Fisheries 26:6-14.

Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. In W.R. Meehan (ed). Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitat. American Fisheries Society Special Publication. Pp 83-138.

Bollenbacher, B., and R. Bush. 2009. Estimates of snag densities for Northern Idaho Forests in the Northern Region. USDA Forest Service, Missoula, Montana.

Bonar, R. L. 2000. Availability of pileated woodpecker cavities and use by other species. The Journal of Wildlife Management 64:52–59.

Bonneau, J.L. and D.L. Scarnecchia. 1998. Seasonal and diel change in habitat use by juvenile bull trout (Salvelinus confluentus) and cutthroat trout (Oncorhynchus clarki) in a mountain stream. Canadian Journal of Zoology. 76: 783-790.

Bradley, Tim, and Tueller, Paul. January 26, 2000. Effects of Fire on bark beetle presence on Jeffrey pine in the Lake Tahoe Basin. Forest Ecology and Management 142 (2001) 205±214

Brais, S., David, P., & Ouimet, R. (2000). Impacts of wild fire severity and salvage harvesting on the nutrient balance of jack pine and black spruce boreal stands. Forest Ecology and Management, 137(1), 231-243.

Brewer, L. T., R. Bush, J. E. Canfield, and A. R. Dohmen. 2009. Northern goshawk Northern Region overview, key findings and project considerations. USDA Forest Service. Missoula, MT.

Brown, A. A., and K. P. Davis. 1973. Forest Fire Control and Use: Second Edition. McGraw-Hill, Inc. 686p.

Brown, A.E., Zhang, L., McMahon, T.A., Western, A.W. and Vertessy, R.A., 2005. A review of paired catchment studies for determining changes in water yield resulting from alterations in vegetation. Journal of hydrology, 310(1), pp.28-61.

Brown, J.K., and J. K. Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol.2. Ogden, UT: USDA, Forest Service, RMRS. 257p.

Brown, J.K., Reinhardt, E.D. and Kramer, K.A. 2003. Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest. General Technical Report RMRS-GTR-105. Ogden, UT: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Brown, Kristopher R., W. Michael Aust, Kevin J. McGuire. 2013. Sediment delivery from bare and graveled forest road stream crossing approaches in the Virginia Piedmont. Forest Ecology and Management, 310 (2013) 836–846.

Buchanan, J. B., R. E. Rogers, D. J. Pierce, and J. E. Jacobson. 2003. Nest-Site Habitat Use by White-Headed Woodpeckers in the Eastern Cascade Mountains, Washington. Northwestern Naturalist 84:119–128.

Buck, C. J., 1936. Forest Roads or Forest Fires? U.S. Forest Service Headquarters History Collection. Forest History Society, Inc. 701 William Vickers Avenue Durham, NC 27701-3162

Bull, E. L. 1987. Ecology of the pileated woodpecker in northeastern Oregon. The Journal of Wildlife Management 51:472–481.

Bull, E. L., and R. S. Holthausen. 1993. Habitat use and management of pileated woodpeckers in northeastern Oregon. The Journal of Wildlife Management 57:335–345.

Bulmer, C., Berch, S., Curran, M., Chapman, B., Kranabetter, M., Dubé, S., ... & Kabzems, R. (2008). Monitoring the effects of forest practices on soil productivity and hydrologic function. Journal of Ecosystems and Management, 9(2).

Bureau of Business and Economic Research. University of Montana. Web. 2 Dec. 2015.

Burroughs, E.R. and J.G. King. 1989. Reduction of soil erosion on forest roads. General Technical Report INT-264. USDA-Forest Service, Intermountain Research Station, Odgen, UT. July 1989. 21 p.

Clayton, J.L. 1990. Soil disturbance resulting from skidding logs on granitic soil in central Idaho. Gen. Tech. Rep. INT-GTR-436. Ogden UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 8p.

Clayton, J.L.; Kellogg, G ; Forester, N. 1987. Soil disturbance Tree-growth relations in central Idaho clearcuts. Gen. Tech. Rep. INT-GTR-372. Ogden UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 6p.

Clean Air Act. 42 USC 85. http://www.epa.gov/air/caa/ 5/18/2008.

Clearwater National Forest 1999. Programmatic Biological Assessment - Road Management Program Fall Chinook Salmon, Steelhead Trout, Westslope Cutthroat Trout and Bull Trout. Orofino, ID.

Clearwater National Forest 2000. Clearwater National Forest revised landslide database. Orofino, ID.

Clearwater National Forest 2000. Clearwater National Forest revised landslide database. Orofino, ID.

Clearwater-Nez Perce Fuel Treatment Allowance Collection Guide, 2010. 39 pages plus Attachments A, B, and C.

Cline, R., Cole, G., Megahan, W., Patten, R. and Potyondy, J., 1981. Guide for predicting sediment yields from forested watersheds. Ogden, UT: Intermountain Forest and Range Experiment Station, Forest Service, US Department of Agriculture.

Clinton, B. D. and J.M. Vose, 2003. Differences in water quality draining four road surface types in the southern Appalachians. Southern Journal of Applied Forestry 27(2):100-106.

Cochnauer, T. and C. Claire. 2009. Evaluate status of Pacific lamprey in the Clearwater River and Salmon River drainages, Idaho. Report by Idaho Department of Fish and Game to Bonneville Power Administration, Portland, OR.

Columbia River DART, Columbia Basin Research, University of Washington. (2013). Available from http://www.cbr.washington.edu/dart

Cook, Philip S., Morgan, Todd A., Hayes, Steven W., Sorenson, Colin B., Taylor, R. Garth, O'Laughlin, Jay. "Idaho's Forest Products Industry Current Conditions and 2015 Forecast." Contribution No. 1081 (2015): 1-4. Moscow, ID: University of Idaho Idaho Forest, Wildlife and Range Experiment Station.

Cooley, Patrick; Dickerson, Gary; Maffei, Tom; Novak, Lis. 2009. Scenic Resource Mitigation Menu & Design Considerations for Vegetation Treatments. [Unpublished] Missoula, MT: U.S. Department of Agriculture, Forest Service, Northern Region. 8 p.

Cooper, S. V., K. E. Neiman, and D. W. Roberts. 1991. Forest habitat types of northern Idaho: a second approximation. General technical report INT no. 236. <http://agris.fao.org/agris-search/search/display.do?f=1992/US/US92074.xml;US9152812>. Accessed 26 Nov 2013.

Coppoletta, M., K. E. Merriam, and B. M. Collins. 2015 pre-print. Post-fire vegetation and fuel development influences fire severity patterns in reburns. Ecological Society of America, preprint49p.

Daly, C., Halbleib, M., Smith, J.I., Gibson, W.P., Doggett, M.K., Taylor, G.H., Curtis, J. and Pasteris, P.P., 2008. Physiographically sensitive mapping of climatological temperature and precipitation across the conterminous United States. International journal of climatology, 28(15), pp.2031-2064.

Debano, L. F., D. G. Neary, and P. F. Ffolliott. 1998. Fire's effects on ecosystems. John Wiley & Sons, Inc., New York.

Dunn, C. J., and J. D. Bailey. 2015. Modeling the direct effects of salvage logging on long-term temporal fuel dynamics in dry-mixed conifer forests. Forest Ecology and Management 341 (2015) 93-109.

Elliot, W., Foltz, R.B. and Luce, C., 1995. Validation of water erosion prediction project (WEPP) model for low-volume forest roads.

