United States
Department of
Agriculture

Forest
Service

June 2014

Final Environmental Impact Statement

Upper North Fork HFRA Ecosystem Restoration Project

North Fork Ranger District, Salmon-Challis National Forest
Lemhi County, Idaho

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TTY). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW., Washington, DC 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TTY). USDA is an equal opportunity provider and employer.

Upper North Fork HFRA Ecosystem Restoration Project
Final Environmental Impact Statement
Lemhi County, Idaho

Lead Agency: USDA Forest Service
Responsible Official: Nora Rasure; Region 4 Regional Forester
Federal Building
324 25th Street
Ogden, UT 84401
801-625-5605

For Information Contact: Maggie Seaberg; IDT Leader
11 Casey Rd
North Fork, ID 83466
208-865-2711

Abstract: The Upper North Fork area contains the State Highway 93 transportation corridor and the Salmon River Scenic Byway, private lands, residences and a winter recreation ski facility that falls within the Lemhi County wildland-urban interface. The Upper North Fork Healthy Forest Restoration Act (HFRA) Ecosystem Restoration Project would conduct fuel and vegetation treatment activities across approximately 41,423 acres. Activities would include commercial harvest and thinning, non-commercial thinning, ladder fuel reduction, shaded fuel breaks and prescribed burning; meadow, aspen and white-bark pine enhancement; culvert replacement and riparian habitat restoration treatments. The purpose of this project is to reduce hazardous natural fuels, restore plant communities and improve fish and wildlife habitat diversity while returning resilient conditions to this fire adapted landscape. This project is needed in order to complement other existing, ongoing and planned fuels treatments surrounding “at-risk” communities within the North Fork drainage, which addresses forest health conditions that are rapidly deteriorating. Two action alternatives are analyzed in this document. Alternative 1 is the proposed action, and alternative 2 is a variation on the proposed action with no new temporary road construction.

Objection Opportunities and Implementation: This Draft Record of Decision (ROD) and Final Environmental Impact Statement (FEIS) are subject to objection pursuant to 36 CFR 218, subparts A and C (Pre-Decisional Administrative Review). Objections will only be accepted from those who have previously submitted specific written comments regarding the proposed project during designated opportunities for public comment in accordance with §218.5(a). Issues raised in objections must be based on previously submitted, timely, specific written comments regarding the proposal unless based on new information arising after the designated comment opportunities.

A written objection must be submitted within 30 calendar days following the publication date of the notice of this opportunity to object in the Federal Register. All objections will be open to public inspection during the objection process. It is the responsibility of the objector to ensure their objection(s) is received in a timely manner. The publication date in the newspaper of record is the exclusive means for calculating the time to file an objection. Those wishing to object should not rely on date or timeframe information provided by any other source. The regulations prohibit extending the time to file an objection. Objections, including attachments, must be filed via mail, fax, email, hand-delivered, express delivery, or messenger service.

The objection must be filed with the objection reviewing officer in writing. The objection must contain the minimum requirements specified in §218.8(d) and incorporation of documents by reference is

permitted only as provided in §218.8(b). At a minimum, the objection must include the following information (36 CFR 218.8(d)):

- The objector's name and address, with a telephone number if available;
- A signature, or other verification of authorship upon request (a scanned signature for electronic mail may be filed with the objection);
- When multiple names are listed on an objection, identification of the lead objector and verification of the identity of the lead objector must be provided upon request;
- The name of the proposed project for which the decision will be made,
- the name and title of the Responsible Official, and the name of the forest and/or ranger district on which the proposed project will be implemented; and
- A description of those aspects of the proposed project addressed by the objection, including specific issues related to the proposed project; if applicable, how the objector believes the environmental analysis or draft decision specifically violates law, regulation, or policy; suggested remedies that would resolve the objection; supporting reasons for the reviewing officer to consider; and
- A statement that demonstrates the connection between prior specific written comments on the particular proposed project or activity and the content of the objection, unless the issue is based on new information that arose after the opportunity for comment;

Written objections must be submitted (regular mail) to: Chief, USDA Forest Service, ATTN: Objection Reviewing Officer, 1400 Independence Ave., SW, EMC-JAR, Mailstop 1104, Washington, D.C. 20250 (postal) or 202-649-1172 (facsimile). Electronic comments must be submitted in a format such as an email message, plain text (.txt), rich text format (.rtf), and Word (.doc or .docx) to: objections-chief@fs.fed.us

Physical address for UPS, FedEx, and hand deliveries: USDA Forest Service, ATTN: Objection Reviewing Officer, 201 14th Street SW, EMC-JAR, Mailstop 1104, Washington, D.C. 20250. Phone for carrier deliveries: 202-205-1449. The office business hours for those submitting hand-delivered comments are 8:00 a.m. to 5:00 p.m. Monday through Friday, excluding federal holidays.

Please type "Upper North Fork HFRA Ecosystem Restoration Project FEIS" in the subject line for e-mail messages and facsimile and include your mailing address and phone number.

An automated response should confirm your electronic objection has been received. In cases where no identifiable name is attached to an electronic message, a verification of identity will be required. A scanned signature is one way to provide verification.

If an objection is received on this project, a 30 day objection review period will begin. Prior to a written response by the reviewing officer, the reviewing officer or the objector may request to meet to discuss issues raised in the objection and any potential resolution. The reviewing officer has the discretion to determine whether or not adequate time remains in the review period to make a meeting with the objector practical. All meetings are open to the public. If you are interested in attending any resolution discussions, please contact Ken Rodgers at (208) 879-4154, who will provide you with the appropriate contact information for the Washington Office.

Objections can be dismissed for a number of reasons including if they are not timely, if the project is not subject to objection, if the person did not comment in a timely or specific manner, if insufficient or illegible information was presented, if identity cannot be provided, if the objector withdraws the objection, or if the responsible official cancels the objection process. The responsible official can cancel

the objection process if he feels the objection process should be re-initiated; for example, if he believes additional information to the environmental impact statement is needed to further understand the project.

At the end of the objection reviewing period the reviewing officer may consolidate objections and issue one response or may decide to issue a written response to each objection. The written response(s) will present the reasons for the response, but is not required to be a point-by-point response. It may contain instructions to the responsible official. The written response will be the final decision by the U.S. Department of Agriculture on the objections.

Once the reviewing officer has issued the response to the objections and the responsible official has followed any instructions contained in the written response, or if no objections are received, the responsible official may sign the final Record of Decision and implement the project without further legal notice of the decision. Interested and affected parties will be informed of the decision. The signing of the Record of Decision in accordance with 40 CFR 1506.10, may occur on, but not before, the 5th business day following the end of the objection filing period.

Contact Person: For additional information concerning this draft decision or the Forest Service objection process, contact Maggie Seaberg, Team Leader, North Fork Ranger Station, P.O. Box 180, 11 Casey Rd. North Fork, Idaho 83466, phone (208) 865-2711 or email margareteseaberg@fs.fed.us.

Objections Must Be Received: **30 days following the publication in the Federal Register**

Summary

Introduction

The United States Department of Agriculture, U.S. Forest Service, Salmon-Challis National Forest, North Fork Ranger District proposes a hazardous fuels reduction project with additional forest restoration components. This project is approximately 41,423 acres and is located in the Upper North Fork River Drainage, about seven miles north of North Fork, Idaho. The project area is located entirely in Lemhi County in portions of Township/Range 27N 20E, 27N 21E, 27N 22E, 26N 20E, 26N 21E, 26N 22E, 25N 21E, 25N 22E, Boise Meridian. Elevation ranges between 4,200 and 8,200 feet.

While this project addresses management only on National Forest System lands, it is designed to function in coordination with past and other planned treatments on nearby and adjacent public and private lands. Treatments have been completed on private lands in Moose Creek Estates (a Firewise community) as well as along the Hughes Creek corridor in partnership with the Lemhi County wildland-urban interface. Plans for expanding landowner participation and treatment areas beyond the home defensible space zone are also underway. The Upper North Fork project would complement recent work done by the 13,000 acre Hughes Creek Hazardous Fuels Reduction project, the 2006-2007 Ransack Timber Sale, the Gibbonsville Fuels Reduction Projects on the east side of the Ditch Creek drainage and the Lost Trail Salvage Timber Sale administered by the Bitterroot National Forest. The Upper North Fork project complements these other projects by expanding treatments to a large, landscape scale area as well as treating public/private land boundaries. In the project area, local communities are interested in seeing treatments expanded on public lands in collaboration with the Lemhi County Forest Restoration Group.

Within the Upper North Fork drainage, fire suppression has allowed dense vegetation and surface fuel loading to accumulate. The potential for a wildfire start is high due to lightning, residential development and recreational use. Predicted fire behavior modeling of timber stands and representative fuel types indicates that high intensity fire with rapid rates of spread would be likely under extreme fire-weather conditions. Existing conditions in the project area, as well as terrain and fuel structures are typical of forested ecosystems throughout the Salmon-Challis National Forest where a number of large-scale wildland fires have occurred in the last decade.

History of project development

This project is designed to complement other existing, ongoing and planned fuels treatments within the Upper North Fork River drainage. This drainage is a mosaic of private and public land, and as such a landscape level management approach was used for developing this proposal. The project area includes the communities of Gibbonsville and North Fork that have widespread private land resources, and have been identified as “at-risk” communities by Lemhi County and the State of Idaho. Lemhi County revised its Wildland/Urban Interface Fire Mitigation Plan in 2006 (also known as a Lemhi County Wildfire Prevention Plan) designating the North Fork drainage as high priority for hazardous fuel reduction.

This project is a collaborative effort between the Forest Service and numerous outside partners including private individuals, industry, environmental and other groups and agencies, particularly the Lemhi County Forest Restoration Group (LCFRG). Discussions with the Lemhi County Forest Restoration Group have been ongoing since 2008. The Lemhi County Forest Restoration Group has held meetings; conference calls and field trips contributing to the common goal of landscape scale ecosystem restoration.

Purpose and Need

The Upper North Fork project area includes the State Highway 93 transportation corridor and the Salmon River Scenic Byway, private lands, residences and a winter recreation ski facility that fall within the Lemhi County wildland-urban interface. The purpose of this project is to reduce hazardous natural fuels, restore plant communities, improve fish and wildlife habitat, and create an environment that is more resilient to disturbance as part of a fire-adapted landscape. This project is needed in order to complement other completed, ongoing and planned fuels and vegetation treatments surrounding “at-risk” communities within the North Fork drainage; all of which address forest health conditions that are rapidly deteriorating.

Existing forest stand structure and forest vegetation have created the potential for large-scale, high-intensity wildfires that threaten human life, property, and natural resources. This potential coupled with the project area’s high frequency of lightning-caused wildfires has created an environment where, if no action is taken, severe impacts from wildland fire would likely result. This leaves surrounding communities vulnerable to damage caused by these fires.

In addition, the biodiversity of the project area is at risk. Quaking aspen stands provide substantial habitat value for wildlife and contribute to landscape habitat diversity. However, many historic aspen stands in Central Idaho have been lost, and many others are either regenerating poorly or are otherwise in decline. Likewise, whitebark pine is the first tree species in the Northwest to be listed as a candidate for the threatened and endangered species list because of a deadly combination of blister rust and mountain pine beetle. Historic logging practices and fire suppression have also contributed to a decline in ponderosa pine, a fire resilient species.

Lemhi County has developed its County Wildfire Protection Plan to include localized mapping and definition of wildland-urban interface areas; and has designated the North Fork area as high priority for hazardous fuels reduction treatment. Private developments, such as Moose Creek Estates, have completed planning and hazard reduction treatments required to enroll as “Fire-Wise Communities” in the State of Idaho. Because there is an identified need to reduce hazardous fuels, and because the County has classified the project area as wildland-urban interface, this project falls under the authority of the Healthy Forest Restoration Act (HFRA).

Proposed Action

The Forest proposes using the HFRA authority to reduce wildfire risk to communities; protect ecosystems within the Upper North Fork watershed; and address threats to forest health, including catastrophic wildfire. Fuel, in the form of vegetation, is the only component of fire behavior that can be controlled through active management. In some portions of the 41,423 acre project area, vegetation is continuous from the ground to the canopy, creating ladder fuel conditions that support crown fires. Crown fire, a symptom of an overcrowded forest, can exhibit high intensity fire behavior that is uncharacteristic of the historic fire regime for the Upper North Fork area. High intensity crown fires leave the landscape scorched and susceptible to other environmental damage such as flooding, landslides, and weed infestations. In addition, high intensity crown fire is difficult to slow or stop through any fire suppression tactics which puts nearby communities at great risk.

The Forest has identified hazardous fuels treatments and associated opportunities for this project through extensive discussions, focused site visits and numerous exchanges of ideas with the Lemhi County Forest Restoration Group and other local community members. These opportunities include reducing ladder fuels along road corridors, creating shaded fuel breaks in strategic locations adjacent to private land and other developments, and using prescribed burns to reestablish resilience to fire on the landscape.

The proposed action includes commercial thinning of trees below the canopy to reduce the understory on approximately 4,520 acres of the project area. These areas would include 2,351 acres of tractor logging and 1,137 acres of helicopter logging. Of the 4,520 commercially thinned acres, 1,032 acres would be skyline logging. Emphasis would be on retaining large trees and using whole tree yarding to facilitate use of tree tops and slash as biomass or for pile burning. All slash piles would be left onsite for one year for possible biomass utilization. Precommercial thinning would occur within the commercial units on not more than 1,300 additional acres. All thinning (commercial/precommercial) units would receive a follow-up prescribed burning treatment.

The entire 41,423 acre project area[1] is proposed for prescribed burning in spring or fall. Prescribed burning activities include the construction of up to 200 miles of handline along unit perimeters to implement burning in commercial units. In units where there would be only an understory or broadcast burn, there would be up to 25 miles of fireline constructed either by hand or excavator for a width of 18 inches down to mineral soil. If an excavator is used, it would be used on no more than 50 percent of the fireline. No trees would be removed to construct handlines with the exception of snags that could be hazardous to firefighters or potentially fall over the fireline. Those would be felled away from the fireline. New shaded fuelbreaks would be constructed on 975 acres in 11 units. Tree species retention for these shaded fuelbreaks is explained in detail in chapter 2.

As part of the hazardous fuels reduction treatments, 13.9 miles of temporary routes would be constructed, and 2.1 miles of that would be located in an Idaho Roadless Area (Anderson Mountain). These routes are short term (less than 2 years) and would be built, utilized for project specific uses, and then immediately rehabilitated through a variety of restoration treatments. Additionally, 12.2 miles of route would be upgraded to meet road standards on routes that are currently closed. These routes would be utilized only for administrative uses to access project areas for fuels reduction activities and would also be rehabilitated after completion of the project. An additional 66.3 miles of route that currently have a closed designation would be rehabilitated through a variety of restoration treatments which are described in chapter 2. No changes in public access are proposed during or after the implementation of the project.

The other component of the proposed action is addressing threats to forest health through restoration activities. The proposed restoration treatments would help create a fire resilient forest by improving overall landscape health through restoring mountain meadows, protecting old growth stands, restoring fish habitat and passage, and improving aspen and whitebark pine communities. This would be accomplished through a variety of actions including resizing and removing culverts, rehabilitating roads designated as closed through the Salmon-Challis National Forest Travel Plan, and rehabilitating riparian habitat.

Public Involvement

Healthy Forest Restoration Act projects are subject to the 36 CFR 218 regulations for a pre-decisional objection process. As part of that pre-decision emphasis, there are distinct requirements for collaboration, public involvement, and alternative development. In part, the Healthy Forest Restoration Act directs:

- Collaboration (Healthy Forest Restoration Act, Section 104(f)) – The Forest Service shall facilitate collaboration when preparing Healthy Forest Restoration Act projects.
- Public Meetings (Healthy Forest Restoration Act, Section 104(e)) – The Forest Service must conduct a public meeting when preparing a Healthy Forest Restoration Act project.

[1] with the exception of the Allen Mountain Research Natural Area and the Lost Trail Ski Area and areas where prescribed burning is not permitted.

- Alternative Development (Healthy Forest Restoration Act, Section 104(c) and (d)) – The requirements for a range of alternatives analyzed in an environmental impact statement developed under the Healthy Forest Restoration Act vary based on land description, including whether the project location is within or outside of wildland-urban interface. The Upper North Fork project is within a wildland-urban interface, and as such, the required alternatives are:
    - The proposed action,
    - The no-action alternative, and
    - Not more than one additional action alternative if one is proposed during scoping or the collaborative process. If more than one additional alternative is proposed, the Forest Service must select one and provide a written record describing the reason for its selection.

The Salmon-Challis National Forest has consulted with individuals and groups for suggestions and input on restoration needs and potential activities for this project area to improve the health of the ecosystem and reach the desired future condition of the Salmon-Challis Land Management Plan. The Lemhi County Forest Restoration Group has been a key partner in developing this proposed action. The Collaborative developed a recommendation memo in 2010 which is the basis of the Upper North Fork Proposed Action. The recommendation memo reflects the consensus that was reached following over two years of field trips and meetings (the memo is located in the project record). A follow-up consensus memo was written in 2012 to reaffirm the Collaborative group's support.

The Notice of Intent (NOI) was published in the Federal Register on August 3, 2011. The Notice of Intent asked for public comment on the proposal by September 2, 2011. Public meetings were held on this proposed project at the Gibbonsville Improvement Association Building and at the Sacajawea Center in Salmon both in August of 2011. Additional public meetings occurred on April 9th and 10th, 2014 during the draft environmental impact statement public comment period. Using the comments from the public, other agencies, and Tribes (see *Issues* section), a list of issues to address was developed.

Tribal Consultation

Government-to-government consultation between the Forest Service, the Nez Perce and the Shoshone-Bannock Tribes regarding the Upper North Fork HFRA Ecosystem Restoration Project was initiated by scoping letter August 1, 2011. Consultation/coordination meetings (staff to staff) with the Shoshone-Bannock Tribes were conducted with the Tribes Resource Staff and held in Challis on May 10, 2011 and May 3, 2012, and November 21, 2013. The Tribes were given summary information and maps; and informed that no Native American archaeological sites were identified during the cultural resource inventory and that there would be no known effects to such sites as a result of project implementation. The Tribes acknowledged these findings and were in agreement with the Forest's no effect determination. No requests were received for more detailed information from Tribal representatives. The Tribes received copies of the draft environmental impact statement.

Issues

Issues serve to highlight effects or unintended consequences that may occur from the proposed action, giving opportunities during the analysis to reduce adverse effects and compare tradeoffs for the decision maker and public to understand. In order to identify issues, the interdisciplinary team (IDT) reviewed and considered all scoping comments submitted in the public involvement period. Comments received were sorted into seven categories and are summarized in a table in the project record with a description of why the issue is insignificant, thus eliminated from detailed analysis. Significant issues are defined as those directly or indirectly caused by implementing the proposed action. The Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations explain this delineation in Sec.

1501.7(a)(3), "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" This process generated two significant issues:

1. Idaho Roadless Areas:

The proposed action would involve cutting and removal of timber along with temporary road building in Idaho roadless areas adjacent to community protection zones and tree cutting/thinning outside the community protection zone which may impact the roadless characteristics of these areas. One of the Lemhi County Forest Restoration Group's recommendation was that an alternative be developed that would not require temporary roads to be constructed within the Idaho roadless area.

Measurement Indicators:

- Miles of temporary road constructed within Idaho roadless areas
- Acres of Idaho roadless areas treated within community protection zone by treatment type
- Acres of Idaho roadless areas treated outside of community protection zone by treatment type

2. Wildlife Habitat:

Proposed treatments for hazardous fuel reduction and forest restoration may impact the amount, quality and distribution of wildlife habitat within the project area. This has been addressed with a site specific Forest Plan amendment related to big game winter range. The best available data and most up to date science has been used to assess impacts to big game anticipated from proposed activities.

Measurement Indicators:

- Percent of the analysis area meeting the "Hillis paradigm" (security areas >than 250 acres and >0.5 miles from open motorized routes).
- Cover:forage ratio within the analysis area.

Alternatives

This Upper North Fork Final Environmental Impact Statement documents the analysis of the following alternatives considered in detail.

No Action with Wildfire

The Healthy Forest Restoration Act states that while agencies are not expected to fully develop a no action alternative, "they should evaluate the effects of failing to implement the project. This evaluation should allow an assessment of the short and long-term effects of failing to implement the project in the event the court is asked to consider requests for an injunction" (HFRA Field Guide 2004).

Changes in forest structure due to fire suppression in the project area over the past few decades have significantly increased the potential for uncharacteristic fire behavior. At a landscape scale, stand replacing fire in up to 50 percent of forested and riparian ecosystems during summer drought and extreme weather conditions is a plausible event as a consequence of not implementing hazardous fuels reduction activities. In 2012 the Mustang Fire burned through 341,416 acres on the North Fork District of the Salmon-Challis National Forest and the adjacent Bitterroot National Forest threatening many homes in the wildland-urban interface. This is the context for which "No Action with Wildfire" was evaluated for the Upper North Fork HFRA Ecosystem Restoration Project.

Alternative 1 - Proposed Action

This alternative was created to respond to the purpose and need for this project. Hazardous fuels reduction treatments would include mechanical thinning from below to reduce understory and ladder fuels on approximately 4,535 acres of the project area. Ground based harvest systems using tractors would be used on 2,350 acres, skyline yarding systems would be used on 1,032.4 acres, and 1,138 acres would use helicopters for tree removal.

Approximately 970 acres of strategically located shaded fuel breaks and 1,291 acres of meadows have been identified within the project area. There are many aspen and whitebark pine stands scattered throughout the project area that may be opportunistically treated during implementation. All thinning (commercial and precommercial) units would receive a follow up prescribed burning treatment. Up to 200 miles of fireline along unit perimeters would be needed to implement burning in commercial thinning units. This includes helicopter, precommercial thin, skyline and tractor unit perimeters.

Ladder fuels would be reduced along access roads; and precommercial thinning of trees less than 7 inches diameter breast height (dbh) would be conducted in helicopter, tractor and skyline harvest units following commercial thinning to reduce ladder fuels. Precommercial thinning would also be conducted on 1,270 acres in select units. Noncommercial fuels treatments would occur on 445 acres using a combination of burning, hand thinning, pruning, and hand piling to achieve the desired level of fuels reduction in each of the proposed units. A number of units from about 500 – 5,000 acres over approximately 38,826 acres (excluding Lost Trail Ski Area and all inholdings) would be prescribed burned primarily during spring and fall spread out over a 5 to 10 year period.

All of the designated old growth stands within the project area would be treated through ladder fuel reduction in the form of low intensity fire, thinning of the small diameter trees, or a combination of both.

In addition to vegetation treatments, there would be 3 miles of stream restoration treatments and 3 culvert replacements to improve riparian habitat and fish passage.

The project would use up to 94 miles of existing system roads and an estimated 26 miles of existing non-system roads to complete the treatments. 13.9 miles of new temporary routes would be constructed, 2.1 miles of which would be located in an Idaho Roadless Area. Additionally, 12.2 miles of roads would be upgraded to meet road standards on routes that are currently closed. An additional 66.8 miles of route that currently have a closed designation would be decommissioned through a variety of restoration treatments. These roads proposed for decommissioning are identified in the Salmon-Challis Travel Plan. No changes in public access are proposed during or after the implementation of the project.

Alternative 2 – No New Temporary Road Construction

This alternative was designed to address concerns raised during the public comment period. Alternative 2 differs from the proposed action in that no new temporary roads would be constructed. All other proposed activities are the same as those described under alternative 1, other than any activities directly affected by not creating new temporary roads. Harvest activities would include commercially thinning from below to reduce the understory on approximately 4,444 acres of the project area, and strategically located shaded fuel break treatments would occur on approximately 1,050 acres. There would be 1,899 acres of tractor logging, 596 acres of skyline logging and 1,949 acres of helicopter logging. Depending upon timber market conditions the economic viability of helicopter logging can vary over time. However, not treating these acres would not meet the purpose and need of the project. Existing road prisms may still be used as temporary roads to implement proposed treatments.