Elliot, W.J., 2004. wepp internet interfaces for forest erosion prediction1.

Elliot, W.J., 2013. Erosion processes and prediction with WEPP technology in forests in the northwestern US. Transactions of the ASABE, 56(2), pp.563-579.

Elliot, W.J., Scheele, D.L. and Hall, D.E., 2000. The forest service WEPP interfaces. Paper 00-5021. St. Joseph, MI: American Society of Agricultural Engineers.

EPA. 2005. https://www.epa.gov/sites/production/files/2015-10/documents/2005_05_09_nps_forestrymgmt_guidance.pdf

Everett, S, C. Beasley, R. Johnson, C. Davenport, R. Larson, and FishPro Division of HDR Engineering (Nez Perce Tribe). 2006. Nez Perce Tribal Hatchery Project; Coho Salmon Master Plan, Clearwater River Basin, 2003-2004 Annual Report, Project No. 198335000, 134 electronic pages, (BPA Report DOE/BP-00004035-1)

Finney, M., and J. Cohen. 2003. Expectation and Evaluation of Fuel management Objectives. p. 353-366. In: Omi, P.N., and J.A. Linda, tech. eds. 2003. Fire, fuel treatments, and ecological restoration: Conference proceedings; 2002. 16-18 April; Ft. Collins, CO. Proceedings RMRS-P-29. USDA, Forest Service, RMRS. 475p.

Fire.org: Public Domain Software for the Wildland Fire Community www.fire.org

Fischer, W. C. 1981a. Photo guide for appraising downed woody fuels in Montana forests: Grand fir-larch-Douglas-fir, western hemlock, western Redcedar-western hemlock, and western Redcedar cover types. USDA For. Serv. Gen. Tech. Rep. INT-96, 53p. Intermt. For. And Range Exp. Stn., Ogden, Utah 84401.

Fischer, W. C. 1981b. Photo guide for appraising downed woody fuels in Montana forests: Interior ponderosa pine, ponderosa pine-larch-Douglas-fir, larch-Douglas-fir, and interior Douglas-fir cover types. USDA For. Serv. Gen. Tech. Rep. INT-97, 133p. Intermt. For. And Range Exp. Stn., Ogden, Utah 84401.

Fischer, W. C. 1981c. Photo guide for appraising downed woody fuels in Montana forests: lodgepole pine and Engelmann spruce-subalpine fir cover types. USDA For. Serv. Gen. Tech. Rep. INT-98, 143p. Intermt. For. And Range Exp. Stn., Ogden, Utah 84401.

Flanagan, D.C., Frankenberger, J.R. and Ascough II, J.C., 2012. WEPP: Model use, calibration, and validation. Transactions of the ASABE, 55(4), pp.1463-1477.

Fogg, A. M., L. J. Roberts, and R. D. Burnett. 2014. Occurrence patterns of Black-backed Woodpeckers in green forest of the Sierra Nevada Mountains, California, USA. Avian Conservation and Ecology 9:3.

Foltz, R. B. 1996. Traffic and No-Traffic on an Aggregate Surfaced Road: Sediment Production Differences. Proceedings of the Seminar on Environmentally Sound Forest Road and Wood Transport; June 1996; Sinaia, Romania Rome, Italy: FAO. 13 p

Foltz, R. B., Rhee, H., & Yanosek, K. A. 2007. Infiltration, erosion, and vegetation recovery following road obliteration. Trans. ASABE, 50(6), 1937-1943.

Foltz, R. B., Robichaud, P. R., & Rhee, H. 2009. A synthesis of post-fire road treatments for BAER teams: methods, treatment effectiveness, and decision making tools for rehabilitation.

Forest Service Manual. FSM 1900-Planning. Chapter 1970-Economic and Social Evaluation. Washington Office.

Fowler, James F.; Sieg, Carolynn Hull; McMillin, Joel; Allen, Kurt K.; Negron, Jose F.; Wadleigh, Linda L.; Anhold John A.; and Gibson, Ken E.; 2010. Development of Post- fire Crown Damage Mortality Thresholds in Ponderosa Pine. International Journal of Wildland Fire, 19, 583-588

Fraley, J.J. and B.B. Shepard. 1989. Life History, Ecology, and Population Status of Bull Trout (Salvelinus confluentus) in the Flathead Lake and River system, Montana. Northwest Science 63:133-143.

Froehlich, H. A., Miles, D. W. R., & Robbins, R. W. 1985. Soil bulk density recovery on compacted skid trails in central Idaho. Soil Science Society of America Journal, 49(4), 1015-1017.

Gerhardt, N, Green, P, and Bonn, J. 1991. Description and Effectiveness of Mitigation Measures Used to Minimize Impacts of Timber Management and Road Construction on Soil and Water Resources. Nez Perce National Forest. Prepared White Paper.

Gerhardt, Nick. 1991. The care and feeding of Appendix A, an implementation guide to the fish/water quality objectives. Unpublished report on file at the Nez Perce National Forest. Grangeville, ID. 19p.

Gilbert, B. A., and W. Pierce. 2005. Predicting the Availability of Understory Structural Features Important for Canadian Lynx Denning Habitat on Managed Lands in Northeastern Washington Lynx Ranges. Western Journal of Applied Forestry 20:224–227.

Graham, R., S. McCaffrey, and T. Jain. 2004. Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity. Gen. Tech. Report RMRS-GTR-120. April 2004. 43p.

Graham, R.T., A.E. Harvey, M.F. Jurgensen, T.B. Jain, J.R. Tonn, and D.S. Page-Dumroese. 1994. Managing coarse woody debris in forests of the Rocky Mountains. Res. Pap. INT-RP-477. USDA Forest Service, Intermountain Research Station. 13p.

Graham, R.T., T.B. Jain, and A.E. Harvey. 1999. Fuel: Logs, sticks, needles, duff and much more. In Proceedings, Joint Fire Science Conference and Workshop. Crossing the millennium: integrating spatial technologies and ecological principles for a new age in fire management. L.F. Neunschwander, K.C. Ryan, G.E. Gollberg, and J.D. Greer (editors). Boise, Idaho.

Graham, Russell T., Harvey, Alan E., Page-Dumroese , Deborah S., Minore, Don, Jurgensen, Martin F.; 1990 Soil Management As An Integral Part Of Silvicultural Systems, Symposium on Management and Productivity of Western-Montane Forest Soils, Boise, ID, April 10-12.

Graham, Russell T.; Jain, Theresa B.; Loseke, Mark. 2009. Fuel treatments, fire suppression, and their interaction with wildfire and its impacts: the Warm Lake experience during the Cascade Complex of wildfires in central Idaho, 2007. Gen. Tech. Rep. RMRS-GTR-229. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 36 p.

Graham, Russell T; McCaffrey, Sarah; Jain, Theresa B.; April 2004 ED. Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity. Report RMRS- GTR-120, Washington DC: U.S. Department of Agriculture, Forest Service

Green, P. 1987. Soil Survey, Nez Perce National Forest. USDA Forest Service, Region 1, Nez Perce National Forest. Grangeville, ID.

Groves, C., T. Frederick, G. Frederick, E. Atkinson, M. Atkinson, J. Shepherd, and G. Servheen. 1997. Density, distribution, and habitat of Flammulated Owls in Idaho. Western North American Naturalist 57:116–123.

Gucinski, H. 2001. Forest roads: a synthesis of scientific information. DIANE Publishing.

Gucinski, Hermann; Furniss, Michael J.; Ziemer, Robert R.; and Brookes, Martha H. 2001. Forest roads: a synthesis of scientific information. Gen. Tech. Rep. PNW GTR- 509. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 103 p.

Habeck, J. R., and R.W. Mutch, 1973. Fire Dependent Forests in the Northern Rocky Mountains. Quaternary Research, Vol. 3, No. 3.

Hatter, D., Green, D.C., and Gerhardt, N. 1995. Nez Perce District Watershed Database. Unpublished Report. 39 p.

Haupt, H. F., & Kidd, W. J. 1965. Good logging practices reduce sedimentation in central Idaho. Journal of Forestry, 63(9), 664-670.

Hazardous Fuels Reduction Act, 2003. H. R. 1904; 1/7/2003.

Hessburg, P. F., R. B. Salter, and K. M. James. 2007. Re-examining fire severity relations in pre-management era mixed conifer forests: inferences from landscape patterns of forest structure. Landscape Ecology 22:5–24.

Hobbs, S. D., S. D. Tesch, P.W. Owston, R. E. Stewart, J. C. Tappeniner, G. E. Wells, eds. 1992.

Hoyt, J. S., and S. J. Hannon. 2002. Habitat associations of black-backed and three-toed woodpeckers in the boreal forest of Alberta. Canadian Journal of Forest Research 32:1881–1888.

http://www.ferc.gov/legal/fed-sta/wsr-act.pdf Accessed: Tues. Oct. 27, 2015

http://www.foresthistory.org/ASPNET/Policy/Fire/Suppression/Suppression.aspx

http://www.fs.fed.us/rm/boise/publications/techtrans/pnw_gtr405_v3.pdf

http://www.fs.usda.gov/npnht/ Accessed: Tues, Oct. 27, 2015.

http://www.fsa.usda.gov/Internet/FSA_File/wilderness_act.pdf Accessed: Thurs. Nov. 19, 2015

https://www.nifc.gov/fireInfo/fireInfo_documents/SuppCosts.pdf

Hutto, R. L. 1995. Composition of bird communities following stand-replacement fires in northern Rocky Mountain (U.S.A.) conifer forests. Conservation Biology 9:1041–1058.

Hutto, R. L. 2006. Toward Meaningful Snag-Management Guidelines for Postfire Salvage Logging in North American Conifer Forests. Conservation Biology 20:984–993.

Hutto, R. L. 2008. The ecological importance of severe wildfires: some like it hot. Ecological Applications 18:1827–1834.

Hutto, R. L., and S. M. Gallo. 2006. The effects of postfire salvage logging on cavity-nesting birds. The Condor 108:817–831.

Ice, G.G., Neary, D.G. and Adams, P.W., 2004. Effects of wildfire on soils and watershed processes. Journal of Forestry, 102(6), pp.16-20.).

Idaho Department of Game and Fish (IDFG). 2005. Fringed Myotis (Myotis thysandodes). Digital Atlas of Idaho report. <http://imnh.isu.edu/digitalatlas/bio/mammal/mamfram.htm>. Accessed 25 Oct 2015.

Inbar, M., Tamir, M., Whittenberg, L., 1997. Soil erosion and forestry management after wildfire in a Mediterranean woodland, Mt. Caramel, Israel. J. Wildland Fire 7 (4), 285–294.

Interagency Lynx Biology Team. 2013. Canada lynx conservation assessment and strategy. Third edition. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication R1-13-19. Missoula, Montana.

Jackson, Marcus, December 2006, "Changes in Fire-killed Western Larch on the Glacier View Ranger District (Flathead National Forest) Montana, Year Five Report." Numbered Report 06-12 USDA, Forest Service, Northern Region, Forest Health Protection, Missoula, MT.

Jennings, T. N., Smith, J. E., Cromack Jr, K., Sulzman, E. W., McKay, D., Caldwell, B. A., & Beldin, S. I. (2012). Impact of postfire logging on soil bacterial and fungal communities and soil biogeochemistry in a mixed-conifer forest in central Oregon. Plant and soil, 350(1-2), 393-411.

Johnson, M. G., & Beschta, R. L. 1980. Logging, infiltration capacity, and surface erodibility in western Oregon. Journal of Forestry, 78(6), 334-337.

Jones, J. L., and E. O. Garton. 1994. Selection of successional stages by fishers in north-central Idaho. Pages 377–387 in S. W. Buskirk, A. S. Harestad, M. G. Raphael, and R. A. Powell, editors. Martens, sables, and fishers. Biology and conservation. Cornell University Press, Ithaca, New York.

Keane, Robert E. and Dickinson, Laura J. 2007. Development and Evaluation of the Photoload Sampling Technique. USDA Forest Service. Rocky Mountain Research Station. RMRS-GTR-190. April 2007. 44p.

Kegley, Sandy; "Management Guide for Douglas-fir Beetle." April 2004 Forest Insect And Disease Identification and Management. USDA Forest Service, Forest Health Protection, North Dakota Forest Service, Montana Department of Natural Resources Idaho Department of Lands.

Kidd, W.J., Jr. 1963. Soil erosion control structures on skidtrails. U.S. Forest Service Research Paper INT-1 1963, USDA Forest Service Intermountain Forest and Range Experiment Station, Ogden, UT. 8 pp.

Kingery, H. E., and C. K. Ghalambor. 2001. Pygmy Nuthatch (Sitta pygmaea). A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. <http://bna.birds.cornell.edu/bna/>.

Kochenderfer, J. N. and J. D. Helvey. 1987. Using gravel to reduce soil losses from minimum- standard forest roads. Journal of Soil and Water Conservation. 42(1): 46-50.

Koehler, G. M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology 68:845–851.

Koivula, M. J., and F. K. A. Schmiegelow. 2007. Boreal woodpecker assemblages in recently burned forested landscapes in Alberta, Canada: Effects of post-fire harvesting and burn severity. Forest Ecology and Management 242:606–618.

Korb, J. E., Johnson N. C., Covington W.W. 2004. Slash Pile Burning Effects on Soil Biotic and Chemical Properties and Plant Establishment: Recommendation for Amelioration. Restoration Ecology Vol 12 (1): 52-62.

Laflen, J.M., Elliot, W.J., Flanagan, D.C., Meyer, C.R. and Nearing, M.A., 1997. WEPP-predicting water erosion using a process-based model. Journal of Soil and Water Conservation, 52(2), pp.96-102.

Larsen, I.J. and MacDonald, L.H., 2007. Predicting postfire sediment yields at the hillslope scale: Testing RUSLE and Disturbed WEPP. Water Resources Research, 43(11).

Larsen, I.J. and MacDonald, L.H., 2007. Predicting postfire sediment yields at the hillslope scale: Testing RUSLE and Disturbed WEPP. Water Resources Research, 43(11).Latif, Q. S., V. A. Saab, K. Mellen-Mclean, and J. G. Dudley. 2015. Evaluating habitat suitability models for nesting white-headed woodpeckers in unburned forest. The Journal of Wildlife Management 79:263–273.

Laven, Edward E. 1991. The Nez Perce National Forest Story. USDA Forest Service and Northwest Interpretive Association.

Laverty, L. and J. Williams. 2000. Protecting People and Sustaining Resources in Fire-Adapted Ecosystems: A Cohesive Strategy. The Forest Service Management Response to the General Accounting Office Report GAO/RCED-99-65. Also known as the National Fire Plan. October 13, 2000. 85p.