All proposed harvest units which are not accessible without the new temporary road construction would either be dropped from treatment, have modified unit boundaries, or harvest methods changed to be suitable with the available road system. In this alternative, the Hammerean Loop Road would no longer be a loop. The road would be closed to all motorized use at the existing rock slide and turnarounds established. Additionally, National Forest System Road 60078A (3.1 miles) would be seasonally closed from October 1st through May 21st to enhance wildlife habitat and security from September 30th through May 21st.

In this alternative, approximately 12 miles of temporary road would be used for access to project areas. All 12 miles of temporary roads to be used are existing unclassified roads where no new construction is needed. Approximately 61.5 miles of non-system user created roads and 6.4 miles of closed system roads would be decommissioned. These roads proposed for decommissioning are identified in the Salmon-Challis Travel Plan.

Table 1. Comparison of alternatives by treatment

	No Action	Alternative 1– Proposed Action	Alternative 2 – No New Temp Roads
Rx Burn	None	38,826 ac	38,826 ac
Precommercial Thin	None	1,270 ac	1,270 ac
Shaded Fuel Break	None	970 ac	1,050 ac
Noncommercial Fuels Treatment	None	445 ac	445 ac
Commercial Thin – All Logging Systems	None	4,520 ac	4,444 ac
Tractor Logging	None	2,350 ac	1,899 ac
Skyline Logging	None	1,032 ac	596 ac
Helicopter Logging	None	1,138 ac	1,949 ac
Meadow Treatment	None	1,291 ac	1,291 ac
Designated Old Growth Treatment	None	3,563 ac	3,563 ac
Temp Road Construction	None	26.1 miles	11.6 miles
Road Decommissioning	None	66.8 miles	67.2 miles
Improved Fish Passage	None	150 meters	150 meters
Culverts Replaced	None	3	3
Stream Restoration	None	3 miles	3 miles

Site Specific Forest Plan Amendments

For both alternative 1 and 2 we are proposing three site specific Forest Plan amendments in order to meet our project objectives. These amendments would change current requirements and prescriptions which limit treatments and activities we have identified as necessary to attain the desired future condition in the project area:

Proposed Site Specific Amendment #1-Wildland fire management would more closely align with Federal Wildland Fire policy by managing unplanned ignitions to meet project objectives.

Proposed Site Specific Amendment #2-Big game winter range would change direction regarding thermal and hiding cover and habitat capability within management area (MA) 4A in order to achieve fuels reduction objective in this Healthy Forest Restoration Act project.

Proposed Site Specific Amendment #3- The Pacific Anadromous Fish Strategy (PACFISH) riparian habitat conservation area buffer widths would be modified to the road allowing mechanical treatment (commercial thinning for fuels reduction) above the road outside of the modified riparian habitat conservation areas. This modification would only take place where there is a road within the riparian habitat conservation area buffer between the unit boundary and the stream channel.

Summary of Effects to Resources

This section provides a summary of the effects of implementing each alternative by resource.

Silviculture

Summary of Effects of Taking No Action

The environmental consequences of adopting the No-Action Alternative would be substantial and important. In short, implementing the No-Action Alternative would be to allow successional and disturbance processes to occur without the influence of activities described under alternatives 1 or 2, and would thereby result in different characteristics of vegetation composition, structure, and density within the Upper North Fork forest affected environment.

These successional and disturbance processes, and the resulting patterns of species composition, density, and forest structure, have been broadly described for forest ecosystems very similar to those in the Upper North Fork area in Powell (2000), and references therein. Site-specific changes, however, would be highly stochastic (unpredictable) and for the purposes of this report essentially unquantifiable. Nevertheless, recent experience with wildfires in nearby, similar forest ecosystems provides some reference of spatial distributions of burn severity occurring in an existing era of full fire suppression, and comparisons to recent spatiotemporal burn distributions can be made. By reducing the occurrence of wildfire disturbance within the Upper North Fork forest affected environment, fire suppression and exclusion activities have had—and would have for the foreseeable future—important consequences for forest vegetation. These effects are well-understood and thoroughly described in general terms in Powell (2000) and references therein. And in combination with fire exclusion and suppression, allowing non-anthropogenic successional and disturbance processes to shape present and future vegetation conditions within the Upper North Fork forest affected environment would also have predictable and significant consequences that can be described in general terms. In the near-term, these would likely include:

- Transition toward (and further over-representation of) mid and late-seral species, and further reductions of early seral species abundance and distribution, including aspen, ponderosa pine, and whitebark pine.
- Transition toward (and further over-representation of) understory re-initiation and old forest (particularly multi-story) structure types, and further reductions of under-represented stem exclusion and stand initiation forest structure types.
- Transition toward (and further over-representation of) high-density forests, at the expense of under-represented low and moderate-density forests.
- Increased susceptibility to high-severity, stand-replacement wildfire over all portions of the landscape. For many ecosystems adapted to low or mixed-severity wildfire, increased susceptibility to high-severity wildfire poses elevated risks of losing key ecosystem components and is outside historic ranges of variability for post fire ecosystem recovery processes.
- Susceptibility to (and tree damage/mortality resulting from) insect, dwarf mistletoe, and disease disturbances is expected to generally increase across the forest vegetation affected environment as

sites increase in density, canopy layering, and the relative abundance of Douglas-fir, spruce, and true firs.

Summary of Effects for Alternative 1 and Alternative 2

Alternative 1 and 2 would have an effect on forest vegetation and how the forest functions in relation the insects and disease and wildfire in the Upper North Fork forest affected environment.

- Forest Vegetation Species Composition
  - Dramatic changes are expected over the long run in response to altered fire regimes associated with the re-introduction of low and mixed severity regimes across the landscape.
  - Low thinning and broadcast burning would focus on the removal of late-seral trees in subordinate canopy positions, and leave a well-stocked stand of remaining trees composed predominantly of the original species characterizing the cover type.
  - Moderate and high-severity fires are expected to regenerate some stands, but in these areas post-fire cover types are expected to be very similar to pre-fire cover types, with some exceptions described below.
- Forest Vegetation Structural Classes
  - High-severity fires are expected to convert approximately 14 percent of the forest vegetation affected environment to the stand initiation class.
  - Widespread conversion from mature forest to the understory re-initiation and multi-storied forest classes due to the break-up of mature forest canopies from fire, bark beetle, and mechanical thinning activities, and expected subsequent tree regeneration.
  - The abundance of stem exclusion classes is expected to decrease only slightly. Although many areas of classed as stem exclusion could be impacted by moderate severity fire and/or thinning as a result of the action alternatives.
- Forest Vegetation Density / Canopy Cover
  - The general effect of the activities would be a reduction of canopy cover, resulting in a distribution shift toward lower density classes. High classes (relatively dense forests) would decrease, while lower classes (relatively sparse forests) would increase.
- Forest Vegetation Insect and Disease Susceptibility
  - Once trees respond to a thinning (usually 3-5 years after treatment), their improved vigor promotes production of defensive chemical compounds enhancing beetle resistance.
  - Reducing stand density, particularly by separating tree crowns, reduces overall susceptibility to defoliating insects such as the Douglas-fir tussock moth and western spruce budworm.
  - A tendency toward greater tree mortality from root diseases has been observed for stands with high density (Filip et al. 1989c). Thinning increases host vigor and resistance to Armillaria; it can also improve resistance by modifying the proportion of hosts to non-hosts in a stand.
- Fire Regime Condition Class
  - The combination of mechanical treatments and prescribed broadcast burning would move much of the Upper North Fork forest affected environment toward a fire regime condition class of 1.

Fire and Fuels

Effects of Taking No Action

- The ability to suppress fire would not improve, because flame lengths would require mechanized equipment and indirect firefighting tactics would be needed for control. (Refer to the section on fire hazard.) Fifty-six percent of the project area would have flame lengths over 4 feet, and 55 percent of the area is subject to passive or active crown fire.
- Firefighter safety would not be improved because of flame length and crown fire potential. Modeling indicates 56 percent of the project area would support flame lengths greater than 4 feet, and 55 percent of the area is subject to passive or active crown fire, and the torching index is well below the 97 percent wind speeds for some fuel models is the majority of the treatment units (see appendix A of the fire and fuels report, located in the project record).
- Risk to life and property within the project area would not be improved because flame lengths would be such that mechanized equipment and indirect firefighting tactics, larger firefighting organization would be needed for control. Torching index is well below the 97 percent wind-speeds for some fuel models is the majority of the treatment units (see appendix A of the fire and fuels report, located in the project record).
- Does not reduce the risk to resource values, because we are not reducing the accumulation of hazardous fuels that has the potential for high severity impacts. 55 percent of the area is subject to passive or active crown fire.
- Not consistent with National Fire Plan and Healthy Forest Initiative because we are not reducing the accumulation of hazardous fuels within the wildland urban interface.
- Does not decrease the potential for high severity fires because we are not increasing canopy base height, reducing ladder fuels and reducing the amount of surface fuels. The torching index would remain low in portions of almost all treatment units.

Effects for Alternative 1 and Alternative 2

- Fire suppression ability would be increased, because flame lengths would be reduced. Flame lengths would generally be less than 4 feet and fireline intensities would be low enough to allow for more direct firefighting tactics when compared with taking no action (see appendix A of the fire and fuels report, located in the project record).
- Firefighter safety would be improved because of reduced flame length, which would generally be less than 4 feet high (appendix A of the fire and fuels report, located in the project record), and fire type would be surface. These would reduce potential fire behavior and increase the torching index - meaning a higher wind speed would be required to initiate any type of crown fire.
- Risk to life and property adjacent to and near the project area, would be improved because post treatment conditions would allow safe fire suppression management actions due to low flame lengths (less than 4 feet high), and surface fire type.
- The torching index is increased, meaning higher wind speeds would be required for any kind of crown fire.
- Risk to resource values would be reduced because we are reducing the potential for high severity wildfire on both action alternatives.

- Proposed fuel treatments would mitigate factors that tend to increase fire behavior potential, such as increased wind penetration, and increased grass and brush growth; by reducing horizontal and vertical fuel continuity, surface fuel accumulation and ladder fuels.
- Consistent with National Fire Plan, Fire Management plan, and Healthy Forest Initiative because we are reducing the accumulation of hazardous fuels within the wildland-urban interface.

Air Quality

Effects of Taking No Action

In taking no action, fuels would increase along with the potential for increased particulate output in the advent of wildfire. These emissions would exceed National Ambient Air Quality Standards particulate matter standards, temporarily degrade air quality and visibility in the wilderness areas, and pose potential safety issues by reducing visibility on major roads such as Highway 93.

Effects for Alternative 1 and Alternative 2

The proposed action and alternative 2 would produce emissions and temporarily impact air quality. Prescribed fire emissions can be mitigated by burning when atmospheric conditions are conducive to the transport and dispersion of smoke. Local air quality districts permit and regulate prescribed burning which assures that conditions are favorable for this activity. There would be a short term cumulative impact to air quality if several prescribed burns are occurring in an air basin at the same time. There would be reduced impacts to air quality when future wildfires burn in units where activity fuels are treated due to lower emissions a result of decreased fuel loading. Both action alternatives conform to national, regional, and local rules and regulations.

Roadless and Unroaded Areas

Effects of Taking No Action

Taking no action would maintain the existing roadless characteristics and wilderness attributes of Idaho Roadless areas and the contiguous unroaded lands in the Upper North Fork HFRA Ecosystem Restoration Project area. Any changes to the roadless characteristics and wilderness attribute would be due to natural occurrence and would likely be the result of insect, disease or wildfire activity. At a landscape scale, stand replacing fire in up to 50 percent of forested and riparian ecosystems during summer drought and extreme weather conditions is a plausible event as a consequence of not implementing hazardous fuels reduction activities. The No Action alternative meets the direction established for unroaded areas by the Forest Plan and the Idaho Roadless Rule.

Effects of Alternative 1 and Alternative 2

While project activities could temporarily reduce the feeling of solitude during the time of implementation and undeveloped feel of areas during short to mid-term recovery periods, there would be no long-term negative effects to the roadless characteristics of the Idaho roadless areas. Cumulatively, the current roadless characteristics and wilderness attributes of the Allan Mountain, Anderson Mountain and West Big Hole Idaho Roadless Areas would be maintained and some criterion improved would remain similar to what they currently are and would not be notably affected by project alternatives 1 and 2 because:

- Fuels reduction and temporary road construction activities proposed inside these Idaho roadless areas and contiguous unroaded areas would occur adjacent to private lands, existing highways, and areas with Forest system roads and active management;

- Fuels reduction treatments in the Idaho roadless areas and unroaded areas would result in stand conditions with varying tree densities and would not be noticeable in the future (20 or more years);
- Restoration activities for mountain meadows, whitebark pine and aspen stands and decommissioning of unneeded roads would result in landscape appearance and ecosystem processes more representative of historic conditions in the long term.
- Prescribed burning and management of wildland fire occurrences mimics and/or returns a natural disturbance process;
- Activities proposed outside and adjacent to these Idaho roadless areas would occur within areas that have been previously developed on National Forest System lands.
- Neither alternative would reduce the existing capability of these Idaho roadless areas to be suitable for wilderness consideration.

Soils and Hydrology

Effects of Taking No Action

The probable long-term consequence of not treating fuels is a large scale, high intensity wildfire. The worst case scenario would concentrate a major wildfire in the Middle and Upper North Fork subwatersheds, in heavy timber, and remove the majority of vegetation which would create hydrophobic soil conditions in areas with heavy fuel accumulation. Appreciable changes in slope stability, runoff, and sediment delivery are likely to occur following a large-scale, high intensity wildfire.

Compliance with State Water Quality Standards and Maintenance of Beneficial Uses

The direct water quality effects of wildfire are usually associated with burned material or air dropped retardant entering a waterbody and potentially elevating water temperature or nutrient levels. The indirect effects include possible decreases in interception and infiltration, with possible increases in surface and mass erosion, nutrient loading, and sedimentation. Fire that includes significant amounts of high burn severity can greatly increase erosion rates. Elevated turbidity (suspended sediment) could also degrade water quality.

Modeled Probability of Erosion and Sediment Delivery

Wildfires burn indiscriminately without regards to mitigation normally associated with prescribed burning including buffer strips, fuel loadings and burn severity. Wildfires usually burn late in the summer when relative humidity and fuel moistures are low; even in the riparian areas. Because the buffer strips burn under these extreme conditions there would be a greater chance for the eroded materials to enter stream courses.

Potential for changes in timing and magnitude of water yield

There is potential for a large increase in Equivalent Clearcut Area[2] in the event of large scale, stand-replacing fire in the project area. Post-wildfire increases in Equivalent Clearcut Area could result in changes in the magnitude and timing of spring-early summer peakflows, and late summer-fall baseflows. Increases in the magnitude and duration of peakflows could result in channel morphology changes and streambank erosion. Decreased baseflows could result in low flow fish migration barriers and increased water temperatures.

[2] Equivalent clearcut area (ECA) is an indicator used to measure the relative loss and recovery of hydrologic function for a forest canopy. The forest canopy intercepts precipitation, affecting evapotranspiration, snow accumulation, and snowmelt. Changes in the forest canopy through disturbances can affect the amount and rate of precipitation that reaches the forest floor and influences the quantity and timing of water runoff.

Analysis of Haul Routes

There would be no direct effects because no hauling would occur. In the event of a wildfire some routes would be opened with bulldozers and receive moderate to heavy traffic during fire suppression activities. Fire suppression activities have the potential to increase the road density, drainage density (the network of channels draining a watershed can be increased by midslope capture of water on improperly built roads altering the time of travel though the system) and contribute to stream sedimentation.

Detrimental Soil Disturbance

With no ground disturbing activities under the No Action alternative, any detrimental disturbances that have occurred as a result of past forest management activities are expected to recover through natural processes. Disturbed sites would return to pre-disturbance conditions by means of freeze thaw cycles, translocation, organic matter accumulation and vegetation establishment.

Effects of Alternative 1 and Alternative 2

Compliance with State Water Quality Standards and Maintenance of Beneficial Uses

Proposed activities such as cutting vegetation and prescribed burning have the potential to disrupt the nutrient cycle and may accelerate dissolved nutrient leaching and loss via streamflow. If vegetation is reestablished quickly, nutrient exports are short-lived and do not represent a threat to water quality or site productivity. Minimization of site disturbance areas would reduce potential soil erosion and allow for quick vegetation establishment. Pacific Anadromous Fish Strategy riparian habitat conservation area buffers proposed for this project have proven to be effective in removing sediment from upslope overland flows and nutrients from surface and subsurface flows.

Prescribed burning would occur in the spring or fall when the soil moisture conditions minimize heat conductivity into the soils. Pacific Anadromous Fish Strategy riparian habitat conservation area buffers along stream channels would provide shade for stream temperatures and provide filter strips for sediment and nutrients maintaining state water quality standards and protecting downstream beneficial uses.

The proposed activities include aquatic habitat improvements and culvert replacements, which if implemented, would enhance the Idaho Department of Environmental Quality designated beneficial uses of cold water biota and salmonid spawning within the analysis area.

Modeled Probability of Erosion and Sediment Delivery

The proposed activities have the potential to increase the probability of erosion and sediment delivery to streams. In order to estimate to the potential effects and evaluate differences between alternatives the Water Erosion Prediction Project (WEPP) model was used to estimate erosion and sediment delivery from treatment units. The riparian habitat conservation area buffers provide sediment filtering as well as other ecological functions (e.g. large woody debris recruitment, riparian habitat, floodplain function, insect production, and instream detritus).

Results of the analysis predict that average probability of sediment reaching a stream channel the first year following a disturbance would be less than 1 percent, values ranged from 0 to 4 percent probability. Buffer effectiveness was shown to be highly effective with an average of 93 percent effectiveness. See table 8 in the soil and hydrology report, located in the project record, for a unit-by-unit breakdown.

Given the unit layout and design criteria of the proposed activities there is a high probability of success for minimizing erosion and retaining or capturing any sediment before it can enter streams within the Upper North Fork Project area.

Potential for Changes in Timing and Magnitude of Water Yield

The proposed action includes the removal of forest cover and has the potential to decrease interception and transpiration, and increase annual water yields. The increases in annual water yield following vegetation treatment are usually assumed to be proportional to the amount of forest cover removed, but at least 10 to 20 percent of the trees must be removed to produce a statistically detectible effect. In areas where the annual precipitation is less than 18 to 20 inches, removing forest canopy is unlikely to significantly increase water yields.

The Upper North Fork Project area receives an average annual precipitation of 25 to 30 inches and would treat between 10 and 15 percent of the forested area in the Upper North Fork subwatershed, and 15 and 20 percent in the Middle North Fork subwatershed. There would be no detectable change in the Upper North Fork subwatershed as a result of the proposed activities. The Middle North Fork subwatershed has the potential to show a statistically detectable change in flow as a result of the proposed activities. While the change may be detectable, it would be small and short lived and should not alter channel morphology.

Analysis of Haul Routes

Roads can affect hydrologic functions and resultant water quality by altering groundwater interception, runoff distribution over time and space, and the potential for sediment production and delivery to streams. The risks of a road affecting water yield and quality are largely determined by location, maintenance level, dimensions, and surfacing. Road density, expressed as miles per square mile, provides an index of the overall potential for roads to affect watershed function. In general, watersheds or subwatersheds with less than 30 percent watershed relief (30 percent average drainage slope from upper end to lower end) and road density of three miles per square mile or less are considered to have low risk for the overall potential for roads to affect watershed function (USDA Forest Service 1993). The road density within the Upper North Fork project area is 1.4 miles per square mile in the Upper North Fork subwatershed and 5.0 miles per square mile in the Middle North Fork subwatershed. Road decommissioning proposed under both action alternatives would reduce road densities in both subwatersheds. The Upper North Fork subwatershed would be reduced to 1.2 miles per square mile and the Middle North Fork subwatershed would be reduced to 2.9 miles per square mile improving overall hydrologic function.

Detrimental Soil Disturbance

Detrimental disturbance effects depend on a combination of factors such as existing ground cover, soil texture, timing of operations, equipment used, skill of the equipment operator, the amount of wood to be removed, and sale administration. Thinning within proposed vegetation treatment units is designed to avoid detrimental soil impacts. Less than 15 percent of an activity area would be in a detrimentally disturbed condition. This goal is achieved by implementing mitigation and design features as best management practices and soil and water conservation practices. The design features and management practices would minimize the extent of compaction, rutting, puddling, and displacement.

Wildlife

With no hazardous fuels reduction, no forest health restoration treatments, and no prescribed burning activities, there would be no direct effects to terrestrial wildlife species or habitat. However, current

conditions are such that there is an increased risk to some species of wildlife and their habitats from severe wildfire. A severe wildfire can have different implications for wildlife, depending on the species and how it uses the affected area.

For species requiring forested habitat, especially the dense stands that now exist, a severe wildfire that eliminates most of the cover could be an adverse effect. There could be losses in the amounts of foraging, denning, resting, or cover habitat. For some species, a severe fire could make available thousands of acres of habitat. For others, especially those that are wide ranging, the Upper North Fork is but a small piece of a home range or territory and changes in forested cover may not impact their use of the area. Table 2 shows the determinations for each of the affected species. Species not included are those that would not be affected at all or have no habitat in the project area.

Table 2. Summary of effects to wildlife

Species	No Action (wildfire)	Action Alternatives
Common Name	**Determination**	**Determination**
Canada lynx	May affect, but is not likely to adversely affect the species	May affect, but is not likely to adversely affect the species
North American wolverine	Will not affect	May affect, but is not likely to jeopardize the continued existence of the species
Gray wolf (S)	May affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability in the planning area
Townsend's western big-eared bat(S)		
Fisher(S)		
Boreal owl(S)		
Flammulated owl(S)		
Three-toed woodpecker(S)		
Northern goshawk(S)		
Columbia spotted frog(S)		
Pileated woodpecker (MIS)	This alternative will not affect the viability of the Columbia spotted frog or the pileated woodpecker at either the project scale or at the forest scale level.	This alternative will not affect the viability of the Columbia spotted frog or the pileated woodpecker at either the project scale or at the forest scale level.
Columbia spotted frog (MIS)		

S = Sensitive
MIS = Management indicator species

Also considered is a site-specific Forest Plan amendment that would address the existing and expected conditions for big game winter range in Management Area 4A. Winter range cover values are at the low end of the range currently, and would drop below the threshold value to address the fire hazard. Because the post-treatment cover values would not meet a Forest Plan standard and guideline, a site-specific amendment is necessary.

Fish and Aquatic Resources

Effects of Taking No Action

With no hazardous fuels reduction, no forest health restoration treatments, no prescribed burning activities, no roads actions and not aquatic habitat improvements, there would be no direct effects to fish species or aquatic habitat. Watershed and aquatic habitat conditions would continue to respond to climatic and other environmental changes and would continue to recover from past flood and fire events until reset

by future natural disturbance events. Any disturbances caused by past forest management activities would also continue to recover to pre-disturbance conditions through natural processes. The no-action alternative would not directly affect fish habitat components including stream shade, water temperature, sedimentation rates or large woody debris.

Taking no action may cause indirect effects to fish and their habitat because the project area would be at a higher risk of high severity wildfire. If a high severity wildfire occurred, it could have adverse impacts to watersheds and streams. Adverse effects of a wildfire would include creation of hydrophobic soils, post-fire increased soil erosion, increased water runoff, decreased lag time, and increased peak flows. These conditions result in disrupted channel maintenance processes, increased sediment delivery to stream channels and degraded aquatic habitat through pool filling, loss of spawning habitat and poor water quality. Post-fire sedimentation would likely be chronic until vegetation and soil recovery occurred. Widespread removal of riparian reserve vegetation from a high severity fire would reduce future large wood recruitment, reduce stream shade and increase stream water temperatures until riparian vegetation was re-established.

Effects of Alternatives 1 and 2

Commercial thinning treatments would have an insignificantly negative effect on peak/base flows and on disturbance regimes. Pre-commercial and non-commercial thinning would have neutral effects to all habitat indicators. Prescribed burning would have short term insignificantly negative effects and long term positive effects on sediment. Log haul would have insignificantly negative effects on sediment. Transportation system management would have short term insignificantly negative effects and long term positive effects on sediment, positive effects on physical barriers, drainage network and road density, and insignificantly negative effects to disturbance regime. Instream fish habitat enhancements would have neutral effects for all habitat indicators.