Lazarus. Laura; 2012. BFO-TR-2012-25 Insects and Disease Concerns for Mosquito Flat Proposed Project, August 27, 2012.

Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, J.E. Williams and others. 1997. Chapter 4: Broadscale Assessment of Aquatic Species and Habitats. In T.M. Quigley and S. J. Arbelbide eds AAn Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins Volume III@. U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management, Gen Tech Rep PNW-GTR-405.

Lehmkuhl, J. F., R. L. Everett, R. Schellhaas, P. Ohlson, D. Keenum, H. Riesterer, and D. Spurbeck. 2003. Cavities in Snags along a Wildfire Chronosequence in Eastern Washington. The Journal of Wildlife Management 67:219–228.

Lewiston Tribune, 10/12/15. Eric Barker: New methods reduce firefighting danger. Monday, 10/12/15.

Litschert, S.E. and MacDonald, L.H., 2009. Frequency and characteristics of sediment delivery pathways from forest harvest units to streams. Forest Ecology and Management, 259(2), pp.143-150.

Luce, C and T. Black, 2001. Effects of Traffic and Ditch Maintenance on Forest Road Sediment Production. In Proceedings of the Seventh Federal Interagency Sedimentation Conference, March 25-29, 2001, Reno, Nevada. pp. V67–V74.

Luce, C.H. and Black, T.A., 1999. Sediment production from forest roads in western Oregon. Water Resources Research, 35(8), pp.2561-2570.

Lysne, S.J. and B.R. Krouse. 2011. Margaritifera falcate in Idaho using museum collections and GIS to demonstrate a declining trend in regional distribution. Journal of the Idaho Academy of Science 47(2) 33-39.

Martin, K., and J. M. Eadie. 1999. Nest webs: a community-wide approach to the management and conservation of cavity-nesting forest birds. Forest Ecology and Management 115:243–257.

Martinson, E., and P. Omi. 2003. Performance of Fuel Treatments Subjected to Wildfires. p. 7-14. In: Omi, P.N., and J.A. Linda, tech. eds. 2003. Fire, fuel treatments, and ecological restoration: Conference proceedings; 2002. 16-18 April; Ft. Collins, CO. Proceedings RMRS-P-29. USDA, Forest Service, RMRS. 475p.

May, B.E., B.J. Writer, and S. Albeke. 2012. Redband trout status update summary. Prepared by Wild Trout Enterprises, LLC. Bozeman, Montana.

McCaffery, M., Switalski, T.A. and Eby, L., 2007. Effects of road decommissioning on stream habitat characteristics in the South Fork Flathead River, Montana. Transactions of the American Fisheries Society, 136(3), pp.553-561.

McClelland, B. R., and P. T. McClelland. 1999. Pileated woodpecker nest and roost trees in montana: links with old-growth and forest "health." Wildlife Society Bulletin 27:846–857.

McDaniel, P. A., & Wilson, M. A. (2007). Physical and chemical characteristics of ash-influenced soils of Inland Northwest forests. USDA For Serv Proc RMRS-P-44, 31-45.

McDaniel, P. A., Fosberg, M. A., & Falen, A. L. (1993). Expression of andic and spodic properties in tephra-influenced soils of northern Idaho, USA. Geoderma, 58(1), 79-94.

McGreer, D. J. 1981. Skid Trail Erosion Tests-First Year Results. Lewiston, ID: Potlatch Corporation.

McIntyre, J. D. and B.E. Rieman. 1995. Westslope cutthroat trout. Pages 1-15 in Young, M. K., editor. Conservation assessment for inland cutthroat trout. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station General Technical Report RM-256, Fort Collins, Colorado.

McIver, J. D., & Ottmar, R. (2007). Fuel mass and stand structure after post-fire logging of a severely burned ponderosa pine forest in northeastern Oregon. Forest Ecology and Management, 238(1), 268-279.

McIver, J.D. and Starr, L. 2001. A literature review of the environmental effects of postfire logging. Western J. Appl. Forest. 12, 159–168.

McIver, J.D., McNeil, R. 2006. Soil disturbance and hill-slope sediment transport after logging of a severely burned site in northeastern Oregon. Western J. Appl. Forest. 21 (3), 123–133.

Megahan, W. F., & Kidd, W. J. (1972). Effects of logging and logging roads on erosion and sediment deposition from steep terrain. Journal of Forestry, 70(3), 136-141.

Megahan, W.F. 1980. Nonpoint source pollution from forestry activities in the western United States: Results of recent research and research needs. In US. Forestry and Water Quality: What Course in the 80s? An Analysis of Environmental and Economic Issues. Proceedings, 92-151. June 19- 20, 1980, Richmond, VA. Washington, DC: Water Pollution Control Federation.

Megahan, W.F. and King, J.G., 2004. Erosion, sedimentation, and cumulative effects in the northern Rocky Mountains.

Megahan, W.F., Monsen, S.B. and Wilson, M.D., 1991. Probability of sediment yields from surface erosion on granitic roadfills in Idaho. Journal of Environmental Quality, 20(1), pp.53-60.

Mellen, T. K., E. C. Meslow, and R. W. Mannan. 1992. Summertime home range and habitat use of pileated woodpeckers in western Oregon. The Journal of Wildlife Management 56:96–103.

Millar, C. I., N. L Stephenson and S. L. Stephens. 2007. Climate Change and Forest of the Future: Managing in the Face of Uncertainty. Ecological Applications, 17(8), 2007, pp. 2145-2151, Ecological Society of America.

Mitchell, R. and H. Preisler, 1998. Fall rate of lodgepole pine killed by mountain pine beetle in central Oregon. West J. Appl. For., 13 (1998) pp. 23-26.

Moehring, D. M., & Rawls, I. W. 1970. Detrimental effects of wet weather logging. Journal of Forestry, 68(3), 166-167.

Montana/Idaho Airshed Group Operating Guide, June 2010.
http://www.smokemu.org/docs/20100601OpsGuide.pdf 60pp.

Moody, J.A., Martin, D.A., Haire, S.L. and Kinner, D.A., 2008. Linking runoff response to burn severity after a wildfire. Hydrological Processes, 22(13), pp.2063-2074.

Morgan, P., and B. Shiplett. 1989. Photographic Series: Appraising Slash Fire Hazard in Idaho-Western Hemlock-Grand Fir-Western Redcedar-Ponderosa Pine. Idaho Department of Lands, Boise, ID. August 1989. 117p.

Moser, B. W., and E. O. Garton. 2009. Short-term effects of timber harvest and weather on northern goshawk reproduction in northern Idaho. Journal of Raptor Research 43:1–10.

Mowat, G., K. G. Poole, and M. O'Donoghue. 2000. Ecology of lynx in northern Canada and Alaska. Ecology and conservation of lynx in the United States. University Press of Colorado, Boulder, USA 265–306.

Muck, J. 2010. Biological effects of sediment on bull trout and their habitat—Guidance for evaluating effects. U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office, Lacey, WA.

Narayanaraj, Ganapathy; Wimberly, Micheal C.; "Influences of forest roads on spatial pattern of wildfire boundaries" International Journal of Wildland Fire CSIRO Publishing 2011 20, 792-803

National Interagency Fire Center, 2010. IRPG. NFES 1077. 2010. 79 p.

National Trails System Act. 1968. P.L. 90-543, P.L. 111-11, 2009. 16 U.S.C.1241-1251.