- The Upper North Fork HFRA Ecosystem Restoration Project "**may affect, but is not likely to adversely affect**" Snake River spring/summer Chinook salmon, Snake River Basin steelhead or Columbia River bull trout.
- The Upper North Fork HFRA Ecosystem Restoration Project **may affect but is not likely to adversely affect** designated critical habitat for the Snake River spring/summer Chinook salmon, Snake River Basin steelhead or Columbia River bull trout.
- The Upper North Fork HFRA Ecosystem Restoration Project **may affect but is not likely to adversely affect** essential fish habitat for the Snake River spring/summer Chinook salmon.
- The Upper North Fork HFRA Ecosystem Restoration Project **may impact** the westslope cutthroat trout R4 sensitive fish species or its habitat in the short term with long-term beneficial effects. The proposed Upper North Fork HFRA Ecosystem Restoration Project shall not contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Botany

Effects of Taking No action

With no hazardous fuels reduction, no forest health restoration treatments, and no prescribed burning activities there would be no direct effects to sensitive plant species.

The no-action alternative may cause indirect effects to sensitive plants and their habitat because the project area could be at a higher risk of high severity wildfire. Forest conditions would continue in a dense condition until fire or other disturbance such as disease changes the forest conditions. For the

sensitive plant species that generally inhabit open places, there would not be much change from wildfire over time other than possibly an increase of available open ground habitats (until they revegetate over time). For forest-specific sensitive plant species such as whitebark pine, a wildfire could eliminate entire occurrences of plants. Some increases on soil movement after a fire could also impact sensitive plant occurrences by eroding or smothering them.

Effects of Alternatives 1 and 2

Direct mortality to sensitive plant species (lost river milkvetch, Lemhi penstemon, flexible alpine collomia, and whitebark pine) could occur from cutting and thinning of vegetation, mechanical soil disturbance, or from trampling of vegetation by people walking over the site.

The project action alternatives may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for

- Lemhi penstemon (*Penstemon lemhiensis*)
- Flexible alpine collomia (*Collomia debilis var. camporum*)
- Whitebark pine (*Pinus albicaulis*)

There is the potential for minor adverse impacts to individuals if present in treatment areas. The design criteria developed for Forest Service sensitive plants was developed to ensure that species are protected from adverse thresholds of impacts from the project that would lead to a trend for listing as threatened or endangered.

There would be no effect to any other listed sensitive plant species. The no effect determination is due to a combination of no habitat present, the project is outside of the known distribution, or other factors detailed in each species' account.

Nonnative Invasive Species

Effects of Taking No Action

With no hazardous fuels reduction, no forest health restoration treatments, no prescribed burning activities, or other soil-disturbing activities, there would be no direct effects on noxious weeds. Weeds already present on public and private lands and being controlled would continue. Any disturbances caused by past forest management activities on public lands would also continue to recover to pre-disturbance conditions through natural processes.

The no-action alternative may cause indirect effects with weeds and increase habitat because the project area could be at a higher risk of high severity wildfire and remove protective soil and canopy cover. If a high severity wildfire occurred, it could have adverse impacts on lands currently unavailable to weeds due to high vegetative cover. Adverse effects of a wildfire would include creation of bare and erosive soils with no canopy cover, a habitat often preferred by many weed species. A common post fire effect on weeds include increases of existing weed species occupied acres and invasion by new weed species.

Effects of Alternative 1

Implementing the proposed action alternative is likely to increase the overall presence and density of noxious weeds in the project area. The acreage infested by spotted knapweed may not substantially increase due to the high levels of current infestation. However, the density of spotted knapweed infestations in vulnerable cover types would increase with soil disturbance and the increased solar exposure at ground level brought about by thinning activities and prescribed fire. This may however be

offset by the potential beneficial effect that increased solar exposure would provide more ideal conditions for the establishment of knapweed root weevil insectaries. Fifteen such insectaries have been established within proposed treatment units. If these insectaries are protected from fire during prescribed burning, insects would be available to colonize areas of dense knapweed occurring several years post-burn. Even though biological control would not eliminate spotted knapweed, widespread establishment of this biological control agent in the project area could result in lower densities of spotted knapweed. This would promote proper functioning of ecological processes and benefit native plant communities and wildlife species that depend on native plant habitats.

The potential adverse effects of project implementation on the current level of noxious weed infestations in the project area can be mitigated with careful adherence to noxious weed prevention best management practices. The risks of implementation must be weighed against the potential adverse effects from and likelihood of high mortality stand-replacing fire due to current fuel loadings.

Effects of Alternative 2

Although activities under this alternative would likely result in essentially similar negative effects on noxious weed populations within the project area as under the proposed action, effects would likely be marginally lower, as approximately 2 percent less of the project area would be directly exposed to ground disturbing activities. However, given the current widespread and pervasive nature of noxious weed presence (particularly spotted knapweed) within the project area, it is impossible to predict with certainty that this alternative would result in lower weed populations than implementation of the proposed action. The factor most likely to minimize negative impacts associated with noxious weeds would be the stringent and consistent implementation of design features and best management practices.

Recreation

Effects of Taking No Action

The primary effects of taking no action on the areas recreation resource is that the risk of losing part or all of a recreation experience as defined by a particular area's Recreation Opportunity Spectrum class, including the risk of losing physical infrastructure or access to physical infrastructure, would not be improved. Taking no action would not reduce the risk to resource values because we are not reducing the accumulation of hazardous fuels that have the potential for high severity wildfire and its effects.

Effects of Alternative 1 and Alternative 2

All of the treatments proposed would have some short term direct and indirect effects on dispersed recreation activities in the project area such as hunting and camping. During active burning, logging and hauling trails and roads could be temporarily closed, impacting access to dispersed recreation areas. All treatments would create some level of noise and disruption that would be heard at varying levels across the project area. The proposed action including the short term disturbance created by temporarily closed access routes, noise, smoke and other generally increased activity across the project area would be consistent with the various recreation opportunity spectrum classifications throughout the project area.

Visual Resources

Effects of Taking No Action

Under the no-action alternative, the crowded, overstocked conditions of the forest would continue. The risk of an intense fire at the landscape level would be high. A landscape level fire would dramatically change the scenic characteristics and recreational setting of the project area. Continuation of overstocked conditions could induce a rapid spread of insects and disease, causing additional mortality in the stand,

heightening the risk of fire. Together, these elements would maintain the uncharacteristic vegetative mosaic across the landscape. If the vegetation is consumed by intensive fire, or widespread insect infestations, a major deviation from the desired landscape character would occur because the vegetative component of scenic attractiveness would drop from its current rating to class C indistinctive. This would result in lowering the visual quality objectives for the project area. It may take decades to meet the desired landscape character and visual quality objectives for the project area under this alternative.

The following Forest-wide direction would not be met:

Rehabilitate all existing projects and areas which do not meet the adopted visual quality objective(s) specified for each management area.

The following Forest-wide goals and strategies would not be met:

Provide for pleasing visual landscapes in areas viewed from major travel routes crossing the Salmon National Forest (pg IV-1).

Direct and Indirect Effects of Alternative 1

The following proposed activities would promote rehabilitation of the landscape back to more natural characteristics:

- Thinning and removal of live trees and reducing the shrub/understory component would open up the stands to a park-like vegetative mosaic that is characteristic of pre-fire suppression efforts, essentially rehabilitating the landscape characteristics and enhancing the visual quality.
- Aspen would be enhanced whenever it is present in these units. Regeneration of aspen will add diversity of color and texture to the stands. These activities would create additional visual depth into the forest, and increase age-class diversity by decreasing the density of vegetation. Essentially this treatment would rehabilitate the landscape to the desired landscape characteristics.
- The appearance of overstocked units would be improved by decreasing the stand density in units proposed for shaded fuelbreaks.
- Prescribed burning is a management tool that can be used to rehabilitate the landscape towards the desired landscape characteristics.

The forest wide direction regarding visual resources in the Forest Plan includes the ability to rehabilitate and enhance landscapes across the Forest. The proposed activities would rehabilitate the existing landscape as described above in the effects analysis. Although the retention visual quality objective would not be met until 3 to 5 years in some areas with implementation of the design features, overall the end goal of rehabilitating the landscape would be in compliance with the Forest Plan. Forest wide direction states that retention and partial retention are supposed to be met 1 growing season after completion of a project. Since several landscape characteristics will be rehabilitated with the implementation of the project, it would take longer to meet retention and partial retention.

With application of the design features direction for all management areas regarding visual resources would be met within 5 years of completion of an activity.

Design features are in place to minimize the effects to visual/scenery resources along Highway 93 the Salmon River Scenic Byway and Lewis and Clark National Historic Trail, Continental Divide National Scenic Trail as well as other areas. If the design features are implemented, the resource management strategies outlined in the Salmon River Scenic Byway Corridor Management Plan would be met.

If the design features are implemented and landing locations are avoided in the immediate foreground of Highway 93 and the Continental Divide National Scenic Trail alternative 1 would be in compliance with the Forest Plan within 5 years as described above. However, in the short-term some impacts to scenery resources along the Continental Divide National Scenic Trail and Lewis and Clark National Historic Trail would be evident to those trail users as described above, and may conflict with the nature and purpose of the trails until the assigned visual quality objective is met over time. Since the portion of the Continental Divide National Scenic Trail in the project area is coincidental with Forest road 081 also known as Anderson Mountain Road, and that road is going to be used as a haul route to implement the proposed activities, there is a potential conflict with the proper use and management of the road that also serves as the Continental Divide National Scenic Trail.

Direct and Indirect Effects of Alternative 2

Alternative 2 has less impact to visual/scenery resources than alternative 1, and would be in compliance with the Forest Plan if the design features are implemented.

Cumulative Effects of Alternative 1 and 2

The reasonable foreseeable activities considered with the proposed actions do not contribute to cumulative effects regarding visual/scenery resources. It is anticipated that the Forest Plan would be met with the addition of the activities above. If an increase in insects and disease occurs in the Allan Mountain and Anderson Mountain Roadless Areas during and after implementation of the proposed activities, those areas would deviate from their assigned visual quality objectives.

Socio-economics

Effects of Taking No Action

Under the no-action alternative, the four county area of impact would not receive the economic benefit of potential employment opportunities from forest restoration activities such as timber harvest, heavy equipment operations and an increase in locally available timber and jobs for both large and small timber companies.

Effects of Alternatives 1 and 2

Under alternatives 1 and 2, workforce capacity to conduct pre-commercial and non-commercial thinning activities, shaded fuel breaks, and restoration treatments exists within Lemhi, Ravalli, and Missoula Counties. Businesses and equipment are in place within these communities to accomplish weed treatment, road construction, culvert installation, and monitoring objectives. In the event the Lemhi County Economic Development Association – Salmon-Challis National Forest stewardship agreement is used to accomplish Upper North Fork work, contract administration is likely to benefit Lemhi, Ravalli, or Missoula Counties.

Heritage Resources

Effects of Taking No Action

In taking no action, hazardous fuels accumulation would increase along with the potential for adverse effects to heritage resources resulting from high severity fires in which protective measures are often not viable or effective. In taking no action, eligible historic properties are at risk from wildland fire. Wooden structures would burn and other historic components could be destroyed or damaged.

Effects of Alternatives 1 and 2

In consultation with the State Historic Preservation Office, 8 of the 57 heritage sites identified in the cultural resource inventory and review have been determined historically significant and eligible for the National Register of Historic Places. According to federal law, the Forest, must consider the effects of the proposed action alternatives on all significant historic properties, and seek ways to reduce or avoid anticipated adverse effects to them. These historic properties will be protected from damage through avoidance and the implementation of detailed protective measures incorporated in the project design. Provided these protective measures are taken, neither of the action alternatives will have an adverse effect on significant heritage resources in the project area.

Comparison of Alternatives

Table 3. Comparison of alternatives by treatment and resource indicator

Treatment and Resource Indicators	No Action – Wildfire	Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Prescribed Burn	None	38,826 ac	38,826 ac
Precommercial Thin	None	1,270 ac	1,270 ac
Shaded Fuel Break	None	970 ac	1,050 ac
Noncommercial Fuels Treatment	None	445 ac	445 ac
Commercial Thin – All Logging Systems	None	4,520 ac	4,444 ac
Tractor Logging	None	2,350 ac	1,899 ac
Skyline Logging	None	1,032 ac	596 ac
Helicopter Logging	None	1,138 ac	1,949 ac
Meadow Treatment	None	1,291 ac	1,291 ac
Designated Old Growth Treatment	None	3,563 ac	3563 ac
Temporary Road Construction	None	26.1 miles	11.6 miles
Road Decommissioning	None	66.8 miles	67.2 miles
Improved Fish Passage	None	150 meters	150 meters
Culverts Replaced	None	3	3
Stream Restoration	None	3 miles	3 miles

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Silviculture Indicators	**Current condition**	**Post Wildfire**		
Forest species composition, as cover type	The cover types below show that the proposed activities would alter the species composition by moving the forest from relatively homogenous stands that are dominated by a single species to stands that have a mixture of species. Mixed stands are more resilient to insects and disease and are also more resistant to fire. A larger component of Douglas-fir and ponderosa pine, both of which are fire tolerant species, in lodgepole pine stands means that stand replacing fire would not be as likely as they are currently. The post wildfire species composition is difficult to predict, but would depend on the current species composition and the intensity of the wildfire.			
Douglas-fir	37%	unknown	8%	8%
Douglas-fir/ lodgepole pine	1%	unknown	19%	19%
Douglas-fir/ ponderosa pine	1%	unknown	12%	12%
Lodgepole pine	30%	unknown	20%	20%
Lodgepole pine/ Douglas-fir	0%	unknown	11%	11%
Ponderosa pine	17%	unknown	18%	18%
Ponderosa pine/ Douglas-fir	1%	unknown	1%	1%
Subalpine fir	7%	unknown	7%	7%
All others	6%	unknown	4%	4%
Forest vegetation structural classes	Forest structure, as represented using structural classes (below), is expected to change in response to implementation of silvicultural activities proposed for alternatives 1 and 2. High-severity prescribed fires are expected to convert approximately 14 percent of the forest vegetation affected environment to the stand initiation class after a short period as upland meadows/shrublands. Other direct effects on forest structural stages include widespread conversion from mature forest to the understory re-initiation and multi-storied forest classes due to the break-up of mature forest canopies from fire, bark beetle, and mechanical thinning activities, and expected subsequent tree regeneration.			
Stand initiation	11%	unknown	25%	25%
Stem exclusion	3%	unknown	3%	3%
Understory re-initiation	6%	unknown	32%	32%
Multi-storied	1%	unknown	9%	9%
Mature forest	78%	unknown	31%	31%

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Forest density, by percent canopy cover	The activities proposed under both action alternatives would have a substantial effect on forest vegetation density/canopy cover across the forest vegetation affected environment. The general effect of the activities would be a reduction of canopy cover, resulting in a distribution shift toward lower density classes. High classes (relatively dense forests) would decrease, while lower classes (relatively sparse forests) would increase. Important factors driving expected fire severity are related to drivers of historic fire regimes, as well as existing local vegetation species composition, density, and structural classes. A less dense forest means that there would be less fuel to support large stand replacing fires. The reduction in density and canopy cover would move stands toward a fire regime condition class of 1.			
Insect and disease disturbances (qualitative)	In general the proposed activities would lead to a more open forest. Thinning a stand, either mechanically or with prescribed fire, would increase tree vigor and resilience to insects and disease. This applies to all insects and diseases that are affecting trees in the Upper North Fork project area including mountain pine beetle, defoliators, root diseases and dwarf mistletoe.			
Fire Regime Condition Class (qualitative)	The application of fire as proposed under either action Alternative in a manner that emulates historic fire regimes would, by definition, move all burned areas to a fire regime condition class of 1. Approximately 40-60% of the landscape is expected to receive initial effects from the combination of prescribed broadcast burning and cutting activities.			
Fire and Fuels Indicators	**Current condition**	**With Wildfire**		
Flame length				
Non-burnable	N/A	<1%	<1%	<1%
0-4 feet Low hazard	N/A	44%	98%	98%
4-12 feet Moderate-high hazard	N/A	28%	2%	2%
Over 12 feet Extreme hazard	N/A	28%	0%	0%
Torching Index greater than 20 mph	N/A	<1%	94%	94%
Fire Type				
Non-burnable	N/A	<1%	<1%	<1%
Surface	N/A	19%	98%	98%
Passive	N/A	28%	2%	2%
Active	N/A	27%	0%	0%
Conditional	N/A	26%	0%	0%

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Air Quality and Smoke Management Indicators	**Current condition**	**With Wildfire**		
Compliance with Idaho/Montana Airshed Group Operating Guide	Not applicable to wildfires	Not applicable to wildfires	Compliant when guidelines followed	Compliant when guidelines followed
Fine Particulate matter ($PM_{2.5}$) lbs/acre	0	252 lbs/acre	555 lbs/acre	555 lbs/acre
Hydrology and Soils Indicators	**Current condition**	**Post wildfire**		
Modeled % probability of erosion and sediment delivery to streams	6	12	8	8
Compliance with State Water Quality Standards; maintenance of beneficial uses	Yes	No	Yes	Yes
Potential for changes in timing and magnitude of water yield (y/n)				
Upper North Fork	No	Yes	No	No
Middle North Fork	No	Yes	Yes	Yes
Watershed risk rating				
Upper North Fork	Low	High	Low-Moderate	Low-Moderate
Middle North Fork	High	High	Moderate-High	Moderate-High
% detrimental soil disturbance within harvest treatment units	0-5	10-20	5-10	5-10
Wildlife Species and Habitats Indicators	**Current condition**	**Post Wildfire**		
Threatened/Endangered Species Determination Statement	Species dependent	Species dependent	May Affect	May Affect
R4 Sensitive species	Species dependent	Species dependent	May Affect/No Affect	May Affect/No Affect
Management Indicator Species	Assumed stable	No loss in viability at the Forest scale	No loss in viability at the Forest scale	No loss in viability at the Forest scale
Migratory Birds	Assumed stable	No loss in viability at the Forest scale	No loss in viability at the Forest scale	No loss in viability at the Forest scale
Management Area 4A – Big Game Winter Range	Stable to increasing cover	Decrease in winter range cover	Decrease in winter range cover	Decrease in winter range cover
Big game cover-forage	Adequate cover, inadequate forage.	Inadequate cover, adequate forage	Inadequate cover, inadequate forage (1% off)	Inadequate cover, inadequate forage (1% off)

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Aquatic Species and Habitats Indicators	**Current condition**	**Post Wildfire**		
Fish presence/absence and population densities and trend	Stable (resident) Fluctuating to depressed (anadromous)	At risk of reduction	Stable (resident) Fluctuating to improved (anadromous)	Stable (resident) Fluctuating to improved (anadromous)
Stream habitat condition (large woody debris, pools and width to depth ratios)	Stable	degraded	Large Woody Debris: unchanged to slightly increased Pools: unchanged to improved Width/Depth ratio: unchanged	Large Woody Debris: unchanged to slightly increased Pools: unchanged to improved Width/Depth ratio: unchanged
Stream sediment	No change	increased sediment delivery	Short-term effects minimal. Long-term positive effects of road maintenance and decommissioning; and culvert replacement.	Short-term effects minimal. Long-term positive effects of road maintenance and decommissioning; and culvert replacement.
Stream temperature	Not limiting	increased	Stable	Stable
Stream connectivity	2 culvert barriers	No change	2 culverts removed, connectivity restored	2 culverts removed, connectivity restored
Bull Trout Viability and Habitat			Both action alternatives (1 and 2) would maintain existing bull trout viability, maintain the bull trout population trend and maintain bull trout habitat on the Salmon-Challis National Forest.	
Botany Indicators	**Current condition**	**Post Wildfire**		
Effects that would result in a trend toward a Sensitive species becoming Federally listed as Threatened or Endangered	None	Effects to sensitive plants would be highest if whitebark pine stands were burned in a fire. The other sensitive plant species known or suspected occur in more fire-resilient locations impacting only individuals.	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability Lemhi penstemon (*Penstemon lemhiensis*) Flexible alpine collomia (*Collomia debilis var. camporum*) Whitebark pine (*Pinus albicaulis*)	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability Lemhi penstemon (*Penstemon lemhiensis*) Flexible alpine collomia (*Collomia debilis var. camporum*) Whitebark pine (*Pinus albicaulis*)

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Noxious Weeds Indicators	**Current condition**	**Post Wildfire**		
Acres of existing inventoried weed infestation by plant cover density with distribution and percentage of increase in extent or density of weed infestations (by new and existing species within the project area).	Approximately 5% (2,181 acres) of the approximately 40, 291 acres of Salmon-Challis National Forest lands within the project area are currently infested. Conservative calculations indicate spotted knapweed is likely present on an additional 13% of the project area (5,183 acres).Higher levels of weeds are present on private lands. Biocontrols for spotted knapweed is beginning to establish and may reduce densities over time.	Weeds likely to increase into burned areas, especially areas with complete loss of canopy cover. Weeds likely to increase unchecked, and high risk of new species from adjacent private lands/post fire treatments	The potential adverse effects of project implementation on the current level of noxious weed infestations in the project area do not negate the need for selection of the Proposed Action. New species are not anticipated due to design criteria for weed prevention (clean equipment and seed mixes).	Slightly lower risk of noxious weed invasion than alternative 1 (~2% lower risk from less ground disturbance)
Recreation Indicators	**Current condition**	**Post Wildfire**		
Changes in recreation opportunities as defined by the Recreation Opportunity Spectrum	There is a risk of the loss of part or all of a recreation experience as defined by a particular areas Recreation Opportunity Spectrum class, including the risk of the loss of physical infrastructure or access to physical infrastructure.	Potential loss of part or all of a recreation experience as defined by a particular areas Recreation Opportunity Spectrum class, including the risk of the loss of physical infrastructure or access to physical infrastructure.	Alternative 1 would result in a reduction in the risk of the loss of part or all of a recreation experience as defined by a particular areas Recreation Opportunity Spectrum class, including the risk of the loss of physical infrastructure or access to physical infrastructure.	Alternative 2 would result in a reduction in the risk of the loss of part or all of a recreation experience as defined by a particular areas Recreation Opportunity Spectrum class, including the risk of the loss of physical infrastructure or access to physical infrastructure.