Nedeau, E.J., A.K. Smith, J. Stone, and S. Jepsen. 2009. Freshwater mussels of the Pacific Northwest, Second edition. The Xerces Society, Portland, Oregon.

Negron, Jose F., Anhold, John; Munson A. Steven; 2001. Within-Stand spatial Distribution of TreeMortality Caused by the Douglas-fir Beetle (Coleoptera: Scolytidae) Environmental Entomology April 2001 Vol 30 no 2. PP 215-224.

Newton, M; Fitzgerald, S; Rose, R.R; Adams, P. W; Tesch, S. D; Sessions, J; Atzet, T; 4. Powers, Noss, R. F. and Lindenmayer, D. B. (2006). The ecological effects of salvage logging after natural disturbance-Introduction.

Nez Perce-Clearwater National Forest. Draft 2014. Forest Plan Revision.

Olson, L. E., J. D. Sauder, N. M. Albrecht, R. S. Vinkey, S. A. Cushman, and M. K. Schwartz. 2014. Modeling the effects of dispersal and patch size on predicted fisher (Pekania [Martes] pennanti) distribution in the US Rocky Mountains. Biological Conservation 169:89–98.

Opperman, J.J., Lohse, K.A., Brooks, C., Kelly, N.M. and Merenlender, A.M., 2005. Influence of land use on fine sediment in salmonid spawning gravels within the Russian River Basin, California. Canadian Journal of Fisheries and Aquatic Sciences, 62(12), pp.2740-2751.

Ottmar, R., J. Peterson, B. Leenhouts, and J. Core. 2001. Smoke management: Techniques to reduce or Redistribute Emissions. Chapter 8, pp. 141-159. In: Hardy, C., R. Ottmar, J. Peterson, J. Core, and P. Seamon. Eds. 2001. Smoke management guide for prescribed and wildland fire. 2001 Edition. National Wildfire Coordination Group, Boise, Idaho. NFES 1279. PMS 420-2. December 2001. 226p.

Page-Dumroese, D., Jurgensen, M., Abbott, A., Rice, T., Tirocke, J., & DeHart, S. (2006). Monitoring changes in soil quality from post-fire logging in the inland northwest. Proceedings, Fuels management: How to measure success. PL Andrews, & BW Butler (compilers). US Department of Agriculture Forest Service, Rocky Mountain Research Station, Fort Collins, Colo. RMRS-P-41, 605-614.

Parsons, A., P. Robichaud, S.A Lewis, C. Napper, and J.T. Clark. 2010. Field guide for mapping post-fire soil burn severity. Gen. Tech. Rep. RMRS-TR-243. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 49p.

Pauley, G.B., B.M. Bortz and M.F. Shepard. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Northwest) steelhead trout. US Fish and Wildlife Service Biological Report 82(11.62). 24p. US Army Corps of Engineers, TR EL-81-4.

Peterson, D., E. Dodson, and R. Harrod. 2015. Post-fire logging reduces surface woody fuels for up to four decades following wildfire. Forest Ecology and management 338(2015) 84-91.

Peterson, D.P., Fausch, K.D., and White, G.C. 2004. Population ecology of an invasion: effects of brook trout on native cutthroat trout. Ecol. Appl. 14(3): 754–772.

Powell, R. A., and W. J. Zielinski. 1994. Fisher. L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, editors. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Missoula, Montana.

Project Scoping Letter, December 2, 2015. File Code 7730, Ralph Rau signed for Cheryl Probert.

Purcell, K. L., A. K. Mazzoni, S. R. Mori, and B. B. Boroski. 2009. Resting structures and resting habitat of fishers in the southern Sierra Nevada, California. Forest Ecology and Management 258:2696–2706.

Quigley, T., R. Haynes, and R. Graham, tech. eds. 1996. Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin. General Technical Report PNW-GTR-382, Sept. 1996, 303p. part of the Interior Columbia Basin Environmental Management Project (ICBEMP, 9/96).

Raley, C. M., and K. B. Aubry. 2006. Foraging Ecology of Pileated Woodpeckers in Coastal Forests of Washington. The Journal of Wildlife Management 70:1266–1275.

Raley, C. M., E. C. Lofroth, R. L. Truex, J. S. Yaeger, and J. M. Higley. 2012. Habitat ecology of fishers in western North America. Pages 231–254 in. Martens, sables, and fishers. A new synthesis. Cornell University Press, Ithaca, New York.

Ratliff, D.E. 1992. Bull trout investigations in the Metolius River-Billy Chinook System. In P.J. Howell and D.V. Buchanan (eds.) Proceedings of the Gearhart Mountain Bull Trout workshop. Oregon Chapter of the American Fisheries Society. Corvallis Or. Pp 37-44.

Reeves, Derrick; Page-Dumroese, Deborah; Coleman, Mark. 2011. Detrimental soil disturbance associated with timber harvest systems on National Forests in the Northern Region. Res. Pap. RMRS-RP-89 Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 12 p.

Reforestation practices in southwestern Oregon and northern California. Forestry Research Laboratory, Oregon State University, Corvallis, Oregon. 465 pp.

Reid, L.M. and Dunne, T., 1984. Sediment production from forest road surfaces. Water Resources Research, 20(11), pp.1753-1761.

Reynolds, Keith M.; Hessburg, Paul F.; Miller, Richard E.; Meurisse, Robert T. 2011. Evaluating soil risks associated with severe wildfire and ground-based logging. Gen. Tech. Rep. PNW-GTR-840. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 27 p.

Reynolds, R. T., R. T. Graham, M. H. Reiser, R. L. Bassett, P. L. Kennedy, D. A. Boyce Jr, G. Goodwin, R. Smith, and E. L. Fisher. 1992. Management recommendations for the northern goshawk in the southwestern

United States. US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station Fort Collins, Colorado.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. Gen. Tech. Rep. INT-302. Ogden, UT: U.S. Dep. of Agriculture, Forest Service, Intermountain Research Station. 38 pp.

Robichaud, P. R., Elliot, W. J., Pierson, F. B., Hall, D. E., Moffet, C. A., & Ashmun, L. E. (2007). Erosion Risk Management Tool (ERMiT) user manual (version 2006.01. 18).

Robichaud, P. R., Wagenbrenner, J. W., Brown, R. E., Wohlgemuth, P. M., & Beyers, J. L. 2008. Evaluating the effectiveness of contour-felled log erosion barriers as a post-fire runoff and erosion mitigation treatment in the western United States. International Journal of Wildland Fire, 17(2), 255-273.

Rosgen, D.L., 1994. A classification of natural rivers. Catena, 22(3), pp.169-199.

Rota, C. T., J. J. Millspaugh, M. A. Rumble, C. P. Lehman, and D. C. Kesler. 2014a. The Role of Wildfire, Prescribed Fire, and Mountain Pine Beetle Infestations on the Population Dynamics of Black-Backed Woodpeckers in the Black Hills, South Dakota. Plos One 9:e94700.

Rota, C. T., M. A. Rumble, J. J. Millspaugh, C. P. Lehman, and D. C. Kesler. 2014b. Space-use and habitat associations of Black-backed Woodpeckers (Picoides arcticus) occupying recently disturbed forests in the Black Hills, South Dakota. Forest Ecology and Management 313:161–168.

Rothermel, Richard C. 1983. How to predict the spread and intensity of forest and range fires. Gen. Tech. Rep. GTR-INT-143.Intermountain Forest and Range Experiment Station, USDA Forest Service.