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Roadless Indicators	**Current condition**	**Post Wildfire**		
Miles of new temporary road construction in Idaho Roadless Areas	0	0	2.2 (Includes 0.1 miles in Lost Trail Ski area, not restricted by Idaho Roadless Rule)	0.1 (Includes 0.1 miles in Lost Trail Ski area, not restricted by Idaho Roadless Rule)
Acres harvested outside Community Protection Zones in Idaho Roadless Areas	0	0	1190 (Meadow restoration)	1190 (Meadow restoration)
Changes in wilderness characteristics	None, but appearance degrading due to current forest health trends	Quality of soil, water, air resources, plant community diversity, fish & wildlife habitats, scenic appearance and character diminished	Short to mid-term duration of effects from activity and disturbances; no long-term adverse effects to characteristics, suitability for wilderness; produces long term benefits to ecosystem health, resilience and function; compared to the current condition and direction of change.	Short to mid-term duration of effects from activity and disturbances, recovery faster than Alternative 1; no long-term adverse effects to characteristics, suitability for wilderness; produces long term benefits to ecosystem health, resilience and function; compared to the current condition and direction of change.
Visual Resources Indicators	**Current condition**	**Post Wildfire**		
Whether or not the Visual Quality Objectives are met	Yes	No	Yes	Yes

Table of Contents

Summary i
Introduction i
History of project development i
Purpose and Need ii
Proposed Action ii
Public Involvement iii
Tribal Consultation iv
Issues iv
1. Idaho Roadless Areas: v
2. Wildlife Habitat: v
Alternatives v
No Action with Wildfire v
Alternative 1 - Proposed Action vi
Alternative 2 – No New Temporary Road Construction vi
Site Specific Forest Plan Amendments vii
Summary of Effects to Resources viii
Silviculture viii
Fire and Fuels x
Air Quality xi
Roadless and Unroaded Areas xi
Soils and Hydrology xii
Wildlife xiv
Fish and Aquatic Resources xv
Botany xvi
Nonnative Invasive Species xvii
Recreation xviii
Visual Resources xviii
Socio-economics xx
Heritage Resources xx
Comparison of Alternatives xxii
Chapter 1. Purpose of and Need for Action 1
Introduction 1
Background 1
Why Here, Why Now? 2
Purpose and Need for Action 5
Proposed Action 6
Desired Condition 7
Site Specific Forest Plan Amendments 8
Decision Framework 8
Collaboration and Public Involvement 8
Tribal Consultation 8
Issues 9
1. Idaho Roadless Areas: 9
2. Wildlife Habitat: 9
Other Related Efforts 9
Chapter 2. Alternatives, Including the Proposed Action 11
Introduction 11
Alternatives Considered in Detail 11

No Action Alternative 11
Alternative 1 - Proposed Action 11
Proposed Site-Specific Forest Plan Amendments 15
Alternative 2 – No New Temporary Road Construction 17
Mitigation Common to All Action Alternatives 18
Alternatives Considered but Eliminated from Detailed Study 18
Comparison of Alternatives 21
Chapter 3. Affected Environment and Environmental Consequences 29
Introduction 29
Silviculture 29
Affected Environment 29
Environmental Consequences 42
Fire and Fuels 70
Affected Environment 70
Environmental Consequences 83
Irreversible and Irretrievable Commitments of Resources 88
Air Quality 88
Affected Environment 88
Environmental Consequences 94
Irreversible and Irretrievable Commitments of Resources 97
Soils and Hydrology 97
Affected Environment 97
Spatial and Temporal Context for the Effects Analysis 106
Measurement Indicators 106
Environmental Consequences 107
Irreversible and Irretrievable Commitments of Resources 125
Aquatic Resources 125
Regulatory Framework 125
Methodology for Analysis 132
Affected Environment 133
Monitoring 142
Environmental Consequences 143
Summary Determinations 161
Irreversible and Irretrievable Commitments of Resources 163
Compliance with the Forest Plan and Other Regulatory Direction 163
Terrestrial Biota 163
Introduction 163
Current Management Direction 163
Consultation to Date 165
Evaluated Species Information, Effects, and Determinations 165
Affected Environment and Environmental Consequences by Species 168
Migratory Bird Assessment 202
Management Area 4A and Big Game Cover, Forage, and Security Assessment 204
Botany 213
Introduction 213
Guiding Policy and Regulation 213
Existing Environment 214
Biological Assessment/Review 214
Environmental Consequences 222
Determination Summary for Sensitive Species 223
Nonnative Invasive Species 224

Regulatory Framework 225
Methodology for Analysis 226
Affected Environment 228
Environmental Consequences 233
Recreation 238
Affected Environment 238
Measurement Indicators 243
Environmental Consequences 245
Compliance with the Forest Plan and Other Regulatory Direction 248
Irreversible and Irretrievable Commitments of Resources 248
Roadless and Unroaded Areas 248
Affected Environment 249
Environmental Consequences 262
Consistency with the Forest Plan 296
Consistency with the Idaho Roadless Rule 296
Adverse Environmental Effects 297
Long-term Productivity 298
Irreversible or Irretrievable Commitment of Resources 298
Visual Resources 298
Introduction 298
Overview of Issues Addressed 298
Forest Plan Direction 299
Legal and Administrative Framework 300
Methodology for Analysis 302
Existing Condition 304
Monitoring 309
Environmental Consequences 309
Socioeconomics 326
Affected Environment 326
Environmental Consequences 329
Environmental Justice 331
Project Cost Analysis 331
Heritage Resources 335
Introduction 335
Forest Plan Direction and Desired Condition 336
Existing Condition 336
Environmental Consequences 336
Short-term Uses and Long-term Productivity 337
Unavoidable Adverse Effects 340
Irreversible and Irretrievable Commitments of Resources 340
Other Disclosures 340
Laws 340
Executive Orders 340
State and Local Direction 341
Other Direction 341
Chapter 4. Preparers, Contributors, Consultation and Coordination 343
Preparers and Contributors 343
Core ID Team Members 343
Consultation 345
Distribution of the Environmental Impact Statement 345
References Cited 349

Silviculture 349
Fire and Fuels, Air Quality 360
Roadless and Unroaded 364
Soils and Hydrology 364
Fish and Aquatic Resources 366
Wildlife 370
Botany 374
Noxious Weeds 375
Recreation 378
Visual Resources 378
Heritage Resources 379
Appendix A – Integrated Design Features and Monitoring Requirements 381
Design Features 381
Forested Vegetation 381
Fire and Fuels 382
Air Quality 382
Transportation 383
Noxious Weeds 384
Visual Resources 385
Soils, Water and Fisheries 386
Heritage Resources 394
Recreation 394
Wildlife 395
Other Resources 397
Monitoring 398
Appendix B – Site-specific Forest Plan Amendments 399
Amendment 1: Forest Plan amendment to utilize wildfire for multiple objectives in the project area 399
Background 399
Proposed Action 399
Amendment 2: Forest Plan Amendment to change big game winter range direction would be changed for hiding and/or thermal cover, and habitat capability for Management Prescription 4A in order to achieve fuels reduction objectives in the project area 403
Background 403
Proposed Action 403
Amendment 3: Forest Plan amendment to modify Pacific Anadromous Fish Strategy riparian habitat conservation areas to achieve fuels reduction objectives in the project area 405
Background 405
Proposed Action 405
Appendix C – Past, Present and Reasonably Foreseeable Activities 407
Appendix D –Wildland Urban Interface Zone and Community Protection Zone in the Upper North Fork of the Salmon River 413
Wildland-Urban Interface 413
Lemhi County WUI Zone Mapping Criteria Lemhi County Fuels Committee 414
A. Geospatial Data: 414
B. Accepted Fire Suppression Tactic: 414
C. Values at Risk: 415
Community Protection Zone 417
How the community protection zone was delineated for the Upper North Fork Project under the Idaho Roadless Rule 417
Appendix E – Treatments by Unit 423
Appendix F – Response to Comments 443

Public Comments Submitted on the DEIS Upper North Fork HFRA Project 443
Jay Davis – 03/24/2014 445
Jay Davis – County Roads – 03/24/2014.....445
Sun Mountain Lumber (Steve Flynn) – 04/07/2014.....446
Janice Richardson – 04/09/2014.....446
Doug Carlson – 04/10/2013.....447
Milt & Sue Usher – 04/20/2014 447
Jerry Jayne – 04/21/2014.....449
Don Smith – 04/26/2014 450
Lemhi County Commissioners (Robert Cope) – 04/26/2014.....450
Paul A. Edstrom – 04/26/2014 452
Will Wyland – 04/26/2014 452
J.C Rye – 04/28/2014 452
Clifford Shaw – 04/29/2014 453
William and Janet Gibbs – 05/01/2014 453
US Department of Interior (Allison O'Brien) – 05/02/2014 453
Jim Fazio (The Governor's Lewis & Clark Trail Committee) – 05/02/2014.....453
Dyrk Krueger – 05/05/2014.....454
Christine B. Reichgott (Environmental Protection Agency) - 05/05/2014.....454
Paul Stokes – 05/05/2014 455
Bob Wilson (Moose Creek Estates Owner) – 05/16/2014.....456
John Goodman (Moose Creek Estates Operations Manager) – 05/16/2014.....461
Gregory Behm – 05/18/2014 465
Louise Wagenecht– 05/18/2014 466
Snake River Waterkeeper (Buck Ryan) – 05/09/2014 470
Idaho Conservation League (Jon Robison) – 05/19/2014 478
Idaho Department of Fish and Game (Tom Curet) – 05/19/2014 483
Lemhi County Forest Restoration Group – 05/19/2014 492
Idaho Parks and Recreation – 05/30/2013.....499
Appendix G – Comments from Federal, State, and Local Agencies and Elected Officials 501
Index.....529
Maps (separate) 533

List of Tables

Table 1. Comparison of alternatives by treatment..... vii
Table 2. Summary of effects to wildlife.....xv
Table 3. Comparison of alternatives by treatment and resource indicator xxii
Table 4. Fire regime condition class descriptions (Barrett et al. 2010).....3
Table 5. Alternative 1 summary of proposed treatments.....17
Table 6. Alternative 2 summary of proposed treatments.....18
Table 7. Comparison of alternatives by treatment and resource indicator 21
Table 8. Comparison of alternatives by issue - inventoried roadless areas[a] 28
Table 9. Comparison of alternatives by issue – wildlife habitat - big game cover and forage.....28
Table 10. Comparison of alternatives by issue – wildlife habitat - elk security.....28
Table 11. Cover types for the forest affected environment 30
Table 12. Forest structural stages for the Upper North Fork project affected environment.....31
Table 13. Forest canopy cover within the Upper North Fork project forest vegetation affected environment.....32
Table 14. Acres of fire regime groups within the Upper North Fork project forest vegetation affected environment.....33

Table 15. Fire regime condition class descriptions (Barrett et al. 2010) 36
Table 16. Fire groups based on plant association groups..... 41
Table 17. Direct effects on cover types for the forest affected environment as a result of implementing alternative 1or 2 of the Upper North Fork Project 46
Table 18. Direct effects on forest vegetation structure classes for the forest affected environment as a result of implementing alternative 1 or 2 of the Upper North Fork Project..... 48
Table 19. Direct effects on forest vegetation density and canopy cover for the forest affected environment as a result of implementing alternative 1 or 2 of the Upper North Fork Project..... 49
Table 20. Cumulative effects of the Upper North Fork HFRA Ecosystem Restoration Project direct and indirect effects, in combination with the direct and indirect effects of past, present, and reasonably foreseeable future activities 53
Table 21. Management area prescriptions, emphasis, and acreage in the Upper North Fork project area . 54
Table 22. Upper North Fork project consistency with Salmon Forest Plan management area activities, general directions, and standards and guidelines 55
Table 23. Upper North Fork Project consistency with Salmon National Forest Land and Resource Management Plan Settlement Agreement general directions, and standards and guidelines relevant to designated old growth forests 58
Table 24. Upper North Fork Project consistency with Salmon Forest Plan forest-wide Pacific Anadromous Fish Strategy / Inland Native Fish Strategy -related management activities, general directions, and standards and guidelines..... 59
Table 25. Compatibility of silvicultural activities and climate change adaptation strategies 63
Table 26. Resistance to control, or difficulty in obtaining fire suppression objectives 73
Table 27. Recent large fires with extreme fire behavior..... 74
Table 28. Fire regime group definitions..... 74
Table 29. Fire regime condition class descriptions..... 75
Table 30. Fire regime condition class across the project area..... 75
Table 31. Recent fire severity within the project area 76
Table 32. Crown fire risk 77
Table 33. Canopy base height and canopy bulk density 79
Table 34. Fire type within the analysis area by alternative..... 84
Table 35. Flame lengths and resistance to control (hazard) by alternative 84
Table 36. Torching index by alternative 85
Table 37. Sensitive receptors 89
Table 38. Federal Class 1 areas..... 91
Table 39. Fuel moisture assumptions..... 91
Table 40. Wildfire smoke emissions pounds per acre..... 94
Table 41. Prescribed fire smoke emissions in pounds per acre..... 95
Table 42. Summary of cumulative effects considered in project area 96
Table 43. Assessment units and 303(d) listed streams..... 99
Table 44. Summary comparison of alternatives and how they meet direction in the Forest Plan 106
Table 45. Water erosion prediction project (WEPP) fuel management (FUME) modeling results..... 108
Table 46. Watershed risk rating for the Upper North Fork Ecosystem Restoration Project..... 111
Table 47. Fireline water bar spacing guidelines 128
Table 48. Miles of critical habitat by stream within the Endangered Species Act action area 135
Table 49. Stream lengths and suitable fish habitat in the Endangered Species Act action area 136
Table 50. Idaho Fish and Game’s North Fork Salmon River Chinook salmon redd counts..... 137
Table 51. Threatened, endangered and sensitive fish species known or suspected habitat use patterns within the Endangered Species Act action area 139
Table 52. Tributary stream temperatures 140
Table 53. Percent depth fines measurements of major tributaries in the project area..... 141
Table 54. Bank stability of major tributaries in the project area..... 142

Table 55. Summary of baseline habitat indicator conditions in the Upper North Fork Salmon River 5th-field watershed 143
Table 56. Road decommissioning in riparian habitat conservation areas along fish-bearing streams 146
Table 57. Units with proposed modified riparian habitat conservation areas (RHCA).....150
Table 58. Effects determination summary of the Upper North Fork HFRA Ecosystem Restoration Project 162
Table 59. Treatments in lynx habitat in the vicinity of the Lost Trail Pass ski area 175
Table 60. Treatments in lynx habitat at and south of Chief Joseph Pass.....176
Table 61. Big game winter range (Management Area 4A) in the North Fork Salmon River drainage (National Forest System lands) (Private and National Forest System lands; derived from Forest project vegetation database) 204
Table 62. Acres of big game winter range cover habitat affected by the project 205
Table 63. Elk security areas in the Upper North Fork project boundary.....206
Table 64. Big game cover and forage figures for the Upper North Fork project area.....208
Table 65. Big game cover and forage figures after treatment for the Upper North Fork project area 210
Table 66. Shaded fuel break units with a 400 foot buffer of ladder fuel treatment.....211
Table 67. Inventoried acreage for noxious weeds within the Upper North Fork project area.....226
Table 68. Idaho Roadless Area and roadless theme management classification allocation within the project area 248
Table 69. Crosswalk between wilderness attributes and roadless area characteristics.....249
Table 70. Alternative 1 – Proposed action summary of proposed treatments-Idaho roadless areas and unroaded lands.....266
Table 71. Summary of past, present, and reasonably foreseeable activities in or near the Allan Mountain Idaho Roadless Area and unroaded lands[a].....271
Table 72. Summary of past, present, and reasonably foreseeable activities in or near the Anderson Mountain Idaho Roadless Area and unroaded lands 275
Table 73. Summary of past, present, and reasonably foreseeable activities in or near the West Big Hole Idaho Roadless Area and unroaded lands.....279
Table 74. Alternative 2 – summary of proposed treatments with no new temporary roads - Idaho Roadless Areas and unroaded lands.....282
Table 75. Summary of past, present, and reasonably foreseeable activities in or near the Allan Mountain Idaho Roadless Area and unroaded lands.....286
Table 76. Summary of past, present, and reasonably foreseeable activities in or near the Anderson Mountain Idaho Roadless Area and unroaded lands 290
Table 77. Summary of past, present, and reasonably foreseeable activities in or near the West Big Hole Idaho Roadless Area and roadless area expanse 294
Table 78. Summary of effects[a] of alternatives to the wilderness attribute/roadless characteristic criterion for Upper North Fork HFRA Ecosystem Restoration Project.....295
Table 79. Alternative 1 acres of logging methods per visual quality objective 310
Table 80. Tractor Units visible from Highway 93.....311
Table 81. Skyline units visible from Highway 93.....311
Table 82. Proposed treatment types in alternative 1.....313
Table 83. Proposed shaded fuelbreaks 314
Table 84. Activities within the immediate foreground of the Continental Divide National Scenic Trail .316
Table 85. Activities within the immediate foreground of Twin Creek Campground.....317
Table 86. Activities within the immediate foreground Twin Creek and Twin Creek Ridge Trails 317
Table 87. Activities within the immediate foreground of the Powder Gulch Trail.....317
Table 88. Activities within the immediate foreground of Highway 93.....318
Table 89. Activities within the retention visual quality objective and foreground distance zone of Highway 93 319

Table 90. Activities within the retention visual quality objective and foreground distance zone of the Continental Divide National Scenic Trail 319
Table 91. Skyline units visible from Highway 93 322
Table 92. Alternative 2 acres of logging removal methods per visual quality objective 323
Table 93. Alternative 2 acres of vegetative treatment per visual quality objective 323
Table 94. Activities within the retention visual quality objective and foreground distance zone of Highway 93 324
Table 95. Activities within the retention visual quality objective and foreground distance zone of the Continental Divide National Scenic Trail 324
Table 96. Population 328
Table 97. Employment 328
Table 98. Per Capita Income 329
Table 99. Unemployment 329
Table 100. Commercial thinning treatments 332
Table 101. Non-Commercial thinning treatments 332
Table 102. Total project costs - alternative 1 334
Table 103. Total project costs - alternative 2 335
Table 104. Costs over the life of the project 335
Table 105. Recommended spacing distances for water bars on tractor skid trails 387
Table 106. Appropriate seed mixes 388
Table 107. Current Forest wide Direction and the recommended changes for wildfire in the project area 401
Table 108. Big game winter range Forest Plan Direction and Proposed amendment changes 404
Table 109. Units with proposed modified riparian habitat conservation areas 406
Table 110. Alternative 1 Treatments by unit 424
Table 111. Alternative 2 treatments by unit 439

List of Figures

Figure 1. Vicinity map 1
Figure 2. Project area fire regime condition class model displaying; in red, yellow and green; the existing fire and fuel conditions within the project area 4
Figure 3. Fire regime groups 34
Figure 4. Fire regime condition class designations within the Upper North Fork project analysis area in red, yellow and green 35
Figure 5. Upper North Fork project area wildland-urban interface map 72
Figure 6. Crown fire risk displayed in red, yellow and green 78
Figure 7. Low canopy base heights 79
Figure 8. Fire and fuels cumulative effects boundary 82
Figure 9. Air quality cumulative effects boundary 93
Figure 10. Typical hydrograph for the North Fork Salmon River 98
Figure 11. Water erosion prediction project (WEPP) fuel management (FUME) modeling prescribed burn units 109
Figure 12.Typical slope profile displaying deposition on road surface and effectiveness of forested buffer 113
Figure 13. Percent of forested area in equivalent clearcut area in the Upper North Fork subwatershed over time 116
Figure 14. Percent of forested area in equivalent clearcut area in the Middle North Fork subwatershed over time 116
Figure 15. Past disturbances, north half of the project area 121
Figure 16. Past disturbances, south half of the project area 122

Figure 17. Typical slope profile displaying deposition on road surface and effectiveness of forested buffer 151
Figure 18. Canada lynx baseline habitat in the project area, including adjacent lynx analysis units.....172
Figure 19. Lynx habitat in the North Fork Headwaters lynx analysis unit.....173
Figure 20. Wolverine habitat in the project area, and in the region (inset).....180
Figure 21. Motorized road access and elk security areas in the Upper North Fork project area.....207
Figure 22. Elk cover and forage habitat in the project area (all ownership).....209
Figure 23. Shaded fuel break treatment units in the Upper North Fork project area, including road access. Four hundred foot treatment distances would occur where an access road intersects a shaded fuel break. 212
Figure 24. Inventoried noxious weeds within the Upper North Fork Project Area.....229
Figure 25. Recreation opportunity spectrum map, Upper North Fork Drainage (based on alternative 1) 244
Figure 26. Upper North Fork HFRA Ecosystem Restoration Project Idaho roadless areas and community protection zones.....251
Figure 27. Alternative 1 – proposed action 267
Figure 28. Alternative 2 – no new temporary roads.....281
Figure 29. Viewpoint 16 North end of Project Area near Lost Trail Pass Ski Area.....305
Figure 30. View at Twin Creek Campground Viewpoint 5.....305
Figure 31. Map of project viewpoints 307
Figure 32. Project Area seen from Viewpoint 7 between the Royal Elk Ranch and Moose Creek Estates 308
Figure 33. Photo 2 at Viewpoint 7.....308
Figure 34. Viewpoint 26 Gibbonsville Area 308
Figure 35. Panoramic View from Viewpoint 3 308
Figure 36. Viewpoint 20 near Twin Creek.....309

List of Maps (Separate)

Map 1 - Project area map displaying project area boundary, communities at risk, designated roadless areas, wildland-urban interface and the community protection zone 533
Map 2 – Alternative 1 large map.....533
Map 3 - Alternative 1 - map index 533
Map 4 - Alternative 1 map 1.....533
Map 5 - Alternative 1 map 2.....533
Map 6 - Alternative 1 map 3.....533
Map 7 - Alternative 1 map 4.....533
Map 8 - Alternative 1 map 5.....533
Map 9 - Alternative 1 map 6.....533
Map 10 - Alternative 1 map 7.....533
Map 11 – Alternative 2 large map.....533
Map 12 - Alternative 2 - map index 533
Map 13 - Alternative 2 map 1.....533
Map 14 - Alternative 2 map 2.....533
Map 15 - Alternative 2 map 3.....533
Map 16 - Alternative 2 map 4.....533
Map 17 - Alternative 2 map 5.....533
Map 18 - Alternative 2 map 6.....533
Map 19 - Alternative 2 map 7.....533

Chapter 1. Purpose of and Need for Action

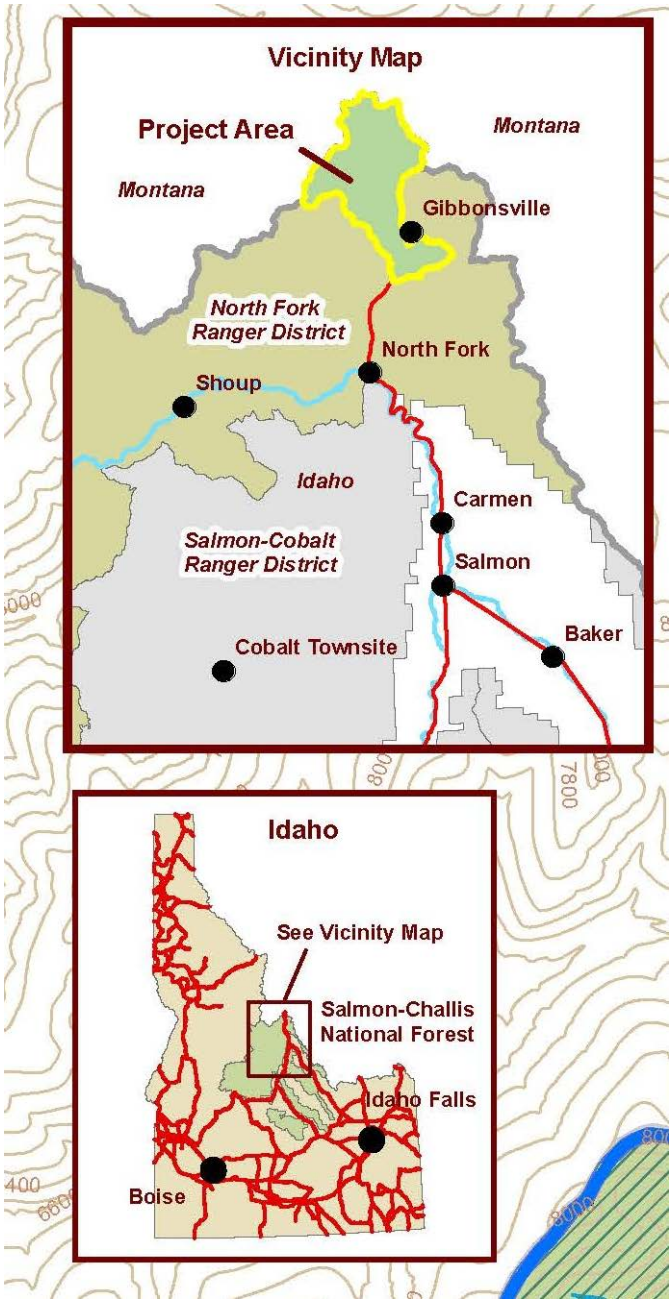


Figure 1. Vicinity map

Introduction

The Forest Service has prepared this environmental impact statement (EIS) in compliance with the National Environmental Policy Act (NEPA), the Healthy Forest Restoration Act (HFRA) of 2003 and other relevant Federal and State laws and regulations. In this environmental impact statement we will identify and discuss the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives.

This proposal is a hazardous fuels reduction project with additional forest restoration components. This project covers approximately 41,423 acres and is located in the Upper North Fork River Drainage, about seven miles north of North Fork, Idaho. The project area is located entirely in Lemhi County in portions of Township/Range 27N 20E, 27N 21E, 27N 22E, 26N 20E, 26N 21E, 26N 22E, 25N 21E, 25N 22E, Boise Meridian. Elevation ranges between 4,200 and 8,200 feet.

This area contains the State Highway 93 transportation corridor and Salmon River Scenic Byway; the communities of Moose Creek Estates, Royal Elk Ranch, Gibbonsville and North Fork; and Lost Trail Ski Area. Additional documentation, including more detailed analyses of project area resources are contained in the project planning record located at the North Fork Ranger District of the Salmon-Challis National Forest, North Fork, ID.

Background

This proposal was designed to complement other existing, ongoing and planned fuels treatments within the Upper North Fork River drainage. This drainage has a mosaic of private and public land boundaries, and as such, a landscape level management approach was taken for the development of this proposal. The project area includes the communities of Gibbonsville and North Fork that have widespread private land resources, and have been identified as “at-risk” communities by Lemhi County and the State of Idaho. Lemhi County revised its Wildland/Urban Interface Fire Mitigation Plan in 2006, and again in 2010 (also

known as a Lemhi County Wildfire Prevention Plan) designating the North Fork drainage as high priority for hazardous fuel reduction.

The development of this project represents a collaborative effort between the Forest Service and numerous outside partners including private individuals, industry, environmental and other groups and agencies, particularly those involved within the local collaborative group; the Lemhi County Forest Restoration Group (LCFRG). Discussions with the Lemhi County Forest Restoration Group began in 2008 and have spanned the last 5 years. The Lemhi County Forest Restoration Group has held meetings; conference calls and field trips contributing to the common goal of a landscape scale ecosystem restoration proposed action.

The identified need for reducing hazardous fuel conditions together with the County's priority designation for this area are essential criteria allowing the use of authorities and environmental analysis under the Healthy Forest Restoration Act of 2003. The Healthy Forest Restoration Act, 2003 was designed to reduce delays and remove statutory barriers for projects that reduce hazardous fuel and improve forest health and vigor. The Healthy Forest Restoration Act contains a variety of provisions intended to expedite hazardous-fuel reduction and forest-restoration projects on specific types of Federal land that are at risk from wildland fire or insect and disease epidemics. The act helps rural communities, States, Tribes, and landowners restore healthy forest and rangeland conditions on Federal, State, Tribal, and private lands. Hazardous fuel reduction projects on National Forest Service lands in one or more of the following areas qualify for expedited environmental analysis and review under the Healthy Forest Restoration Act:

- At-risk communities
- Municipal watersheds that are at risk from wildland fire
- Areas where wind throw, blowdown, ice storm damage, or the existence or imminent risk of an insect or disease epidemic significantly threatens ecosystem components or resource values
- Areas where wildland fire poses a threat to, and where the natural fire regimes are important for, threatened and endangered species or their habitat

The project area is almost entirely within wildland-urban interface boundaries for communities (Gibbonsville, Moose Creek, and Lost Trail) identified as at-risk in the Lemhi County Community Wildfire Protection Plan (CWPP). All proposed treatment units within the project area are located within a wildland-urban interface (see figure 1 the vicinity map and map 1 in the map package which shows the project boundary, communities at risk, designated roadless areas, wildland-urban interface, and community protection zones). The Upper North Fork proposal is a fuels reduction project that also includes several restoration components beneficial to the health of the watershed. The restoration components of the project were designed collaboratively with the Lemhi County Forest Restoration Group. The elements of the project described above make this environmental impact statement eligible for expedited environmental analysis and review under the Healthy Forest Restoration Act.

Why Here, Why Now?

This project addresses management on National Forest System lands; however, this project has been designed to function in coordination with past and other planned treatments on nearby and adjacent public and private lands. Treatments have been accomplished on private lands in Moose Creek Estates (a Firewise community) as well as along the Hughes Creek corridor through a partnership with Lemhi County wildland-urban interface. Plans for expansion of landowner participation and treatment area beyond the home defensible space zone are also underway. The 13,000 acre Hughes Creek Hazardous Fuels Reduction project, the 2006-2007 Ransack Timber Sale, the Gibbonsville Fuels Reduction Projects on the east side of the Ditch Creek drainage and the Lost Trail Salvage Timber Sale administered by the

Bitterroot National Forest are all recent treatments that would also be complemented by this project. The Upper North Fork Ecosystem Restoration Project provides mutual benefit of expanding these treatments by treating a large, landscape scale area in addition to public/private land boundaries. There has been very high interest in the local communities to expand treatments on public lands, working in collaboration with the Lemhi County Forest Restoration Group. Within the Upper North Fork drainage, fire suppression has allowed dense vegetation and surface fuel loading to accumulate. The potential for a wildfire start is high due to lightning, residential development and recreational use. Predicted fire behavior modeling of timber stands and representative fuel types indicates that high intensity fire with rapid rates of spread would be likely under extreme fire-weather conditions. Existing conditions in the project area, as well as terrain and fuel structures are typical of forested ecosystems throughout the Salmon-Challis National Forest where many large-scale wildland fires have occurred in the last decade (see figure 2 project area fire regime condition class modeling of the project area).

Fire regime condition classes (table 4) reflect the current degree of departure from modeled reference conditions. Fire regime condition class assessments measure departure in two main components of ecosystems: fire regime, and associated vegetation (Interagency FRCC Guidebook 2010).

Table 4. Fire regime condition class descriptions (Barrett et al. 2010)

Fire Regime Condition Class	Description	% of project area (41,423ac)
1	Less than 33 percent departure from the central tendency of the historical range of variation: Fire regimes are within the natural or historical range and risk of losing key ecosystem components is low. Vegetation attributes (composition and structure) are well intact and functioning.	1%
2	33 to 66 percent departure: Fire regimes have been moderately altered. Risk of losing key ecosystem components is moderate. Fire frequencies may have departed by one or more return intervals (either increased or decreased). This departure may result in moderate changes in fire and vegetation attributes.	40%
3	Greater than 66 percent departure: Fire regimes have been substantially altered. Risk of losing key ecosystem components is high. Fire frequencies may have departed by multiple return intervals. This may result in dramatic changes in fire size, fire intensity and severity, and landscape patterns. Vegetation attributes have been substantially altered.	59%

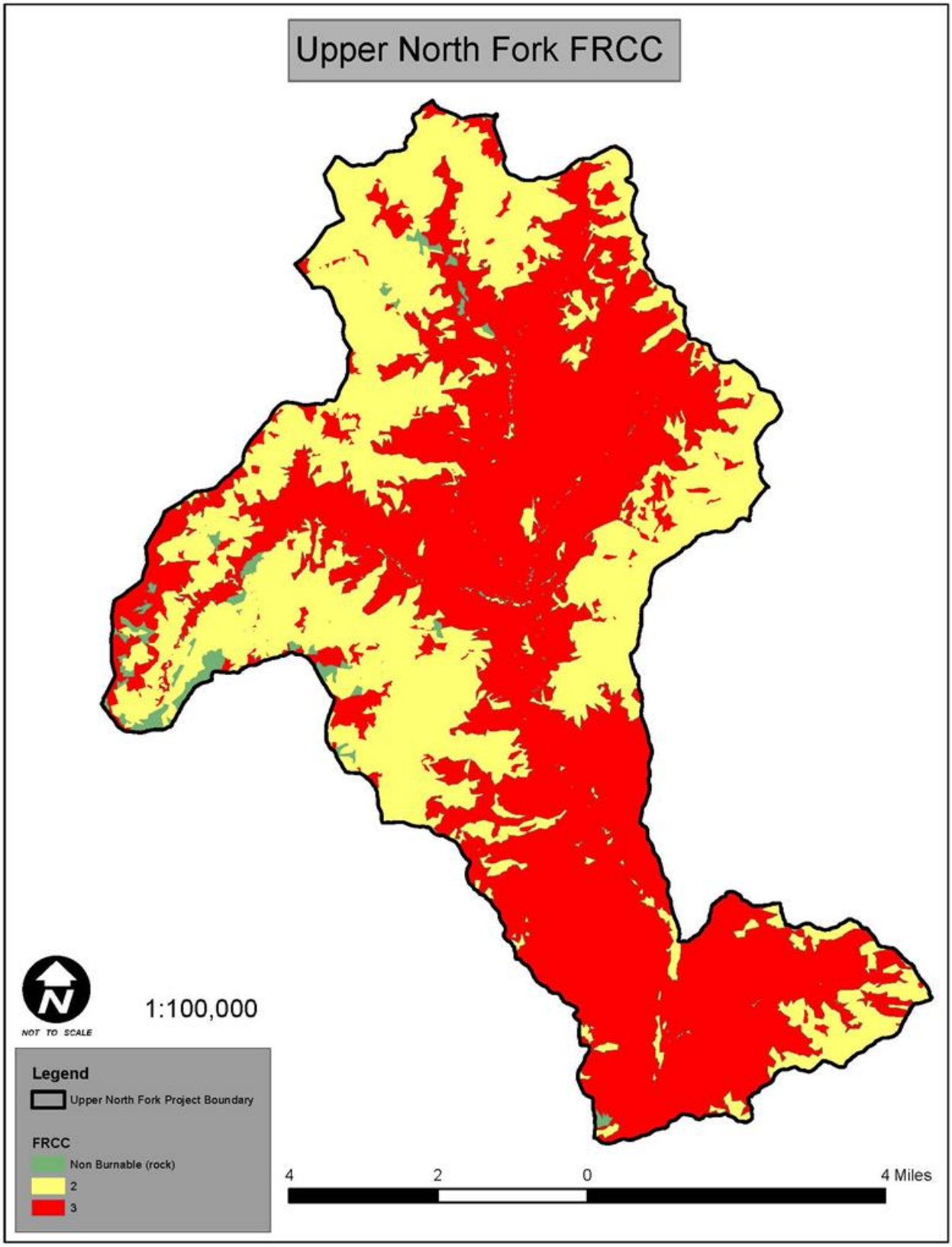


Figure 2. Project area fire regime condition class model displaying; in red, yellow and green; the existing fire and fuel conditions within the project area

Current stand conditions in the Upper North Fork subwatershed have not been influenced by the normal pattern of periodic fires. Most stands in the area have been fire free since 1919 (Metzger, 2008). Existing vegetation conditions have been altered from those that would have historically occurred under natural fire regimes. A recently completed fire history study on the Salmon National Forest found that prior to 1900 fires occurred as frequently as every 12 years in the North Fork drainage (Morgan, 2008). Fire regime condition class (FRCC) has been developed to classify the amount or degree of departure from the historic fire regimes. Currently, 59 percent of stands within the Upper North Fork subwatershed are in condition class 3, indicating a high departure, with 40 percent of stands being considered class 2, indicating a moderate departure. The existing stand conditions in the Hughes Creek project area have changed from their historical fire regime condition class for several reasons. First, timber harvesting that began in the early 1900s and has continued with numerous re-entries since. Next, fire suppression has virtually eliminated fires natural role in the project area. Lastly, the establishment of noxious weeds has increased from historical conditions. All of these have combined to change species composition and diversity, stand ages, stand densities, and fuel loadings (fire regime condition class 3 and 2 figure 2). For a comprehensive view of the project area in relationship to the wildland-urban interface, community protection zone and inventoried roadless area, please refer to map 1 in the map package.

Purpose and Need for Action

The Upper North Fork project area includes the State Highway 93 transportation corridor and the Salmon River Scenic Byway, private lands, residences and a winter recreation ski facility that fall within the Lemhi County wildland-urban interface. The purpose of this project is to reduce hazardous natural fuels, restore plant communities, improve fish and wildlife habitat, and create an environment that is more resilient to disturbance as part of a fire-adapted landscape. This project is needed in order to complement other completed, ongoing and planned fuels and vegetation treatments surrounding “at-risk” communities within the North Fork drainage; all of which address forest health conditions that are rapidly deteriorating.

Existing forest stand structure and forest vegetation have created the potential for large-scale, high-intensity wildfires that threaten human life, property, and natural resources. This potential coupled with the project area’s high frequency of lightning-caused wildfires has created an environment where, if no action is taken, severe impacts from wildland fire will likely result. This leaves surrounding communities vulnerable to damage caused by these fires.

In addition, the biodiversity of the project area is at risk. Quaking aspen stands provide substantial habitat value for wildlife and contribute to landscape habitat diversity. However, many historic aspen stands in Central Idaho have been lost, and many others are either regenerating poorly or are otherwise in decline. Likewise, whitebark pine is the first tree species in the Northwest to be listed as a candidate for the threatened and endangered species list because of a deadly combination of blister rust and mountain pine beetle. Historic logging practices and fire suppression have also contributed to a decline in ponderosa pine, a fire resilient species.

Lemhi County has developed its County Wildfire Protection Plan to include localized mapping and definition of wildland-urban interface areas; and has designated the North Fork area as high priority for hazardous fuels reduction treatment. Private developments, such as Moose Creek Estates, have completed planning and hazard reduction treatments required to enroll as “Fire-Wise Communities” in the State of Idaho. Because there is an identified need to reduce hazardous fuels, and because the County has classified the project area as wildland-urban interface, this project falls under the authority of the Healthy Forest Restoration Act (HFRA).

Proposed Action

The Forest proposes using the Healthy Forest Restoration Act authority to reduce wildfire risk to communities; protect ecosystems within the Upper North Fork watershed; and address threats to forest health, including catastrophic wildfire. Fuel, in the form of vegetation, is the only component of fire behavior that can be controlled through active management. In some portions of the 41,423 acre project area, vegetation is continuous from the ground to the canopy, creating ladder fuel conditions that support crown fires. Crown fire, a symptom of an overcrowded forest, can exhibit high intensity fire behavior that is uncharacteristic of the historic fire regime for the Upper North Fork area. High intensity crown fires leave the landscape scorched and susceptible to other environmental damage such as flooding, landslides, and weed infestations. In addition, high intensity crown fire is difficult to slow or stop through any fire suppression tactics which puts nearby communities at great risk.

The Forest has identified hazardous fuels treatments and associated opportunities for this project through extensive discussions, focused site visits and numerous exchanges of ideas with the Lemhi County Forest Restoration Group and other local community members. These opportunities include reducing ladder fuels along road corridors, creating shaded fuel breaks in strategic locations adjacent to private land and other developments, and using prescribed burns to reestablish resilience to fire on the landscape.

The proposed action includes commercial thinning of trees below the canopy to reduce the understory on approximately 4,520 acres of the project area. These areas would include 2,351 acres of tractor logging and 1,137 acres of helicopter logging. Of the 4,520 commercially thinned acres, 1,032 acres would be skyline logging. Emphasis would be on retaining large trees and using whole tree yarding to facilitate use of tree tops and slash as biomass or for pile burning. All slash piles would be left onsite for one year for possible biomass utilization. Precommercial thinning would occur within the commercial units on not more than 1,300 additional acres. All thinning (commercial and precommercial) units would receive a follow-up prescribed burning treatment.

The entire 41,423 acre project area[3] is proposed for prescribed burning in spring or fall. Prescribed burning activities include the construction of up to 200 miles of handline along unit perimeters to implement burning in commercial units. In units where there would be only an understory or broadcast burn, there would be up to 25 miles of fireline constructed either by hand or excavator for a width of 18 inches down to mineral soil. If an excavator is used, it would be used on no more than 50 percent of the fireline. No trees would be removed to construct handlines with the exception of snags that could be hazardous to firefighters or potentially fall over the fireline. Those would be felled away from the fireline. New shaded fuelbreaks would be constructed on 975 acres in 11 units. Tree species retention for these shaded fuelbreaks is explained in detail in chapter 2.

As part of the hazardous fuels reduction treatments, 13.9 miles of temporary routes would be constructed, and 2.1 miles of that would be located in an Idaho roadless area (Anderson Mountain). These routes are short term (less than 2 years) and would be built, utilized for project specific uses, and then immediately rehabilitated through a variety of restoration treatments. Additionally, 12.2 miles of route would be upgraded to meet road standards on routes that are currently closed. These routes would be utilized only for administrative uses to access project areas for fuels reduction activities and would also be rehabilitated after completion of the project. An additional 66.3 miles of route that currently have a closed designation would be rehabilitated through a variety of restoration treatments which are described in chapter 2. No changes in public access are proposed during or after the implementation of the project.

[3] with the exception of the Allen Mountain RNA and the Lost Trail Ski Area and areas where prescribed burning is not permitted

The other component of the proposed action is addressing threats to forest health through restoration activities. The proposed restoration treatments would help create a fire resilient forest by improving overall landscape health through restoring mountain meadows, protecting old growth stands, restoring fish habitat and passage, and improving aspen and whitebark pine communities. This would be accomplished through a variety of actions including resizing and removing culverts, rehabilitating roads designated as closed through the Salmon-Challis National Forest Travel Plan, and rehabilitating riparian habitat.

Desired Condition

The National Fire Plan (2003) and Healthy Forest Restoration Act (2003) provide direction to reduce fuel loadings in fire-prone forests to protect people and sustain resources. The wildland-urban interface, areas where flammable wildland fuels are near homes and communities, is one of the highest priorities for treatment.

The Salmon National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service 1988) outlines desired future condition of the Forest with respect to resource type on pages IV-87a to IV-93. In addition to these expected results, this project is designed to reduce the crown fire risk in the Salmon River corridor and North Fork area by modification of fuel loading and vegetation characteristics. In turn this leads to decreased fire intensity, a potentially safer fire environment for firefighters and the public, reduced chance for fire spread to adjoining lands and healthy forests with fire resilient conditions.

This action complies with the National Fire Plan, Healthy Forest Restoration Act, and the Salmon National Forest Plan. The proposed action is designed to meet Forest program goals (Forest Plan, pages IV-1 to IV-4), follow Forest-wide direction along with standards and guidelines (Forest Plan, pages IV-4 to IV-84), and Management Area direction for Management Prescriptions 1A, 2A, 3A, 4A, 5A and 6A (Forest Plan, pages IV-97 to IV-150).

Management Area Direction

1A: Emphasis on providing downhill skiing opportunity on the Lost Trail Pass Ski Area (Forest Plan, IV-97 to 97a);

2A: In higher elevation areas along the Continental Divide and border with Montana - emphasis on dispersed recreation activities including semi-primitive motorized recreation, no timber harvest planned Forest Plan, IV-98 to 100;

3A- 4A: In the lower elevations of the Highway 93 corridor from the southern end of the project boundary northward to about Elk Creek – emphasis on meeting anadromous fish habitat needs and providing for big game habitat needs on key big game winter range (Forest Plan, IV- 107 to 109 and IV-110 to 112);

3A-5A: In areas east of Moose Creek Estates and both sides of the Highway 93 corridor with emphasis on aquatic habitat management for anadromous fish species and producing long-term timber outputs through high investment in regeneration and thinning (Forest Plan, IV-107 to 109 and IV-116 to 121).

6A: Emphasis is on protection and interpretation of areas of unusual scenic, archeological, historical, geological, botanical, ecological, paleontological or other special characteristic (i.e., Allan Mountain Research Natural Area established by Forest Plan Amendment #5, April 25, 1996)[4] (Forest Plan, IV-76 and IV-150).

[4] MA# 6A is from a 1996 forest plan amendment that added the Allan Mountain RNA

Site Specific Forest Plan Amendments

We are proposing three site specific Forest Plan amendments in association with this project. These amendments would change current requirements and prescriptions which limit treatments and activities we have identified as necessary to attain the desired future condition in the project area:

Proposed Site Specific Amendment #1-Wildland fire management would more closely align with Federal Wildland Fire policy by allowing unplanned ignitions to meet project objectives.

Proposed Site Specific Amendment #2-Big game winter range would change direction regarding thermal and hiding cover and habitat capability within management area (MA) 4A in order to achieve fuels reduction objective in this Healthy Forest Restoration Act project.

Proposed Site Specific Amendment #3- The Pacific Anadromous Fish Strategy (PACFISH) riparian habitat conservation area buffer widths would be modified to the road allowing mechanical treatment (commercial thinning for fuels reduction) above the road outside of the modified riparian habitat conservation areas. This modification would only take place where there is a road within the riparian habitat conservation area buffer between the unit boundary and the stream channel.

Decision Framework

The regional forester will decide whether or not some level of fuels reduction, forest plan amendments and other management in the proposed project area would be conducted based on the analysis and conclusions of this environmental impact statement. The regional forester will publish the decision with an explanation of rationale in a Record of Decision (ROD).

Collaboration and Public Involvement

The Salmon-Challis National Forest has consulted with individuals and groups for suggestions and input on restoration needs and potential activities for this project area to improve the health of the ecosystem and reach the desired future condition of the Salmon-Challis Land Management Plan. The Lemhi County Forest Restoration Group has been a key partner in developing this proposed action. The Collaborative developed a recommendation memo which is the basis of the Upper North Fork Proposed Action. The recommendation memo reflects the consensus that was reached following over two years of field trips and meetings (the memo is located in the project record).

The Notice of Intent (NOI) was published in the Federal Register on August 3, 2011. The Notice of Intent asked for public comment on the proposal by September 2, 2011. Public meetings were held on this proposed project at the Gibbonsville Improvement Association Building and at the Sacajawea Center in Salmon both in August of 2011. Additional public meetings will occur on April 9th and 10th, 2014 during the draft environmental impact statement public comment period. Using the comments from the public, other agencies, and Tribes (see *Issues* section), a list of issues to address was developed.

Tribal Consultation

Government-to-government consultation between the Forest Service, the Nez Perce and the Shoshone-Bannock Tribes regarding the Upper North Fork HFRA Ecosystem Restoration Project was initiated by scoping letter August 1, 2011. Consultation/coordination meetings (staff to staff) with the Shoshone-Bannock tribes were conducted with the tribes Resource Staff and held in Challis on May 10, 2011 and May 3, 2012, and November 21, 2013. The tribes were given summary information and maps; and informed that no Native American archaeological sites were identified during the cultural resource inventory and that there would be no known effects to such sites as a result of project implementation.

The tribes acknowledged these findings and were in agreement with the Forest's no effect determination. No requests were received for more detailed information from Tribal representatives. The Tribe will receive a copy of the final environmental impact statement.

Issues

Issues serve to highlight effects or unintended consequences that may occur from the proposed action, giving opportunities during the analysis to reduce adverse effects and compare tradeoffs for the decision maker and public to understand. In order to identify issues, the interdisciplinary team (IDT) reviewed and considered all scoping comments submitted in the public involvement period. Comments were sorted into seven categories and are summarized in a table in the project record with a description of why the issue is insignificant, thus eliminated from detailed analysis. Significant issues are defined as those directly or indirectly caused by implementing the proposed action. The Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…". This process generated two significant issues:

1. Idaho Roadless Areas:

The proposed action would involve cutting and removal of timber along with temporary road building in Idaho roadless areas adjacent to community protection zones and tree cutting/thinning outside the community protection zone which may impact the roadless characteristics of these areas. One of the Lemhi County Forest Restoration Group's recommendation was that an alternative be developed that would not require temporary roads to be constructed within the Idaho roadless areas.

Measurement Indicators:

- Miles of temporary road constructed within Idaho roadless areas
- Acres of Idaho roadless areas treated within community protection zone by treatment type
- Acres of Idaho roadless areas treated outside of community protection zone by treatment type

2. Wildlife Habitat:

Proposed treatments for hazardous fuel reduction and forest restoration may impact the amount, quality and distribution of wildlife habitat within the project area. This has been addressed with a site specific Forest Plan amendment related to big game winter range. The best available data and most up to date science will be utilized to assess impacts to big game anticipated from proposed activities.

Measurement Indicators:

- Percent of the analysis area meeting the "Hillis paradigm" (security areas over 250 acres and more than 0.5 miles from open motorized routes).
- Cover:forage ratio within the analysis area.

Other Related Efforts

Lemhi County is coordinating with private residences in Hughes Creek through various grants to treat fuels on private property. Lost Trail Ski Area and the Bitterroot National Forest are actively conducting fuels treatments in and around that area. Moose Creek Estates continues to maintain and improve the hazardous fuels work in that area. In 2012, Moose Creek Estates received official recognition for its work to become a "Fire Wise Community." Lemhi County is still actively working with private residences in the Hwy 93 corridor conducting hazardous fuels reduction on private property. Bill Grasser (owner of

Lost Trail Ski Area), John Goodman (former Moose Creek Estates Manager), Mike England (North Fork Volunteer Fire Department Chief) and Karin Drnjevic (Lemhi County wildland-urban interface Coordinator) are all members of the Lemhi County Forest Restoration Group and have been involved with the Upper North Fork project since its beginning.