Ruediger, B., J. Claar, S. Mighton, B. Naney, T. Rinaldi, F. Wahl, N. Warren, D. Wenger, A. Williamson, and L. Lewis. 2000. Canada lynx conservation assessment and strategy.

Russell, R. E., V. A. Saab, J. G. Dudley, and J. J. Rotella. 2006. Snag longevity in relation to wildfire and postfire salvage logging. Forest Ecology and Management 232:179–187.

Saab, V. A., Q. S. Latif, M. M. Rowland, T. N. Johnson, A. D. Chalfoun, S. W. Buskirk, J. E. Heyward, and M. A. Dresser. 2014. Ecological Consequences of Mountain Pine Beetle Outbreaks for Wildlife in Western North American Forests. Forest Science 60:539–559.

Saab, V. A., R. E. Russell, and J. G. Dudley. 2007. Nest densities of cavity-nesting birds in relation to postfire salvage logging and time since wildfire. Condor 109:97–108.

Saab, V. A., R. E. Russell, and J. G. Dudley. 2009. Nest-site selection by cavity-nesting birds in relation to postfire salvage logging. Forest Ecology and Management 257:151–159.

Saffel, P.D. and D.L. Scarnecchia. 1995. Habitat use by juvenile bull trout in belt-series geology watersheds of northern Idaho. Northwest Science 69:304-317.

Saracco, J. F., R. B. Siegel, and R. L. Wilkerson. 2011. Occupancy modeling of black-backed woodpeckers on burned Sierra Nevada forests. Ecosphere 2. <http://www.esajournals.org/doi/abs/10.1890/ES10-00132.1>. Accessed 11 Sep 2013.

Sauder, J. D. 2014. Landscape ecology of fishers (*Pekania pennanti*) in north-central Idaho. Ph.D., University of Idaho, Moscow, Idaho.

Sauder, J. D., and J. L. Rachlow. 2014. Both forest composition and configuration influence landscape-scale habitat selection by fishers (*Pekania pennanti*) in mixed coniferous forests of the Northern Rocky Mountains. Forest Ecology and Management 314:75–84.

Sauder, J. D., and J. L. Rachlow. 2015. Forest heterogeneity influences habitat selection by fishers (*Pekania pennanti*) within home ranges. Forest Ecology and Management 347:49–56.

Schoby, G.P and E.R. Keeley. 2011. Home Range Size and Foraging Ecology of Bull Trout and Westslope Cutthroat Trout in the Upper Salmon River Basin, Idaho. Transactions of the American Fisheries Society. 140:636-645

Schwartz, M. K., N. J. DeCesare, B. S. Jimenez, J. P. Copeland, and W. E. Melquist. 2013. Stand-and landscape-scale selection of large trees by fishers in the Rocky Mountains of Montana and Idaho. Forest Ecology and Management 305:103–111.

Scott, Joe H. and R. Burgan. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

Seyedbagheri, K.A. 1996. Idaho Forestry Best Management Practices: Compilation of Research on Their Effectiveness. Gen. Tech. Rep. INT-GTR-339. Ogden UT: USDA, Forest Service, Intermountain Research Station. 89 p.

Shepard, B, S.A. Leathe, T.M. Weaver and M.D. Enk. 1984. Monitoring levels of fine sediment within tributaries to Flathead Lake, and Impacts of Fine Sediment on Bull Trout Recruitment. Unpublished paper presented at the Wild Trout III Symposium, Yellowstone National Park, WY. On file at Montana Department of Fish, Wildlife and Parks. Kalispell, MT.

Silins, U., Stone, M., Emelko, M. B., & Bladon, K. D. (2009). Sediment production following severe wildfire and post-fire salvage logging in the Rocky Mountain headwaters of the Oldman River Basin, Alberta. Catena, 79(3), 189-197.

Simmons, Eric A., Hayes, Steven W., Morgan, Todd A., Keegan, Charles E., Witt, Chris. "Idaho's Forest Products Industry and Timber Harvest 2011 with Trends Through 2013." Resource Bulletin RMRS-RB-19 (2014): 1-46. Fort Collins, CO: USDA Rocky Mountain Research Station.

Skinner, C; "Comment on ''Post-Wildfire Logging Hinders Regeneration and Increases FireRisk'' August 2006, American Association for the Advancement of Science, 1200 New York Avenue NW, Washington.

Slesak, R. A., Schoenholtz, S. H., & Evans, D. (2015). Hillslope erosion two and three years after wildfire, skyline salvage logging, and site preparation in southern Oregon, USA. Forest Ecology and Management, 342, 1-7.

Smith, D. M. 1986. The Practice of Silviculture, Eighth Edition. John Wiley and Sons, New York. 527p.

Smith, H. G., & Dragovich, D. (2008). Post-fire hillslope erosion response in a sub-alpine environment, south-eastern Australia. Catena, 73(3), 274-285.

Smith, H.G., Sheridan, G.J., Lane, P.N.J., Bren, L.J.(2011). Wildfire and salvage harvesting effects on runoff generation and sediment exports from radiata pine and eucalypt forest catchments, south-eastern Australia. For. Ecol. Manage. 261, 570–581.

Smith, J.K., and W.C. Fischer. 1997. Fire Ecology of the Forest Habitat Types of Northern Idaho. Gen. Tech. Report INT-GTR-363. Ogden, UT: USDA Forest Service, Intermountain Research Station. 142p.

Smith, K (District Fisheries Biologist). Personal observations of PACFISH buffers post-harvest and post-site preparation (slash burning) on Clearwater National Forest timber sales from 2000 through 2013.

Smith, K. 2014. PACFISH buffer monitoring report. Lochsa District, Nez Perce-Clearwater National Forest, Kooskia, ID. 10 pp.

Spanos, I., Raftoyannis, Y., Goudelis, G., Xanthopoulou, E., Samara, T., Tsiontsis, A., 2005. Effects of postfire logging on soil and vegetation recovery in a Pinus halepensis Mill. Forest of Greece. Plant Soil 278, 171–179.

Squires, J. R., and L. F. Ruggiero. 2007. Winter prey selection of Canada lynx in northwestern Montana. Journal of Wildlife Management 71:310–315.

Squires, J. R., K. S. McKelvey, and L. F. Ruggiero. 2004. A snow-tracking protocol used to delineate local lynx (Lynx canadensis), distributions. The Canadian Field-Naturalist 118:583–589.

Squires, J. R., N. J. Decesare, J. A. Kolbe, and L. F. Ruggiero. 2008. Hierarchical den selection of Canada lynx in western Montana. Journal of Wildlife Management 72:1497–1506.

Squires, J. R., N. J. Decesare, J. A. Kolbe, and L. F. Ruggiero. 2010. Seasonal resource selection of Canada lynx in managed forests of the northern Rocky Mountains. Journal of Wildlife Management 74:1648–1660.

Stabenow, J.H., Ulvestad, K.N., Fitz, L., Hardee, V., Howard, G., McClelland, K., Robbins, M.A., Woodward, W.W., Sundberg, F.A. 2006. The effects of logging burned wood on soil erosion rates. Hydrol. Water Resour. Arizona Southwest. 36, 13–20.

Steinbrenner, E. C., & Gessel, S. P. (1955). The effect of tractor logging on physical properties of some forest soils in southwestern Washington. Soil Science Society of America Journal, 19(3), 372-376.