In June 2011, the Salmon-Challis National Forest and the Lemhi County Forest Restoration Group entered into a Memorandum of Understanding to provide a framework of cooperation to facilitate community-based collaborative processes for forest health restoration activities on the Salmon-Challis National Forest between the Forest Service, the Lemhi County Forest Restoration Group, and the public. Further purposes of this Memorandum of Understanding are to foster trust, clarify roles, and assist in achieving shared community, economic and forest health objectives in a timely manner on the Salmon-Challis National Forest.

For the Upper North Fork Ecosystem Restoration Project, these parties, along with stakeholders, have worked together prior to and during, the environmental analysis process to establish expectations for landscape scale restoration and on such products as proposed action, alternatives, collection and use of data, and development of monitoring and adaptive management processes subject to/consistent with applicable federal laws, regulations, land management plans, and other management direction. It is expected that the Lemhi County Forest Restoration Group will continue to assist the Forest through the implementation and monitoring phases for the life of the project.

In addition, the Forest has a Master Stewardship Agreement in place with the Lemhi County Economic Develop Association. This agreement gives the Forest the option to have Lemhi County Economic Develop Association administer both noncommercial and commercial thinning within the project area by creating supplemental stewardship project agreements.

Within and adjacent to the Upper North Fork project area are ongoing forestwide noxious weeds treatments. Weed treatments would include standard prevention activities as defined in the USDA Forest Service guide to Noxious Weed Practices (USDA Forest Service 2001) and programmatic treatments accomplished as part of the Forest’s annual noxious weeds program management. Pretreatment using vehicle mounted spray equipment would be emphasized in areas where fuels reduction activities may occur. Fuels reduction activities should be coordinated to complement existing weed treatments, biocontrol releases and special grant-funded control actions. No additional types or amounts of weeds treatments are proposed as a part of this project.

Chapter 2. Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the Upper North Fork Restoration Project, including a description and map of each alternative considered. In this section alternatives are presented in comparative form, clearly defining the differences among the alternatives and providing a clear basis for choice among options by the regional forester and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., helicopter logging versus the use of skid trails) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (i.e., the amount of erosion caused by helicopter logging versus skidding).

Alternatives Considered in Detail

The Healthy Forest Restoration Act (HFRA), under Section 104 does not require the Forest Service to analyze any alternative to the proposed action when a project is in a wildland-urban interface setting within 1.5 miles of an at-risk community (HFRA Field Guide 2004). The Upper North Fork HFRA Ecosystem Restoration Project area is almost entirely within wildland-urban interface and the 1.5 mile criteria. However, based on comments received during the scoping process three alternatives were developed, are described below, and will be analyzed in the proceeding chapter. These alternatives include the no-action, the proposed action, and an alternative action.

Maps displaying the alternatives are located in the maps package at the end of this environmental impact statement.

No Action Alternative

The Healthy Forest Restoration Act also states that while agencies are not expected to fully develop a no action alternative, “they should evaluate the effects of failing to implement the project. This evaluation should allow an assessment of the short and long-term effects of failing to implement the project in the event the court is asked to consider requests for an injunction” (HFRA Field Guide 2004).

Changes in forest structure due to fire suppression in the project area over the past few decades have significantly increased the potential for uncharacteristic fire behavior. At a landscape scale, stand replacing fire in up to 50 percent of forested and riparian ecosystems during summer drought and extreme weather conditions is a plausible event as a consequence of not implementing hazardous fuels reduction activities. In 2012 the Mustang Fire burned through 341,416 acres on the North Fork District of the Salmon-Challis National Forest and the adjacent Bitterroot National Forest threatening many homes in the wildland-urban interface. This is the context for which “No Action with Wildfire” was evaluated for the Upper North Fork HFRA Ecosystem Restoration Project.

Alternative 1 - Proposed Action

The Forest Service proposes using the Healthy Forest Restoration Act authority to reduce wildfire risk to communities, to enhance efforts to protect watersheds, and address threats to forest and rangeland health, including catastrophic wildfire. Hazardous fuels treatments and associated opportunities have been identified for this project through extensive discussions, field surveys, fuel and vegetation modeling, focused site visits and numerous exchanges of ideas with the Lemhi County Forest Restoration Group collaborative group and other local community members.

A portion of the proposed activities under this action would be accomplished through mechanical and nonmechanical treatment methods. Nonmechanical treatments would be accomplished using prescribed fire and hand-felling techniques. The mechanical treatments are divided into two categories based upon their primary objectives; hazardous fuels reduction treatments and restoration treatments. If both mechanical and nonmechanical treatments occur on the same piece of ground, mechanical treatments would precede nonmechanical treatments. Details of the mechanical and nonmechanical treatments, as well as road/trail activities, aquatic habitat improvement projects, Forest Plan amendments to support the described actions, and the specifics of the proposed treatments in the Roadless Area are all described below.

Mechanical Treatments

The proposed mechanical treatments are divided into two categories based upon their primary objectives; hazardous fuels reduction treatments and restoration treatments.

Hazardous Fuels Reduction Treatments

Hazardous fuels reduction treatments would include treatments which have the primary objective of creating a resilient forest and vegetative structure that should not sustain crown fire or flame lengths greater than those that can be suppressed by hand crews. These treatments would also establish strategic fuel breaks for communities, values at risk, and to improve firefighter safety. These treatments would have a secondary restoration objective and would focus on ecosystem restoration to the extent that it does not compromise the hazardous fuels reduction efforts.

Hazardous fuels reduction treatments would include mechanical thinning from below to reduce understory and ladder fuels on approximately 4,535 acres of the project area. Ground based harvest systems using tractors would be utilized on 2,364 acres, skyline yarding systems would be utilized on 1,032.4 acres, and 1,139 acres would utilize helicopters for tree removal. All emphasis would be to retain large trees, some small (under 0.1 acres) clumps of trees, and diversity of structures within stands and across landscapes. Whole-tree yarding would be used to remove activity fuels and facilitate use of tree tops and slash as biomass or for pile burning. All slash piles would be left onsite for 1 year for possible biomass utilization or later burning.

Tree spacing for commercial thinning would be accomplished using an Individuals Clumps and Openings (ICO) method. The individual clumping and openings method is a stand-level approach to restoring the mosaic patterns of individual trees, clumps, and openings commonly found in pine and mixed conifer forests that have intact, frequent fire regimes (Larson and Churchill 2012).This method meets fuels objectives while still meeting the wildlife habitat cover standard. With the exception of areas immediately adjacent to private land, shaded fuel breaks, and access roads, the mechanical treatments would be implemented in such a manner as to create a complex mosaic of forest structures and seral stages. Furthermore, with the same exceptions listed above, all mechanical activities would also be implemented to create, enhance and perpetuate variability of tree density within individual stands, characterized by a complex assemblage of gaps/openings, and small (under 0.1 acre in size) clumps of trees with interlocking crowns.

Approximately 970 acres of strategically located shaded fuel breaks are proposed for treatment. One is adjacent to the Lost Trail Ski Area and the other is adjacent to Moose Creek Estates. These areas would retain large trees wherever possible while still maintaining the integrity of the fuel break. Trees would be pruned and thinned commercially if markets allow; otherwise cut, handpiled and burned to achieve approximately 10 foot crown separation, reducing the potential for crown fire and increase fire control opportunities. All activity slash in these areas would be piled. Approximately 2 handpiles per acre would be retained for wildlife habitat.

Restoration Treatments

Restoration treatments would include those which primarily focus on restoring plant communities, improving habitat diversity for fish and wildlife, enhancing old growth stands and improving forest health. These proposed restoration treatments would also meet the hazardous fuels reduction goals of creating a fire resilient forest by reducing the potential for large-scale, high intensity wildfires that threaten human life, property and natural resources.

Approximately 1,291 acres of meadows have been identified within the project area for meadow restoration activities including hand felling, piling and burning of encroaching conifers and/or prescribed burning to reduce conifers while enhancing native herbaceous vegetation and brush cover.

There are many aspen and whitebark pine stands scattered throughout the project area that may be opportunistically treated during implementation. Treatments designed to restore and/or enhance productivity would include the removal of competitive species within and adjacent to aspen and whitebark pine stands. Restoration activities may also include using fire to create conditions conducive to natural regeneration of the aspen and caching whitebark pine seeds.

Ground disturbing mechanical activities directly associated with the proposed restoration activities would be limited to established mechanical units. Restoration efforts conducted outside these units would entail hand felling and burning only.

Nonmechanical Treatments

Prescribed Burning & Hand-Felling

All thinning (commercial/precommercial) units would receive a follow up prescribed burning treatment as outlined below. Up to 200 miles of fireline along unit perimeters would be needed to implement burning in commercial thinning units. This includes helicopter, precommercial thin, skyline and tractor unit perimeters.

Ladder fuels would be reduced along access roads in designated shaded fuel breaks only – 400 feet on each side of the road. Where other thinning is not planned this would be accomplished through hand felling, hand piling and burning (noncommercial 18 by 18 foot spacing).

Precommercial thinning of trees less than 7 inches diameter breast height (dbh) would be conducted in helicopter, tractor and skyline harvest units following commercial thinning to reduce ladder fuels and create 18 by 18 foot spacing in some, but not all pockets of healthy saplings for crown separation. Precommercial thinning with these same specifications would also be conducted on 1,269 acres in select units as the only mechanical treatment needed for fuels reduction.

Noncommercial fuels treatments would occur on 445 acres which would include a combination of burning, hand thinning, pruning, hand piling to achieve the desired level of fuels reduction in each of the proposed units.

A number of burn units from about 500 – 5,000 acres over approximately 40,273 acres (excludes Lost Trail Ski Area and all inholdings) would be prescribed burned primarily during spring and fall spread out over a 5 to 10 year period. Fuels treatments would include broad scale, low to high intensity underburning in thinning units and in surrounding locations (including Idaho Roadless Area) to reduce concentrations of natural surface fuels and activity generated slash from commercial, precommercial and hand thinning. The result or the underburning would be a mosaic burn pattern of varying intensities across the entire project area creating a more fire-resilient landscape. An additional 15.5 miles of fireline along burn unit

perimeters could potentially be needed. Pile burning would occur where hand or machine piles remained after treatment and biomass utilization.

All of the designated old growth stands should receive a ladder fuel reduction treatment in the form of low intensity fire or thinning of the small diameter or a combination of both. Designated old growth stands that have or are near a road would receive a thinning of the small diameter followed by a pile or low intensity broadcast burn. Those units requiring a substantial hike in would receive a fire only treatment, of low intensity.

Roads and Trails

The project would utilize a combination of existing system, non-system and newly constructed temporary roads. System roads are defined as those identified as open in the Salmon-Challis National Forest Travel Plan. Non-system roads are defined as unauthorized routes that are not identified as open to vehicular travel in the Travel Plan, commonly referred to as closed routes. Many of these routes are abandoned "temporary" roads that were authorized for short periods of time to facilitate timber harvest, suppress fire or other activities. Others may have been built as part of the system but later abandoned due to reduced transportation needs resulting from either change in management plans or changes in timber harvesting methods or technology. Finally, some roads were likely created by forest users without ever having been authorized. Newly constructed temporary roads are being proposed only where the existing road prisms do not meet project needs. Historically, temporary roads on timber sales were not removed or obliterated but were closed by blocking vehicular traffic through barriers or berms, which allowed natural reestablishment of vegetation. The proposed project would minimize additional construction by utilizing, to the extent possible, existing road prisms and create an opportunity to decommission these and other non-system roads.

The project would utilize up to 94 miles of existing system roads and an estimated 26 miles of non-system roads to complete the treatments. 13.9 miles of new temporary route would be constructed, and 2.1 miles of that would be located in an Idaho roadless area. These routes are short term (less than 2 years) and would be built, utilized for project specific uses, and then immediately rehabilitated through a variety of restoration treatments. Additionally, 12.2 miles of route would be upgraded to meet road standards on routes that are currently closed. These routes would be utilized only for administrative uses to access project areas for fuels reduction activities and would also be rehabilitated after completion of the project. An additional 66.3 miles of route that currently have a closed designation would be rehabilitated through a variety of restoration treatments. No changes in public access are proposed during or after the implementation of the project.

Making closed roads suitable for safe travel is generally limited to removal of earth barriers, slough and debris removal, brushing and minor repairs to drainage features. Replacing these barriers or other methods of road-closure would occur at the conclusion of the project. It is anticipated that most would be opened and reclosed in the same season but could be used for more than one season depending on the scheduling of treatments. Temporary roads would be treated similarly with decommissioning occurring at the completion of project activities supported by the route.

Decommissioning of temporary or unauthorized roads is intended to eliminate the use of the route and facilitate a rapid return to vegetative production within the disturbed area. Fewer road prisms on the landscape reduce the risk of sediment being transported to streams and improve wildlife habitat security. A range of treatments may be used to achieve effective decommissioning of a road. Roads used for timber harvest or other treatments would require higher levels of treatment in order to eliminate compaction, restore vegetation and prevent drainage problems. Most of these roads would be treated by full or partial re-contouring, removal of temporary drainage structures, slash placement and seeding. Roads identified

for decommissioning but not used for treatment activities, may only need entrance treatments to eliminate potential traffic and allow a full return to vegetative production.

Closing system roads differs from decommissioning in that the intent is to preserve the prism for future use while minimizing maintenance needs and resource risks. Typical closure treatments would include scarification and seeding, vehicle barriers such as gates or earth berms and in some cases temporary removal of culverts or drainage structures to minimize watershed risks.

Aquatic Habitat Improvements and Culvert Replacements

This project proposes instream aquatic habitat enhancement activities to help restore spawning and rearing habitat for Chinook salmon, steelhead/rainbow trout, bull trout and westslope cutthroat trout. The enhancements would occur within a 150 meter reach of the North Fork Salmon River at the confluence with Twin Creek. Stream enhancement activities would include hand labor and machine construction of two instream rock structures and approximately 12 random boulder placements.

The Deep Creek, Hammerean Creek and Johnson Gulch culverts would be replaced with new structures that would allow passage for all aquatic organisms, including fish. These three streams support westslope cutthroat trout populations. Details regarding the design and placement of aquatic habitat treatments and culverts can be found in the soils and hydrology specialist's report located in the project record.

Idaho Roadless

The proposed action would include treatments inside the Allan Mountain, Anderson Mountain, and West Big Hole Idaho Roadless Areas. Table 5 summarizes the current allocation of Idaho roadless areas within the project area as well as all proposed treatments in designated Idaho roadless areas.

The Forest Service has worked with the Idaho Roadless Commission (Commission) over the course of three meetings to develop the list of at risk communities within the project and the community protection zone which is an important step in developing the proposed action for projects in Idaho Roadless Areas. The Commission participated in a field trip to the project area on September 29, 2010 and suggested a few minor changes to the community protection zone that better reflected the level of current and projected development on the adjacent private land in the Moose Creek area. The Commission has expressed support for this project and the Forest Service will continue to work closely with them as the project progresses.

Proposed Site-Specific Forest Plan Amendments

In order to meet the objectives of the project and the purpose and need for the project as described in this document, the following three site-specific amendments to the Salmon National Forest Land and Resource Management Plan (Forest Plan) are included as part of this proposal.

Utilizing wildfire for multiple use objectives – Amendment 1

The deciding official proposes to amend the Salmon Forest Plan Forestwide Direction for the project area excluding the Allan Mountain Research Natural Area. This proposed site specific Forest Plan amendment constitutes an effort to readjust and clarify schedules to reach the goals and objectives of the Plan. Wildland fire would be allowed to play a natural role in the Upper North Fork Ecosystem Restoration Project Area. It would allow the line officer to manage wildland fire in the project area under specific prescription parameters.

Each decision regarding prescription parameters for using wildland fire as a management tool would be on a case by case basis. The forest fire management officer, district ranger and forest supervisor would meet to discuss these opportunities as they occur. Things that would be considered are current fuels

conditions, seasonal trends, current and expected weather forecast, time of year/month, and other fires burning in the area. Consulting with the adjacent Bitterroot or Beaverhead-Deerlodge Forest in these discussions would be important because fire in the project area has potential to burn onto one of those adjacent forests.

The 1988 Establishment Record for Allan Mountain Research Natural Area includes language requiring a high level of fire protection. Fire would not be used as a tool to induce or maintain seral species. Wildfires that originate within the area would be suppressed as soon as practicable by methods that cause the least disturbance.

Big game winter range – Amendment 2

Management area 3A-4A is 11,361 acres; 3,978 of which is within the project area, and none of which is within community protection zone (see map 5 in map package). The deciding official proposes to site-specifically amend the Salmon Forest Plan standards and guidelines to delete the following (Salmon Forest Plan, p. IV-111):

a. Maintain hiding and/or thermal cover on at least 25 percent of the area (where land types are capable). Maintain at least 90 percent of potential cover on land types that are not capable of reaching 25 percent cover.
b. Maintain big game habitat capability at 80 percent or more of winter range potential.

The primary objective of this project is hazardous fuels reduction. The amount of fuel loading that is characteristic of hiding and/or thermal cover conflicts with the primary objective of this project; therefore it would be necessary to amend the plan. The proposed deletion applies only to this project.

Modification of riparian habitat conservation areas – Amendment 3

Currently the Forest Plan contains direction regarding Pacific Anadromous Fish Strategy riparian habitat conservation areas. This direction prohibits commercial timber harvest within Pacific Anadromous Fish Strategy riparian habitat conservation areas. Within the project area there are currently 37.5 stream miles with a 300 foot riparian habitat conservation area buffer, 47.5 stream miles with a 150 foot riparian habitat conservation area buffer, and 57.6 stream miles with a 100 foot riparian habitat conservation area buffer. The Pacific Anadromous Fish Strategy standard widths defining riparian habitat conservation areas are as follows:

a. 300 feet on either side of fish bearing streams,
b. 150 feet on either side of permanently flowing non-fish bearing streams,
c. 150 feet around the outer edges from riparian vegetation for ponds, lakes, reservoirs and wetlands greater than 1 acre,
d. 100 feet on either side of seasonally flowing or intermittent streams and around the outer edges from riparian vegetation for wetlands less than 1 acre, landslides and landslide prone areas.

In order to achieve the fuels reduction objective in this Healthy Forest Restoration Act project, the above Pacific Anadromous Fish Strategy riparian habitat conservation area buffer widths would be modified to the road allowing mechanical treatment (commercial thinning for fuels reduction) above the road outside of the modified riparian habitat conservation areas. This modification would only take place where there is a road within the riparian habitat conservation area buffer between the unit boundary and the stream channel. Eleven fuels reduction units would be affected by this proposed modification adding approximately 75 acres to the commercial thinning treatments.

Table 5. Alternative 1 summary of proposed treatments

Proposed Treatments		National Forest (Outside Roadless)	Treatments in Idaho Roadless Areas			Total Treatment
			Inside CPZ[a]	Outside CPZ[a]	Total	
Rx Burn	Acres	17,665	5,729	16,432	22,161	**39,826**
Precommercial Thin		1,268	2	0	2	**1,270**
Shaded Fuel Break		783	192	0	192	**970**
Noncommercial Fuels Treatment		445	0	0	0	**445**
Commercial Thin – All Logging Systems		3,935	583	2	585	**4,520**
Meadow Treatment		101	168	1,022	1,190	**1,291**
Designated Old Growth Treatment		1321	715	1527	2242	**3563**
Temporary Road Construction	Miles	23.95	2.13	0	2.13	**26.08**
Road Decommissioning		63.84	0.72	2.17	2.99	**66.83**
Improved Fish Passage	Meters	150				**150**
Culvert Replacement	Number	3				**3**
Stream Restoration	Miles	3				**3**

a - CPZ – Community Protection Zone

Alternative 2 – No New Temporary Road Construction

This alternative was designed to address concerns raised during the public comment period. Alternative 2 differs from the proposed action in that no new temporary roads would be constructed. All other proposed activities are the same as those described under alternative 1, other than any activities directly affected by not creating new temporary roads. Harvest activities would include commercially thinning from below to reduce the understory on approximately 4,444 acres of the project area, and strategically located shaded fuel break treatments would occur on approximately 1,050 acres. There would be 1,899 acres of tractor logging, 596 acres of skyline logging and 1,949 acres of helicopter logging. Depending upon timber market conditions the economic viability of helicopter logging can vary over time. However, not treating these acres would not meet the purpose and need of the project. Existing road prisms may still be used as temporary roads to implement proposed treatments.

All proposed harvest units which are not accessible without the new temporary road construction would either be dropped from treatment, have modified unit boundaries, or harvest methods changed to be suitable with the available road system. In this alternative, the Hammerean Loop Road would no longer be a loop. The road would be closed to all motorized use at the existing rock slide and turnarounds established. Additionally, National Forest System Road 60078A (3.1 miles) would be seasonally closed

from October 1st through May 21st to enhance wildlife habitat and security from September 30th through May 21st.

In this alternative, approximately 12 miles of temporary road would be utilized for access to project areas. All 12 miles of temporary roads to be used are existing unclassified roads where no new construction is needed. Approximately 61.5 miles of non-system user created roads and 6.4 miles of closed system roads would be decommissioned. These roads proposed for decommissioning are identified in the Salmon-Challis Travel Plan.

Table 6. Alternative 2 summary of proposed treatments

Proposed Treatments		National Forest (Outside Roadless)	Treatments in Idaho Roadless Areas			Total Treatment
			Inside CPZ[a]	Outside CPZ[a]	Total	
Rx Burn	Acres	17,665	5,729	16,432	22,161	**39,826**
Precommercial Thin		1,268	2	0	2	**1,270**
Shaded Fuel Break		859	192	0	192	**1,051**
Noncommercial Fuels Treatment		445	0	0	0	**445**
Commercial Thin – All Logging Systems		3,859	583	2	585	**4,444**
Meadow Treatment		101	168	1,022	1,190	**1,291**
Designated Old Growth Treatment		1321	715	1527	2242	**3563**
Temporary Road Construction	Miles	11.54	0.05	0	0.05	**11.59[a]**
Road Decommissioning		64.17	0.72	2.17	2.99	**67.16**
Improved Fish Passage	Meters	150				**150**
Culvert Replacement	Number	3				**3**
Stream Restoration	Miles	3				**3**

a – all temporary road construction would occur on existing temporary road.

Mitigation Common to All Action Alternatives

Mitigation measures have been developed to be used as part of a list of integrated design features and monitoring requirements located in appendix A of this environmental impact statement.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by CEQ regulations to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). The public comments received in response to the Proposed Action

provided suggestions for alternative methods for achieving the purpose and need, including an alternative that would: (1) eliminate temporary road construction, (2) improve cost efficiency by eliminating helicopter logging, (3) use hand cutting only in Idaho roadless areas, (4) reduce tractor units, and (5) reduce commercial logging in non- Idaho roadless area units.

This alternative was not analyzed in detail. After an initial analysis, it was determined that it would not meet various elements of the purpose and need, as described below.

The primary purpose for the Upper North Fork Forest Restoration project is to reduce hazardous fuels, restore plant communities, and improve habitat diversity for fish and wildlife. Existing forest stand structure and forest vegetation have created the potential for large-scale, high-intensity wildfires that threaten human life, property, and natural resources. Quaking aspen stands provide substantial habitat value for wildlife and contribute to landscape habitat diversity. However, many historic aspen stands in Central Idaho have been lost, and many others are either regenerating poorly or are otherwise in decline. Likewise, whitebark pine is being considered as the first tree species in the Northwest to be listed as endangered because of a lethal combination of blister rust and mountain pine beetle. Historic logging practices and fire suppression have contributed to a decline in ponderosa pine, known to be more fire resilient. In essence, the rich biodiversity in the project area is at risk.