Stevens, S. and J. Moghaddas. 2005. Experimental fuel treatment impacts on forest structure, potential fire behavior, and predicted tree mortality in a California mixed conifer forest. Forest Ecology and Management 215 (2005) 21-36.

Stone, D., S. Holland, M. Dressen, J. Bonn, J. D. Sauder, J. R. Squires, and M. K. Schwartz. 2013. Nez Perce National Forest multi-species meso-carnivore surveys. USDA Forest Service, Rocky Mountain Research Station, Missoula, Montana.

Sullivan, B. L., C. L. Wood, M. J. Iliff, R. E. Bonney, D. Fink, and S. Kelling. 2009. eBird: A citizen-based bird observation network in the biological sciences. Biological Conservation 142:2282–2292.

Sullivan, Timothy E. 1988. Monitoring soil physical conditions on a national forest in eastern Oregon: a case study. In: Slaughter, Charles W.; Gasbarro, Tony, eds. Proceedings of the Alaska Forest Soil Productivity Workshop; 1987 April 28-30; Anchorage, AK. Gen. Tech. Rep. PNW-219. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 69-76.

Swanberg, T.R. 1997. Movements of and habitat use by fluvial bull trout in the Blackfoot River, Montana. Transactions of the American Fisheries Society 126: 735-746.

Swift, L. W., Jr. 1984.Gravel and grass surfacing reduces soil loss from mountain roads. Forest Science. 30(3): 657-70.

Tague, C. and Band, L., 2001. Simulating the impact of road construction and forest harvesting on hydrologic response. Earth Surface Processes and Landforms, 26(2), pp.135-151.

Tappeiner II, John C.; Maguire, Douglas A.; Harrington, Timothy B.; 2007 Silviculture and Ecology of Western U.S. Forest. Oregon State University Press; Corvallis, OR. pp 440

Tepp, J.S. 2002. Assessing visual soil disturbance on eight commercially thinned sites in northeastern Washington. Res. Note. PNW-RN-535. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 20p.

Thurow, R. 1987. Evaluation of the South Fork Salmon River Steelhead Trout Fishery Restoration Program. Lower Snake River Fish and Wildlife Compensation Plan. Job Completion Report, Contract No 14-16-0001-86505. Idaho Department of Fish and Game.

Tingley, M. W., R. L. Wilkerson, M. L. Bond, C. A. Howell, and R. B. Siegel. 2014. Variation in home-range size of Black-backed Woodpeckers. The Condor 116:325–340.

Toupin, Richard; Filip, Gregory; Erkert, Barger, Micheal. 2008 A Field Guide for Danger Tree Identification and Response. USDA, Forest Service, Pacific Northwest Region, USDI, Bureau of Land Management, Associate Oregon Loggers Inc. and Oregon OSHA.

Truex, R. L., and W. J. Zielinski. 2013. Short-term effects of fuel treatments on fisher habitat in the Sierra Nevada, California. Forest Ecology and Management 293:85–91.

Ulizio, T., J. R. Squires, and J. J. Claar. 2007. Nez Perce National Forest 2007 Lynx Surveys. Final Report. USFS Rocky Mountain Research Station, Missoula, Montana.

United States Fish and Wildlife Service (USFWS). 2002. Bull Trout (Salvelinus confluentus) Draft Recovery Plan. Portland, Oregon.

USDA 2008 Coarse Woody Debris, Snag and Green Tree Retention Guidelines

USDA Forest Service & MT Department of Fish Wildlife and Parks. 2010. Missoula Area Snowmobile Trails Map, Lolo and Clearwater National Forests and the Montana Department of Fish, Wildlife and Parks.

USDA Forest Service 1974. National Forest Landscape Management, Volume 2, Chapter: The Visual Management System. Agric. Handbook. 462. Washington, DC: U.S. Department of Agriculture, Forest Service. 47 p.

USDA Forest Service 1982. Recreation Opportunity Spectrum (ROS) Users Guide. Washington DC. http://www.fs.fed.us/cdt/carrying_capacity/rosguide_1982.pdf Accessed: Monday, Nov. 30, 2015.

USDA Forest Service 1987. Clearwater National Forest Land and Resource Management Plan. Clearwater National Forest. Northern Region. Kamiah, ID.

USDA Forest Service 1987. Final environmental impact statement for the Clearwater National Forest Plan. USDA Forest Service, Clearwater National Forest, Orofino, Idaho.

USDA Forest Service 1987. Nez Perce National Forest Land and Resource Management Plan. Nez Perce-Clearwater National Forest. Northern Region. Kamiah, ID.

USDA Forest Service 1990. Forest Service Manual (FSM) 2300 - Recreation, Wilderness, and Related Resource Management WO Amendment 2300-90-1. Chapter 2310 - Planning and Data Management. Section 2311.1 Pg. 4.

USDA Forest Service 1995. Landscape Aesthetics: A Handbook for Scenery Management. Agric. Handbook. 701. Washington, DC: U.S. Department of Agriculture, Forest Service. 246 p.

USDA Forest Service 1995. Decision notice and finding of no significant impact for the inland native fish strategy (INFISH). July 1995. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_033158.pdf

USDA Forest Service 1995. Per FSM File Code 2670/1950, August 17, 1995; Streamlining Biological Evaluations and Conclusions for Determining Effects to Listed, Proposed and Sensitive Species.

USDA Forest Service 1999. Health and Safety Code Handbook Washington DC: U.S. Department of Agriculture, Forest Service FSH 6709.11.

USDA Forest Service 2002. Lolo National Forest, Post burn: Environmental impact statement.

USDA Forest Service 2003. Nez Perce National Forest. Coarse Woody Debris, Snag, and Green Tree Retention Guidelines. Red Pines EIS, Appendix K. Elk City, ID.

USDA Forest Service 2005. Travel Guide. Clearwater National Forest. Northern Region. R1-05-70.

USDA Forest Service 2007. Northern Rockies lynx management direction record of decision. USDA Forest Service, Rocky Mountain Region, Missoula, Montana.

USDA Forest Service 2008. Flathead National Forest, Sheppard Creek Post-fire Project: Environmental Impact Statement

USDA Forest Service 2011. Travel Planning: Final Environmental Impact Statement Record of Decision, Volume 1& 2. Clearwater National Forest. Northern Region.

USDA Forest Service 2011. Winter Recreation Trails Map: Clearwater Country: State Designated Area 18 as part of 25B north of Hwy 12. Pierce, Idaho Area.

USDA Forest Service 2012. Nez Perce-Clearwater National Forest.-Black Sheep Salvage EA.

USDA Forest Service 2015. Nez Perce-Clearwater National Forests: Road, Administrative Site and Recreation Site Maintenance Project Initiation Letter.

USDA Forest Service 2016. DRAMVU: Final Environmental Impact Statement Record of Decision, Nez Perce National Forest. Northern Region.

USDA Forest Service and USDI Bureau of Land Management 1995. Decision notice and finding of no significant impact for the interim strategies for managing anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho, and portions of California. February1995.

USDA Forest Service National Park Service, Bureau of Land Management, U.S. Fish & Wildlife Service. "About the Wild and Scenic River Act." http://www.rivers.gov/wsr-act.php Accessed Sun, Dec 6, 2015

USDA Forest Service, 1965. Silvics of Forest Trees of the United States Washington DC: U.S. Department of Agriculture, Forest Service Agricultural Handbook No 271.

USDA Forest Service, Forest Health Protection, North Dakota Forest Service, Montana Department of Natural Resources Idaho Department of Lands. 2004 Forest Insect and Disease Identification and Management.