An additional proposal was received which emphasized cost-effectiveness, conservation-orientation and suggesting more protections for Idaho roadless areas and for at-risk fish and wildlife species. This proposal was considered but eliminated from detailed study because it did not meet the purpose and need of this project.

This proposal suggested removing helicopter units, temporary roads in Idaho roadless areas, and a wildlife-related forest plan amendment which would translate to the following activity changes:

- No helicopter logging. Changes fuels reduction treatment from commercial harvest to precommercial thinning (hand cutting) on at least 1,270 acres in areas along the Highway 93 corridor.
- Elimination of new temporary road construction. Drops fuel reduction treatments (or changes to precommercial thinning or other treatment) on at least 800 acres, primarily adjacent to Moose Creek Estates and Lost Trail Ski Area.
- Non-commercial, non-mechanical, hand cutting only treatments in Idaho roadless areas. Some of the same acreage as impacted by the no helicopter/no temp road construction bullets above (585 acres of commercial thin would be eliminated, 192 acres of shaded fuel break with minimal change).
- No commercial harvest on non- Idaho roadless area lands more than ¼- ½ mile from Moose Creek Estates. Drops or changes additional 200 + acres of treatment west of Highway 93 and Moose Creek Estates.
- Elimination of tractor thinning units outside of inventoried roadless area in the Anderson Mountain Road, Highway 43, Chief Joseph Pass areas. Drops additional 150+ acres of treatment because of low priority location.

Existing forest stand structure and forest vegetation have created the potential for large-scale, high-intensity wildfires that threaten human life, property, and natural resources. Each unit/fuel model proposed under this proposal was run through current fire behavior modeling software for crown fire potential. Most of the units proposed for removal would support an active crown fire. Active crown fires are continuous and the burn the entire tree canopy. On the Salmon-Challis there is a long history of fires that fit the definition of active crown fires. Numerous Salmon-Challis fires in the last decade have demonstrated large crown fire runs of over 10,000 acres in just one day. In addition the Salmon-Challis

has had numerous fatalities, shelter deployments and entrapments that were the direct result of active crown fires

This proposal removes only small diameter trees. The post-treatment condition would not move the project area toward forest structure and pattern desired conditions. If a portion of the larger trees are not removed and only the small diameter trees are cut a short term solution regarding hazardous fuels maybe met, but an active crown fire is dependent on ground and ladder fuels for initiation and there would still be an overstory of interlocking crowns that would eventually support an active crown fire once the small diameter trees grow back. By removing the small trees the link to the overstory is removed, but most of the non-commercial trees are approximately 3-15 years old. By only cutting non-commercially we are not meeting the intent of returning resilient conditions to this fire adapted landscape. Leaving the larger overstory would not return the project area to more resilient conditions, and therefore, would not meet the intent of the project's purpose and need. The current stand structure in much of the project area did not exist historically. The current stands in question were historically dominated by Ponderosa pine with spacing between trees being much greater. Historically interlocking crowns were rarely present. Currently, stands are dominated by Douglas-fir and interlocking crowns, which supports active crown fires.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 7. Comparison of alternatives by treatment and resource indicator

Treatment and Resource Indicators	No Action – Wildfire	Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Prescribed Burn	None	38,826 ac	38,826 ac
Precommercial Thin	None	1,270 ac	1,270 ac
Shaded Fuel Break	None	970 ac	1,050 ac
Noncommercial Fuels Treatment	None	445 ac	445 ac
Commercial Thin – All Logging Systems	None	4,520 ac	4,444 ac
Tractor Logging	None	2,350 ac	1,899 ac
Skyline Logging	None	1,032 ac	596 ac
Helicopter Logging	None	1,138 ac	1,949 ac
Meadow Treatment	None	1,291 ac	1,291 ac
Designated Old Growth Treatment	None	3,563 ac	3563 ac
Temporary Road Construction	None	26.1 miles	11.6 miles
Road Decommissioning	None	66.8 miles	67.2 miles
Improved Fish Passage	None	150 meters	150 meters
Culverts Replaced	None	3	3
Stream Restoration	None	3 miles	3 miles

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Silviculture Indicators	**Current condition**	**Post Wildfire**		
Forest species composition, as cover type	The cover types below show that the proposed activities would alter the species composition by moving the forest from relatively homogenous stands that are dominated by a single species to stands that have a mixture of species. Mixed stands are more resilient to insects and disease and are also more resistant to fire. A larger component of Douglas-fir and ponderosa pine, both of which are fire tolerant species, in lodgepole pine stands means that stand replacing fire would not be as likely as they are currently. The post wildfire species composition is difficult to predict, but would depend on the current species composition and the intensity of the wildfire.			
Douglas-fir	37%	unknown	8%	8%
Douglas-fir/ lodgepole pine	1%	unknown	19%	19%
Douglas-fir/ ponderosa pine	1%	unknown	12%	12%
Lodgepole pine	30%	unknown	20%	20%
Lodgepole pine/ Douglas-fir	0%	unknown	11%	11%
Ponderosa pine	17%	unknown	18%	18%
Ponderosa pine/ Douglas-fir	1%	unknown	1%	1%
Subalpine fir	7%	unknown	7%	7%
All others	6%	unknown	4%	4%
Forest vegetation structural classes	Forest structure, as represented using structural classes (below), is expected to change in response to implementation of silvicultural activities proposed for alternatives 1 and 2. High-severity prescribed fires are expected to convert approximately 14 percent of the forest vegetation affected environment to the stand initiation class after a short period as upland meadows/shrublands. Other direct effects on forest structural stages include widespread conversion from mature forest to the understory re-initiation and multi-storied forest classes due to the break-up of mature forest canopies from fire, bark beetle, and mechanical thinning activities, and expected subsequent tree regeneration.			
Stand initiation	11%	unknown	25%	25%
Stem exclusion	3%	unknown	3%	3%
Understory re-initiation	6%	unknown	32%	32%
Multi-storied	1%	unknown	9%	9%
Mature forest	78%	unknown	31%	31%

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Forest density, by percent canopy cover	The activities proposed under both action alternatives would have a substantial effect on forest vegetation density/canopy cover across the forest vegetation affected environment. The general effect of the activities would be a reduction of canopy cover, resulting in a distribution shift toward lower density classes. High classes (relatively dense forests) would decrease, while lower classes (relatively sparse forests) would increase. Important factors driving expected fire severity are related to drivers of historic fire regimes, as well as existing local vegetation species composition, density, and structural classes. A less dense forest means that there would be less fuel to support large stand replacing fires. The reduction in density and canopy cover would move stands toward a fire regime condition class of 1.			
Insect and disease disturbances (qualitative)	In general the proposed activities would lead to a more open forest. Thinning a stand, either mechanically or with prescribed fire, would increase tree vigor and resilience to insects and disease. This applies to all insects and diseases that are affecting trees in the Upper North Fork project area including mountain pine beetle, defoliators, root diseases and dwarf mistletoe.			
Fire Regime Condition Class (qualitative)	The application of fire as proposed under either action alternative in a manner that emulates historic fire regimes would, by definition, move all burned areas to a fire regime condition class of 1. Approximately 40-60% of the landscape is expected to receive initial effects from the combination of prescribed broadcast burning and cutting activities.			
Fire and Fuels Indicators	**Current condition**	**With Wildfire**		
Flame length				
Non-burnable	N/A	<1%	<1%	<1%
0-4 feet Low hazard	N/A	44%	98%	98%
4-12 feet Moderate-high hazard	N/A	28%	2%	2%
Over 12 feet Extreme hazard	N/A	28%	0%	0%
Torching Index greater than 20 mph	N/A	<1%	94%	94%
Fire Type				
Non-burnable	N/A	<1%	<1%	<1%
Surface	N/A	19%	98%	98%
Passive	N/A	28%	2%	2%
Active	N/A	27%	0%	0%
Conditional	N/A	26%	0%	0%

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Air Quality and Smoke Management Indicators	**Current condition**	**With Wildfire**		
Compliance with Idaho/Montana Airshed Group Operating Guide	Not applicable to wildfires	Not applicable to wildfires	Compliant when guidelines followed	Compliant when guidelines followed
Fine Particulate matter ($PM_{2.5}$) lbs/acre	0	252 lbs/acre	555 lbs/acre	555 lbs/acre
Hydrology and Soils Indicators	**Current condition**	**Post wildfire**		
Modeled % probability of erosion and sediment delivery to streams	6	12	8	8
Compliance with State Water Quality Standards; maintenance of beneficial uses	Yes	No	Yes	Yes
Potential for changes in timing and magnitude of water yield (y/n)				
Upper North Fork	No	Yes	No	No
Middle North Fork	No	Yes	Yes	Yes
Watershed risk rating				
Upper North Fork	Low	High	Low-Moderate	Low-Moderate
Middle North Fork	High	High	Moderate-High	Moderate-High
% detrimental soil disturbance within harvest treatment units	0-5	10-20	5-10	5-10
Wildlife Species and Habitats Indicators	**Current condition**	**Post Wildfire**		
Threatened/Endangered Species Determination Statement	Species dependent	Species dependent	May Affect	May Affect
R4 Sensitive species	Species dependent	Species dependent	May Affect/No Affect	May Affect/No Affect
Management Indicator Species	Assumed stable	No loss in viability at the Forest scale	No loss in viability at the Forest scale	No loss in viability at the Forest scale
Migratory Birds	Assumed stable	No loss in viability at the Forest scale	No loss in viability at the Forest scale	No loss in viability at the Forest scale

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Management Area 4A – Big Game Winter Range	Stable to increasing cover	Decrease in winter range cover	Decrease in winter range cover	Decrease in winter range cover
Big game cover-forage	Adequate cover, inadequate forage.	Inadequate cover, adequate forage	Inadequate cover, inadequate forage (1% off)	Inadequate cover, inadequate forage (1% off)
Aquatic Species and Habitats Indicators	**Current condition**	**Post Wildfire**		
Fish presence/absence and population densities and trend	Stable (resident) Fluctuating to depressed (anadromous)	At risk of reduction	Stable (resident) Fluctuating to improved (anadromous)	Stable (resident) Fluctuating to improved (anadromous)
Stream habitat condition (large woody debris, pools and width to depth ratios)	Stable	degraded	Large woody debris: unchanged to slightly increased Pools: unchanged to improved Width/Depth ratio: unchanged	Large woody debris: unchanged to slightly increased Pools: unchanged to improved Width/Depth ratio: unchanged
Stream sediment	No change	increased sediment delivery	Short-term effects minimal. Long-term positive effects of road maintenance and decommissioning; and culvert replacement.	Short-term effects minimal. Long-term positive effects of road maintenance and decommissioning; and culvert replacement.
Stream temperature	Not limiting	increased	Stable	Stable
Stream connectivity	2 culvert barriers	No change	2 culverts removed, connectivity restored	2 culverts removed, connectivity restored
Botany Indicators	**Current condition**	**Post Wildfire**		
Effects that will result in a trend toward a Sensitive species becoming Federally listed as Threatened or Endangered	None	Effects to sensitive plants would be highest if whitebark pine stands were burned in a fire. The other sensitive plant species known or suspected occur in more fire-resilient locations impacting only individuals.	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability Lemhi penstemon (*Penstemon lemhiensis*) Flexible alpine collomia (*Collomia debilis var. camporum*) Whitebark pine (*Pinus albicaulis*)	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability Lemhi penstemon (*Penstemon lemhiensis*) Flexible alpine collomia (*Collomia debilis var. camporum*) Whitebark pine (*Pinus albicaulis*)

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Noxious Weeds Indicators	**Current condition**	**Post Wildfire**		
Acres of existing inventoried weed infestation by plant cover density with distribution and percentage of increase in extent or density of weed infestations (by new and existing species within the project area).	Approximately 5% (2,181 acres) of the approximately 40, 291 acres of Salmon-Challis National Forest lands within the project area are currently infested. Conservative calculations indicate spotted knapweed is likely present on an additional 13% of the project area (5,183 acres).Higher levels of weeds oare present on private lands. Biocontrols for spotted knapweed is beginning to establish\ch and may reduce densities over time.	Weeds likely to increase into burned areas, especially areas with complete loss of canopy cover. Weeds likely to increase unchecked, and high risk of new species from adjacent private lands/post fire treatments	The potential adverse effects of project implementation on the current level of noxious weed infestations in the project area do not negate the need for selection of the Proposed Action. New species are not anticipated due to design criteria for weed prevention (clean equipment and seed mixes).	Slightly lower risk of noxious weed invasion than alternative 1 (~2% lower risk from less ground disturbance)
Recreation Indicators	**Current condition**	**Post Wildfire**		
Changes in recreation opportunities as defined by the Recreation Opportunity Spectrum	There is a risk of the loss of part or all of a recreation experience as defined by a particular areas Recreation Opportunity Spectrum class, including the risk of the loss of physical infrastructure or access to physical infrastructure.	Potential loss of part or all of a recreation experience as defined by a particular areas Recreation Opportunity Spectrum class, including the risk of the loss of physical infrastructure or access to physical infrastructure.	Alternative 1 would result in a reduction in the risk of the loss of part or all of a recreation experience as defined by a particular areas Recreation Opportunity Spectrum class, including the risk of the loss of physical infrastructure or access to physical infrastructure.	Alternative 2 would result in a reduction in the risk of the loss of part or all of a recreation experience as defined by a particular areas Recreation Opportunity Spectrum class, including the risk of the loss of physical infrastructure or access to physical infrastructure.

Treatment and Resource Indicators	No Action – Wildfire		Alternative 1 Proposed Action	Alternative 2 No New Temp Roads
Roadless Indicators	**Current condition**	**Post Wildfire**		
Miles of new temporary road construction in Idaho Roadless Areas	0	0	2.2 (Includes 0.1 miles in Lost Trail Ski area, not restricted by Idaho Roadless Rule)	0.1 (Includes 0.1 miles in Lost Trail Ski area, not restricted by Idaho Roadless Rule)
Acres harvested outside Community Protection Zones in Idaho Roadless Areas	0	0	1190 (Meadow restoration)	1190 (Meadow restoration)
Changes in wilderness characteristics	None, but appearance degrading due to current forest health trends	Quality of soil, water, air resources, plant community diversity, fish & wildlife habitats, scenic appearance and character diminished	Short to mid-term duration of effects from activity and disturbances; no long-term adverse effects to characteristics, suitability for wilderness; produces long term benefits to ecosystem health, resilience and function; compared to the current condition and direction of change.	Short to mid-term duration of effects from activity and disturbances, recovery faster than Alternative 1; no long-term adverse effects to characteristics, suitability for wilderness; produces long term benefits to ecosystem health, resilience and function; compared to the current condition and direction of change.
Visual Resources Indicators	**Current condition**	**Post Wildfire**		
Whether or not the Visual Quality Objectives are met	Yes	No	Yes	Yes

Table 8. Comparison of alternatives by issue - inventoried roadless areas[a]

Proposed Treatments		Treatments in Idaho Roadless Areas					
		Alt 1	Alt 2	Alt 1	Alt 2	Alt 1	Alt 2
		Inside CPZ[b]		Outside CPZ		Total	
Prescribed Burn	Acres	5,729	5,729	16,432	16,432	22,161	22,161
Precommercial Thin		2	2	0	0	2	2
Shaded Fuel Break		192	192	0	0	192	192
Noncommercial Fuels Treatment		0	0	0	0	0	0
Commercial Thin – All Logging Systems		583	583	2	2	585	585
Meadow Treatment		168	168	1,022	1,022	1,190	1,190
Designated Old Growth Treatment		715	715	1,527	1,527	2,422	2,422
Temporary Road Construction	Miles	2.13	0.05	0	0	2.13	0.05
Road Decommissioning		0.72	0.72	2.17	2.17	2.99	2.99

a - No Action Alternative is not included in this table because there are no proposed treatments in that alternative.
b – CPZ – Community protection zone

Table 9 and table 10 display the comparison by alternatives by issue for wildlife habitat.

Table 9. Comparison of alternatives by issue – wildlife habitat - big game cover and forage

	No action		Alternatives 1 and 2	
Habitat type	**Acres**	**Percent of project area[a]**	**Acres**	**Percent of project area**
Cover	21,344	51.5	13,867	33.7
Forage	16,962	40.9	24,439	59.0
Other (Rock, road, water, other ownership)	3117	7.3	3117	7.3
Total	**41,423**	**100.0**	**41,423**	**100.0**

a – note: due to rounding, figures add up to less than 100%

Table 10. Comparison of alternatives by issue – wildlife habitat - elk security

Security area	Acres		Change	
	No action	Alternatives 1 and 2	Acres	Percent
A	500	451	-49	-9.2
B	3314	3004	-310	-9.3
C	3509	2280	-1034	-29.5
D	5550	4616	-934	-16.8
Total	**12,873**	**10,351**	**-2522**	**-19.6**

Chapter 3. Affected Environment and Environmental Consequences

Introduction

This chapter describes the environmental effects of taking no action and of implementing the proposed action and alternative. This analysis is organized by resource.

Silviculture

Affected Environment

Forested acreage managed by the US Forest Service is used as the analysis area for the forest vegetation analysis described in this section, and is defined as any area with a forested cover type (see table 11 below for a list of included cover types) with forest vegetation species occupying 10 percent or more canopy cover (see Existing Condition section for a description of canopy cover) of the site.

Existing Condition

Forest Vegetation Species Composition

Within the Upper North Fork forest vegetation analysis area, existing and potential species composition has been characterized by forest vegetation species composition (cover types) and habitat types, respectively. A fine-scale, stand-level analysis of existing dominant cover types was performed using aerial photo interpretation by Forest Service analysts (for methodology details, see Data Sources and Methodology section). Individual stands were delineated using criteria described in the Salmon Forest Plan or Forest Service Manual and Handbook. Within each delineated stand, cover types of the majority and/or plurality tree species, as well as other species with a substantial presence in the dominant tree canopy, were identified. Table 11 summarizes existing dominant forest vegetation species compositions for the Upper North Fork project forest vegetation analysis area.

Lower elevation areas within the Upper North Fork project forest vegetation analysis area are generally dominated by ponderosa pine, high elevation upland environments by subalpine fir, while Engelmann spruce, is prominent in drainage bottoms throughout the Upper North Fork project forest vegetation analysis area. Cottonwood, willow, alder and dogwood are common deciduous trees that frequent most riparian stream bottoms and draws. Remnant pockets of aspen are present in places, but aspen is only sparsely represented within the Upper North Fork project forest vegetation analysis area as a whole. The more shade-tolerant conifers are progressively replacing hardwoods in the riparian areas. Representative shrubs and grasses include the Idaho fescue, pinegrass, heartleaf arnica, snowberries and white spirea. Willow, alder and dogwood are common shrubs located in the riparian areas. At higher elevations the species composition is dominated by lodgepole pine and subalpine fir with a lesser component of Engelmann spruce. Engelmann spruce is common in the wetter low areas and drainage bottoms. Beargrass, sedges and grouse whortleberry are major components of the ground vegetation.

Whitebark pine is prevalent on the harsh high elevation sites along the Continental Divide, and is an ecologically important species that grows in high elevation forests all across the northern Rocky Mountains, where its cold tolerance, superior hardiness on the harsh microsites that may exist after a fire, unique method of seed dispersal (seed caching in soil by Clark's nutcrackers), and resistance to lower intensity fires allow it to compete successfully in the upper subalpine zone. Its long life (many centuries is not unusual) makes it a very persistent species in the upper subalpine forests. Whitebark pine is an

important ecological component of these higher elevation forest communities, providing a valuable food source and shelter to squirrels, bears and other animals (its cones contain large, highly desirable seeds); aiding in the protection of soil and water quality in the sensitive high basins where it grows; acting as a "nurse tree" for the establishment of other conifers around it; and undoubtedly filling a host of other roles in these harsh, cold environments.

Whitebark pine is a species of special concern because of the dramatic population decline it has been experiencing throughout its range in the western US over the past few decades, due primarily to white pine blister rust (refer to discussion under Insect and Diseases later in this chapter). Fire exclusion and suppression have also contributed to the decline of whitebark pine in some ecosystems, primarily by allowing the spruce and subalpine fir to increase in dominance and gain competitive advantage on whitebark pine sites. In some landscapes, the lack of fire may have also reduced the availability of suitable open sites where whitebark pine can successfully establish and maintain sufficient growth rate to outcompete associated species. Mountain pine beetle epidemics spreading upslope from lodgepole stands in lower elevations have also periodically caused high mortality in some stands of whitebark pine. Warming climatic trends exacerbate this situation. In summary, whitebark pine is in a rapid, downward spiral across portions of its range.

Table 11. Cover types for the forest affected environment

Cover Type Code	Cover Type Description	Acres	Percent of Total
COT	Forest with black cottonwood as the majority tree species	13	<1
DF	Forest with Douglas-fir as the majority tree species	13,576	37
DF/LP	Forest with Douglas-fir as the plurality species, with lesser, but substantial amounts of lodgepole pine	334	1
DF/PP	Forest with Douglas-fir as the plurality species, with lesser, but substantial amounts of ponderosa pine	410	1
ES	Forest with Engelmann spruce as the majority tree species	758	2
ES/SAF	Forest with Engelmann spruce as the plurality species, with lesser, but substantial amounts of subalpine fir.	36	<1
LP	Forest with lodgepole pine as the majority tree species	11,202	30
LP/SAF	Forest with lodgepole pine as the plurality species, with lesser, but substantial amounts of subalpine fir	68	<1
PP	Forest with ponderosa pine as the majority tree species	6,309	17
PP/DF	Forest with ponderosa pine and Douglas-fir as the two dominant species	346	1
RIPR	Riparian Forest with or without cottonwood as the majority tree species	42	<1
SAF	Forest with subalpine fir as the majority tree species	2,534	7
SAF/LP	Forest with subalpine fir as the plurality species, with lesser, but substantial amounts of lodgepole pine.	185	<1
WBP	Forest with whitebark pine as the majority tree species	1,278	3

Within the Upper North Fork project forest vegetation analysis area, ponderosa pine cover types typically occur in stands on the drier aspects at mid to lower elevations of the more southerly slopes within the steep, deeply incised drainages that are characteristic of this area. Its drought and heat tolerance give it a competitive advantage over its associates on these sites. It can live for many centuries and grow into very large-diameter trees. The stands where these large ponderosa pine exist (often associated with large, old

Douglas-fir as well) provide high quality foraging, nesting and shelter for many wildlife species, both as live trees and as large, long-lasting snags. Their large size and the historically natural open nature of the stands are visually and aesthetically pleasing to people.

Fire historically played a major role in the maintenance of ponderosa pine and the characteristically open forest structure. The drier sites where ponderosa pine grows were visited frequently by fire, which was usually of low or moderate severity because of the lower fuel loadings typical on these sites. Ponderosa pine is highly fire resistant and will usually survive these low or moderate-intensity fires, whereas competing tree species, and in particular Douglas-fir, are less fire resistant and would experience higher mortality during a fire. Lack of fire has allowed dense understories and more continuous canopy cover of Douglas-fir (and sometimes lodgepole pine) to develop, where more frequent, low intensity fire would have kept tree density relatively low, tree sizes and ages more diverse, and forest canopy more broken and patchy across the landscape.

Forest Vegetation Structural Classes

Past disturbance processes—or the lack thereof—have influenced existing forest vegetation structure. Within the Upper North Fork project forest vegetation analysis area, wildfire plays the dominant role in shaping forest vegetation structure (Crane and Fischer 1986), with insect and disease disturbances playing less significant, but still-important roles. Wildfire suppression has led to a disproportionate increase of mature, dense structural classes, which today dominate the Upper North Fork project forest vegetation analysis area (USDA Forest Service 1995, table 12). Where they exist, younger structural classes (stand initiation, stem exclusion, and understory reinitiation) are largely the result of past timber harvest activities and similar silvicultural practices (pre-commercial thinning, sanitation activities, etc.) or the Frog Pond wildfire. Uneven-aged forests also exist in relatively minor amounts, largely as a result of past silvicultural practices (see section of Past activities above), as well as recurring insect and disease disturbances (see Forest Vegetation Insect and Disease Damage, Risk, and Susceptibility on page 36).