USDA Forest Service, USDI Bureau of Land Management, February 2004b, The Healthy Forest Initiative and the Healthy Forest Restoration Act Interim Field Guide. Washington DC: U.S. Department of Agriculture, Forest Service Report FS-799 pp 58

USDA Forest Service 2002. Lolo National Forest, Post burn: Environmental impact statement.

USDA Forest Service 2008. Flathead National Forest, Sheppard Creek Post-fire Project: Environmental Impact Statement

USDA Forest Service 2012. Nez Perce-Clearwater National Forest.-Black Sheep Salvage EA.

USDA Forest Service. 2014. Soil Management Supplement 2500-2014-1. Forest Service Manual. USDA Forest Service, Region 1. Missoula, MT. 9p.

USDA Forest Service. 2015. Boulder Burned-Area Report. USDA Forest Service, Region 1, Nez Perce – Clearwater NF. Kamiah, ID. 15p.

USDA Forest Service. 2015. Elk City Complex Burned-Area Report. USDA Forest Service, Region 1, Nez Perce – Clearwater NF. Kamiah, ID. 12p.

USDA Forest Service. 2015. Jay Point Burned-Area Report. USDA Forest Service, Region 1, Nez Perce – Clearwater NF. Kamiah, ID. 15p.

USDA Forest Service. 2015. Motorway North Burned-Area Report. USDA Forest Service, Region 1, Nez Perce – Clearwater NF. Kamiah, ID. 15p.

USDA Forest Service. 2015. Slide Burned-Area Report. USDA Forest Service, Region 1, Nez Perce – Clearwater NF. Kamiah, ID. 15p.

USDA Forest Service. 2015. Teepee Springs Burned-Area Report. USDA Forest Service, Region 1, Nez Perce – Clearwater NF. Kamiah, ID. 20p.

USDA Forest Service. 2015. Wash Burned-Area Report. USDA Forest Service, Region 1, Nez Perce – Clearwater NF. Kamiah, ID. 14p.

USDA Forest Service. 2015. Woodrat Burned-Area Report. USDA Forest Service, Region 1, Nez Perce – Clearwater NF. Kamiah, ID. 13p.

USDA Forest Service. Nez Perce National Forest 1987. Nez Perce Forest Plan. Nez Perce National Forest. Grangeville, Idaho.

USDA Natural Resources Conservation Service 1986. Urban Hydrology for Small Watersheds. Conservation Engineering Division, Technical Release 55.

USDA Natural Resources Conservation Service. 1986. Urban Hydrology for Small Watersheds. Conservation Engineering Division, Technical Release 55.

Vierling, K. T., V. A. Saab, and B. W. Tobalske. 2013. Lewis's Woodpecker (Picoides albolarvatus). A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. <http://bna.birds.cornell.edu/bna/>.

Wade, C. R., Bolding, M. C., Aust, W. M., & Lakel, W. A. (2012). Comparison of five erosion control techniques for bladed skid trails in Virginia. Southern Journal of Applied Forestry, 36(4), 191-197.

Wagenbrenner, J.W., MacDonald, L.H., Coats, R.N., Robichaud, P.R., Brown, R.E., (2015). Effects of post-fire salvage logging on ground cover, soils and sediment production in the interior western USA. Forest Ecol. Manage. 335, 179–193.

Wagenbrenner, J.W., MacDonald, L.H., Coats, R.N., Robichaud, P.R., Brown, R.E., (2015). Effects of post-fire salvage logging on ground cover, soils and sediment production in the interior western USA. Forest Ecol. Manage. 335, 179–193.

Ward, D.L., B.J. Clemens, D. Clugston, A.D. Jackson, M.L. Moser, C. Peery, and D.P. Statler. 2012. Translocating adult Pacific lamprey within the Columbia River basin: state of the science. Fisheries 37(8): 351-361.

Weaver T.M., and J. Fraley. 1991. Fisheries habitat and Fish populations, Flathead Basin Forest Practices. Flathead Basin Commission Water Quality and Fisheries Cooperative Program, Kalispell, MT.

Weigel, D.E., Peterson, J.T., Spruell, P. 2003. Introgressive hybridization between native cutthroat trout and introduced rainbow trout. Ecological Applications. 13: 38-50.

Weir, R. D., and F. B. Corbould. 2010. Factors affecting landscape occupancy by fishers in north-central British Columbia. Journal of Wildlife Management 74:405–410.

Wemple, B.C. and Jones, J.A., 2003. Runoff production on forest roads in a steep, mountain catchment. Water Resources Research, 39(8).

Wemple, B.C., Jones, J.A. and Grant, G.E., 1996. Channel network extension by logging roads in two basins, Western Cascades, Oregon1.

Wemple, B.C., Jones, J.A. and Grant, G.E., 1996. Channel network extension by logging roads in two basins, Western Cascades, Oregon1.

Wild and Scenic Rivers Act. 1968. (P.L. 90-542; 16 U.S.C. 1271-1287).

Wilderness Act. 1964. (P.L.88–577; 16 U.S.C 1131-1136)

Wilson, D.J., J. Coyner and T. Dechert. 1983. Land system inventory, Clearwater National Forest. USDA Forest Service, Region 1, Clearwater National Forest, Orofino, ID.

Wipfli, Mark S, J.P. Hudson, J.P. Caouette, N.L. Mitchell, J.L. Lessard, R.A. Heintz, D.T. Chaloner. 2010. Salmon Carcasses Increase Stream Productivity More than Inorganic Fertilizer Pellets: A Test on Multiple Trophic Levels in Streamside Experimental Channels. Transactions of the American Fisheries Society 139: 824-839.

Wisdom, M. J., R. S. Holthausen, B. C. Wales, C. D. Hargis, V. A. Saab, D. C. Lee, W. J. Hann, T. D. Rich, M. M. Rowland, and W. J. Murphy. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia Basin: broad-scale trends and management implications. US Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Wondzell, S.M. and J.G. King. 2003. Postfire erosional processes in the Pacific Northwest and Rocky Mountain regions. Forest Ecology and Management. 178: 75-87

Wondzell, S.M. and King, J.G., 2003. Postfire erosional processes in the Pacific Northwest and Rocky Mountain regions. Forest Ecology and Management, 178(1), pp.75-87.

www.nps.gov/ncrc/programs/nts/legislation.html Accessed: Tues, Oct 27, 2015.

Youkey, D. 2012. Status of Management Indicator Species on the Colville National Forest. Okanogan-Wenatchee National Forest.

Youngblood, A., C. Wright, R. Ottmar, and J. McIver. 2007. Changes in fuel bed characteristics and resulting fire potentials after fuel reduction treatments in dry forests of the Blue Mountains, northeastern Oregon. Forest Ecology and Management 225: 3151-3169.

Zack, A., and P. Morgan. 1994. Fire History on the Idaho Panhandle National Forest. Review Draft. March 22, 1994. 44p.

Zielinski, W. J., J. R. Dunk, J. S. Yaeger, and D. W. LaPlante. 2010. Developing and testing a landscape-scale habitat suitability model for fisher (*Martes pennanti*) in forests of interior northern California. Forest Ecology and Management 260:1579–1591.

Zielinski, W. J., R. L. Truex, G. A. Schmidt, F. V. Schlexer, K. N. Schmidt, R. H. Barrett, and Martin. 2004. Resting habitat selection by fishers in California. Journal of Wildlife Management 68:475–492.