Table 12. Forest structural stages for the Upper North Fork project affected environment

Forest Structural Stage Name	Acres	Percent of Total
Stand initiation	4,000	11
Stem exclusion	1,231	3
Understory re-initiation	2,351	6
Multi-storied forest	488	1
Mature forest	29,021	78

Sources/Notes: Summarized from the UNF vegetation database (forested NFS lands only). Forest structural classes are described in O'Hara et al. (1996), except for mature forest, which is a forest whose dominant canopy cohort has an average stem diameter exceeding 9 inches at breast height (dbh).

Old-growth forest is a subset of the mature forest class. Though all stands age through time, not all stands have the capability of developing into what Hamilton (1993) would define as old-growth. General characteristics of old-growth include sufficient overall tree density and specific numbers of large, live, "old growth" using the Hamilton (1993) definition for a given forest type (Society of American Foresters 1980).

Forest Vegetation Density / Canopy Cover

Canopy cover is a density metric used to describe site occupancy and forest vegetation competition based on the relative abundance of canopy foliage and resulting interception of light and water resources. Although it has important limitations (Powell 2009a), it is nonetheless used extensively in ecological

studies and forest density management (Powell 1999 and references therein). It is defined as the vertical projection of vegetation foliage onto the ground surface when viewed from above.

Table 13. Forest canopy cover within the Upper North Fork project forest vegetation affected environment

Percent canopy cover	Acres	Percent of Total
10	3,353	9
20	1,242	3
30	2,140	6
40	1,939	5
50	3,825	10
60	3,204	9
70	9,193	25
80	8,573	23
90	3,261	9
100	361	1

The values in table 13 indicate that a large majority of the Upper North Fork forest vegetation analysis area is heavily stocked and exceeds productive, ecologically resistant and resilient zones typically recommended for multi-resource management (Powell 1999). The large acreages of areas with high (over 60 percent) canopy cover values are in large part a result of past fire suppression activities, in combination with natural and artificial conifer regeneration practices. Areas with low (under 30 percent) canopy cover values are often associated with past wildfire (especially the Frog Pond wildfire) and timber harvest disturbances.

Fire Regimes and Fire Regime Condition Class

Wildfire is the dominant ecological disturbance affecting vegetation composition and structure on the Salmon-Challis National Forest. The relative influence of wildfire on forest vegetation, as well as the effects of fire suppression and exclusion, can be expressed using the concepts of fire regimes (Agee 1998), historic ranges of variability (Keane et al. 2009), and fire regime condition class (Barret et al. 2010). In a fundamental ecological sense, a restoration of historic fire regimes to an ecosystem like the Upper North Fork forest vegetation analysis area, with its largely intact assemblage of native plant species, leads ultimately to at least a partial restoration of forest vegetation (Allen et al. 2002).

Fire regimes are defined using a five-group classification based on fire frequency and fire severity. Reference fire regimes (also known as “natural” or “historical” fire regimes) may differ from current regimes, as measured by fire regime condition class departure metrics. Broad-scale alterations of historical fire regimes and vegetation dynamics have occurred in many landscapes in the U.S. through the combined influence of land management practices, fire exclusion, livestock grazing, insect and disease outbreaks, climate change, and invasion of non-native plant species. The LANDFIRE Project produces maps of historical fire regimes and historical and current vegetation conditions.

The location, distribution, and size of fire regime groups within the analysis area are indicated in table 14 and figure 3 below.

Table 14. Acres of fire regime groups within the Upper North Fork project forest vegetation affected environment

Fire Regime Group	Historic burn severity	Acres	Percent of Total
I – 0 to 35-year frequency, low to mixed severity	Low (0-25% canopy cover loss) Mixed (25-75%)	3,210	9
II – 0 to 35-year frequency, high severity	High (75-100%)	0	0
III – 35 to 100+-year frequency, mixed severity	Mixed (25-75%)	27,960	75
IV – 35 to 100+-year frequency, high severity	High (75-100%)	5,922	16
V – 200+ year frequency, high severity			

Historic range of variability describes the variability and central tendencies of biophysical, disturbance, and climatic systems, across landscapes and through time, in the absence of modern human interference. Natural disturbances include Native American influences that have contributed to the development of native species adaptations and natural disturbance regimes.

Fire regime condition class is the difference in conditions (percent departure) at a given time period (such as current or future) from ecological reference (historical) conditions. Pre-settlement ecosystems are commonly used as a benchmark for reference conditions and include Native American influence in the natural fire regime. The fire regime condition class system uses three condition classes to signify low, moderate, or high departure from the central tendencies and variation of natural fire regimes and associated vegetation.

The associated effects of departures of fire regimes from the central tendency of the historical range of variability on forest vegetation generally includes: 1) an increase of overall tree and shrub canopy density, 2) an increase of the relative and absolute abundance of late-seral tree and shrub species, and 3) an increase over space and time in the relative proportion of disturbances of higher size, severity and/or intensity (Powell 2000 and references therein). The relative abundance of areas in each fire regime condition class within National Forest System lands inside the Upper North Fork project analysis area (table 15) is shown in figure 4.

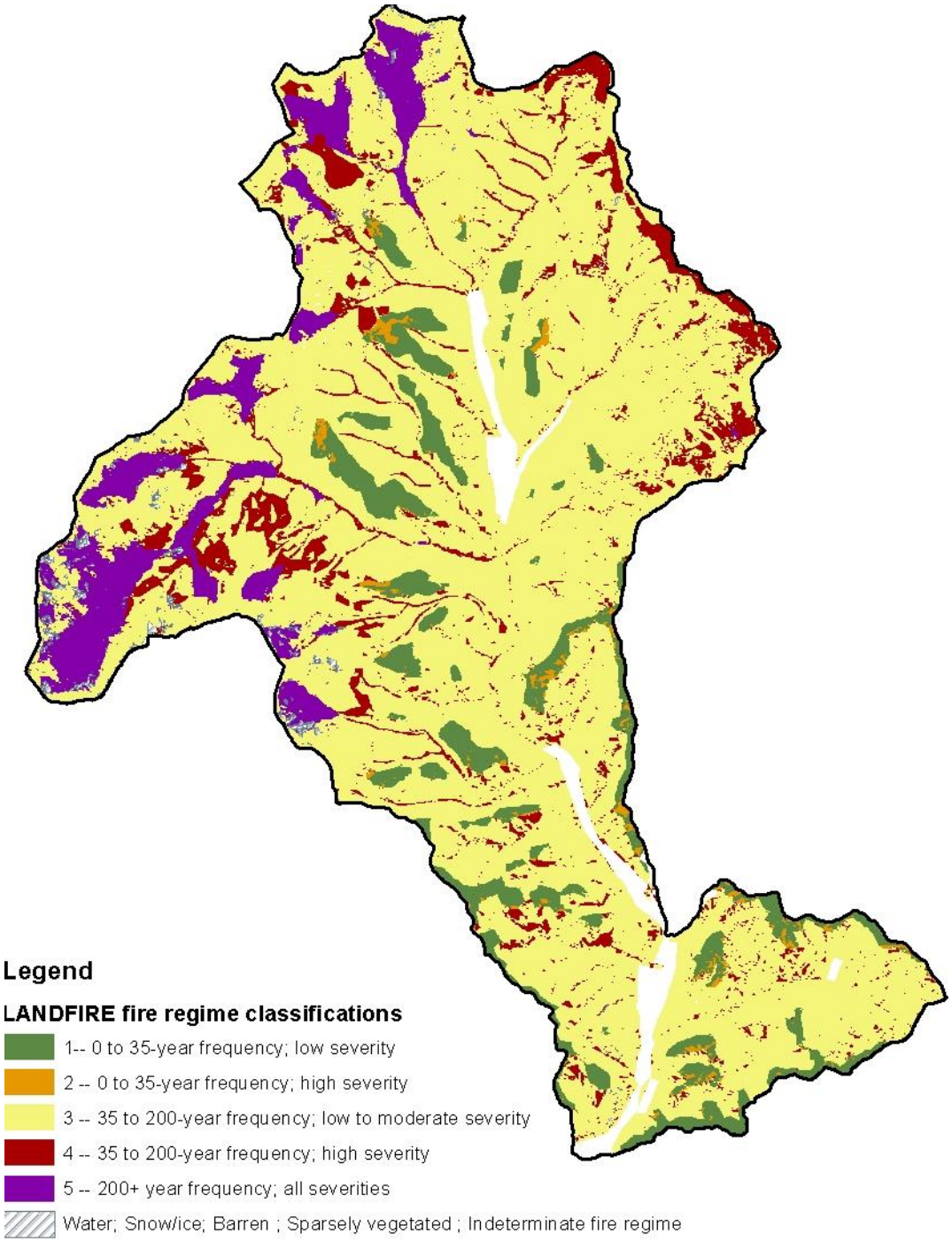


Figure 3. Fire regime groups

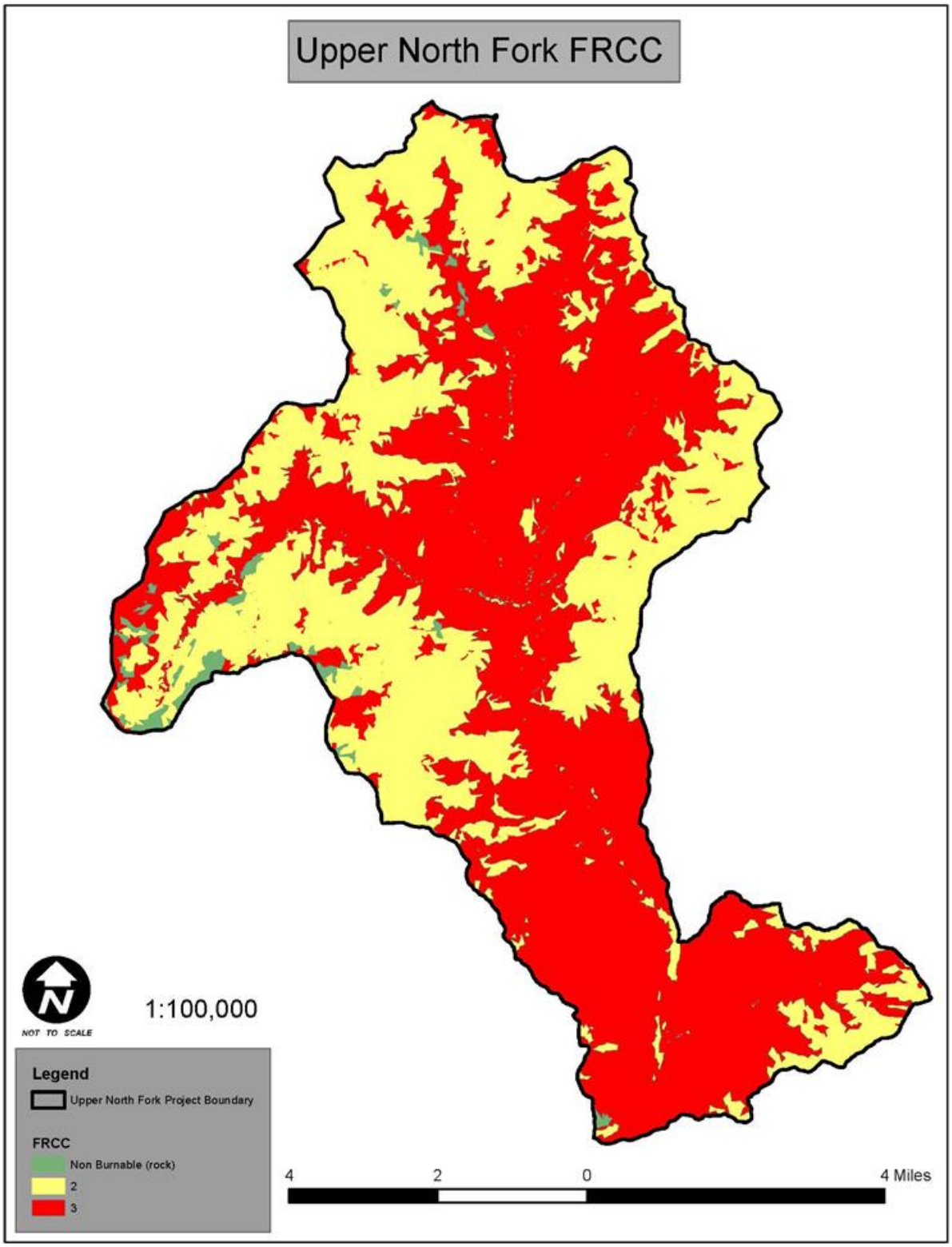


Figure 4. Fire regime condition class designations within the Upper North Fork project analysis area in red, yellow and green

Table 15. Fire regime condition class descriptions (Barrett et al. 2010)

Fire Regime Condition Class	Description
1	Less than 33 percent departure from the central tendency of the historical range of variation: Fire regimes are within the natural or historical range and risk of losing key ecosystem components is low. Vegetation attributes (composition and structure) are well intact and functioning.
2	33 to 66 percent departure: Fire regimes have been moderately altered. Risk of losing key ecosystem components is moderate. Fire frequencies may have departed by one or more return intervals (either increased or decreased). This departure may result in moderate changes in fire and vegetation attributes.
3	Greater than 66 percent departure: Fire regimes have been substantially altered. Risk of losing key ecosystem components is high. Fire frequencies may have departed by multiple return intervals. This may result in dramatic changes in fire size, fire intensity and severity, and landscape patterns. Vegetation attributes have been substantially altered.

Forest Vegetation Insect and Disease Damage, Risk, and Susceptibility

Disturbance processes influence forest composition, structure and density (Perera et al. 2004). Among the many different disturbance processes that have influenced vegetation conditions in the Upper North Fork project forest vegetation analysis area to varying degrees in the recent past, forest insects, dwarf mistletoes, and root diseases have been important disturbance agents.

Insects and diseases can exert major influence on forest conditions over time, although they are usually less spectacular or immediately noticeable than fire or timber harvesting. Their influence on a year-by-year accounting can appear deceptively inconsequential, but over time, they can cause shifts in species composition, stand structure, and other characteristics by causing mortality to selective stand components. Sometimes their effects can be relatively quick and dramatic, such as during an insect epidemic. Though native insects, plant parasites, and diseases are a natural component of the ecosystem and accepted as such, their effects, particularly at epidemic levels, may not be a desired condition in some areas from a resource management or social perspective. Exotic (non-native) insects or disease are particularly undesirable, because little natural resistance may exist in the host species, high mortality can occur, and key ecosystem components can be irreparably damaged.

Mountain pine beetle (*Dendroctonus ponderosae*) is a major insect noticeably affecting existing stand conditions in the Upper North Fork project forest vegetation analysis area. It is a native species that affects lodgepole pine, ponderosa pine, and whitebark pine in this area.

In most years, persistent but low, endemic population levels of mountain pine beetle exist. However, mountain pine beetle is capable of rapidly building up to very high population levels, which can overwhelm the trees natural defenses and cause large amounts of mortality in the host species, given favorable forest and environmental conditions. This situation most typically occurs in landscapes where lodgepole pine-dominated stands extend across large expanses of the land, providing a large amount of breeding habitat for the beetle, and when these stands are at their condition of highest risk, which is greater than 80 years old, average diameters greater than 8 inches.

In the mid-1990s, aerial and field surveys showed mountain pine beetle populations beginning to increase in the Upper North Fork project forest vegetation analysis area, with a significant rise in acres infested and trees killed starting in 1999. Refer to appendix B in the silviculture report, located in the project

record, for more information on recent, ongoing, and anticipated mountain pine beetle activity and effects in the area.

Whitebark pine is also vulnerable to attack from mountain pine beetle. Though there has been high whitebark pine mortality within the Upper North Fork project forest vegetation analysis area over recent decades, mountain pine beetle was probably not the primary causal agent. Whitebark pine inhabits quite harsh, high elevation sites, conditions which historically were far less conducive to beetle survival. However, recent beetle populations and suitable climatic patterns have increased beetle-caused mortality in whitebark pine and have caused the beetle to temporarily become the primary mortality agent among this high-elevation tree species.

White pine blister rust (*Cronartium ribicola*) is a fungal disease that affects whitebark pine. Blister rust was introduced into western North America from Europe in 1910. Because it is not a disease that these species have evolved with, little natural resistance exists in the affected species in this country. White pine blister rust has been one of the most damaging diseases of forests in the Northwest and has had a major impact on ecosystems, shifting large areas once dominated by western white pine or whitebark pine forest types to forests dominated by different species. Because of the important role these species play in the forests they inhabit, this has dramatically changed the functioning of the ecosystem from one of wider adaptability and tolerance for endemic insects, pathogens and fire, to one of more narrow adaptive capacities, more pre-disposed to stress, and more susceptible to detrimental impacts from insects, disease, and fire (Harvey et al. 1994).

White pine blister rust has caused rapid mortality of whitebark pine over the last 30 to 60 years. Keane and Arno (1993) reported that 42 percent of whitebark pine in western Montana had died in the previous 20 years with 89 percent of remaining trees being infected with blister rust. The ability of whitebark pine to reproduce naturally is strongly affected by blister rust infection. The rust kills branches in the upper cone bearing crown, effectively ending seed production. In addition, mature whitebark pine is susceptible to mountain pine beetle attack and mortality. In some areas the few remaining whitebark that show the potential for blister rust resistance are being attacked and killed by mountain pine beetles, thus accelerating the loss of key mature cone-bearing trees. These factors have severely limited the amount of whitebark pine seed.

Douglas-fir bark beetle (*Dendroctonus pseudotsugai*) is the major bark beetle that attacks Douglas-fir, its main host, in this region. Beetles are attracted to slash, stumps, windthrow, and trees weakened by fire, drought, defoliation or disease (such as root disease). Populations expand rapidly in such material and in subsequent generations beetles attack and kill surrounding green trees. Douglas-fir bark beetle are not, however, particularly aggressive. As more of the susceptible trees are killed, beetles are forced into increasingly healthier trees which are better able to repel attacks, and populations quickly decline.

Susceptibility of stands to Douglas-fir bark beetle is based on the proportion of Douglas-fir in the stand, its density, size and age. The most vulnerable stands ("high hazard") are relatively densely stocked, where Douglas-fir comprises at least 50 percent of the stocking, average stand age is over 120 years, and average diameter of Douglas-fir is over 14 inches dbh. Other factors that increase vulnerability include stands on moister habitat types, where Douglas-fir grows best, and stands where root disease is present or trees are injured and vigor is reduced. Fire, particularly low severity fire, can substantially increase the susceptibility of Douglas-fir to infestation by Douglas-fir bark beetle, because though the tree may not die from the fire directly, root and bole injury often occurs, increasing tree stress levels.

The fungi that cause root diseases are so widespread that they are probably present to some level in soils on every forested site in the northern Rocky Mountain area. Root disease is one of the most damaging groups of tree diseases, causing mortality, wood decay, and reduced growth in host trees. All tree species

are susceptible to one root disease or another however some trees are considered particularly vulnerable. Douglas-fir is particularly susceptible to a whole host of root diseases, with the main species being *Armillaria ostoyae*, followed by *Phaeolus schweinitzii* and *Phellinus weirii*. As with Douglas-fir bark beetle; root diseases target trees weakened by other factors such as competition, insect infestation or climate. However, healthy young trees will also be invaded and killed on sites where the pathogen exists at high levels. The fungus colonizes the roots or root collar, kills the living material in the tree (i.e. the cambium) and eventually may kill the tree through excessive decay, causing windthrow, or girdling. Trees infected by root disease are weakened and, in turn, often attacked by bark beetles.

Within the Upper North Fork project forest vegetation analysis area, relatively low, endemic levels of root disease are associated with Douglas-fir stands in the warm to cool, moist Douglas-fir habitat groups, especially on southerly aspects and moderate slopes. These levels, however, are likely elevated relative to historic amounts (Hessburg et al. 199b) and are expected to increase over time as suitable conditions persist and develop (Hessburg et al. 1999a, Powell 2000). These are the primary Douglas-fir habitat types that occur in the Upper North Fork project forest vegetation analysis area. Moderate mortality of Douglas-fir within stands on the cool, moist subalpine fir series habitats also occurs, which are the most common habitat type in the Upper North Fork project forest vegetation analysis area.

Management Direction

Regulatory Framework

Environmental laws such as the National Forest Management Act, Endangered Species Act, Clean Water Act, and Clean Air Act provide the direction to the Forest Service for management of forest vegetation resources. These laws are interpreted and defined through the Code of Federal Regulations (CFR), Idaho Administrative Procedures Act, Land and Resource Management Plan (Forest Plan) direction, Forest Service Manual (FSM) direction, and Forest Service policy. The regulatory framework associated with each resource is helpful in relating national and Forest direction to resource analysis procedures. This analysis also addresses the consistency of the Proposed Alternative with the Healthy Forest Restoration Act.

Methodology

Data Sources and Methodology

The analysis information provided in this section was based on a variety of methodologies, models, and procedures, all of which are derived from scientific sources included in the references cited section. Many of the analytical processes were based on local protocols, and documentation for them is also included in the references cited section. Additional details regarding the methodology can be found in the silviculture report, located in the project record.

Data sources and analysis consist of:

- Stand examinations including:
    - Cursory exams in designated old growth stands and potential harvest units.
    - Detailed exams in selected stands.
- Extensive field reconnaissance during all seasons.
- Historical and scientific documents from the USDA Forest Service and the Salmon-Challis National Forest to provide information on vegetation patterns and processes.
- Professional expertise of the silviculturist.

- Aerial photogrammetry where field reconnaissance and stand examinations were not feasible to provide information on vegetation composition, structure, density, and susceptibility to insects and diseases.
- Missoula Fire Sciences Lab Image-based potential vegetation type and forest structure datasets combined with forest cover type and structural stage maps to generate fire regime condition class.

Inventory and evaluation of mature forest/old growth forest

Within the Upper North Fork forest vegetation analysis area, Salmon Land and Resource Forest Management Plan designated old growth stands were inventoried and evaluated for their old growth character using a combination of the methods described above. In addition, any other stands within units to be thinned using mechanical and/or hand chainsaw methods that could potentially qualify as old growth (Hamilton 1993) were inventoried and evaluated.

Best Available Science

Analysis and consistency findings are based on the best available scientific information with respect to forest vegetation. All cited references are considered to be the most appropriate for the particular habitat types, biophysical processes, and environmental conditions of the Upper North Fork analysis area, within the temporal boundary of the analysis described above. The best available scientific understanding of likely climate change, with associated effects on forest vegetation resources in the Upper North Fork Project forest vegetation analysis area, was utilized in the analysis of direct, indirect, and cumulative effects of each Alternative in the project. Other scientific references with similar findings or hypotheses not as applicable to this analysis area were considered, but not utilized in this analysis.

Geographic Boundary for Analysis

The geographic context for estimating effects includes all lands located within the Upper North Fork planning area forest vegetation analysis area expected to be directly, indirectly, and/or cumulatively affected or impacted by implementation of a no-action alternative, action alternatives, or other past, present or foreseeable future human activity. Silvicultural activities (which include prescribed fire) included in alternatives 1 and 2 would directly, indirectly, and/or cumulatively affect up to approximately 40,274 acres, of which 37,091 acres constitute the forest vegetation analysis area.

The analysis area is appropriate for the purposes of this silviculture analysis for three reasons: 1) all of the forest vegetation attributes affected by the Proposed Action (i.e., various categories of species composition, forest structural stage, and tree density) are common and widely distributed throughout the planning area, the North Fork Ranger District in which it occurs, the Salmon-Challis National Forest containing the North Fork Ranger District, and the Salmon River Mountains containing this portion of the Salmon-Challis National Forest; 2) Any specific threatened, endangered, or sensitive tree, graminoid, shrub, or forb species occurring within and around the forest analysis area and affected by the activities included under action alternatives 1 and 2 are addressed in this analysis; 3) Indirect and/or cumulative effects to forest vegetation resulting from the activities proposed under alternatives 1 and 2 and occurring outside the Upper North Fork forest analysis area are highly speculative, extremely minor, and/or essentially not measurable.

Temporal Boundary for Analysis

The effects analysis is bounded in time by considering the present time and how far into the past and future to consider human actions which have measureable effects on vegetation resources that would overlap in time with the proposed Upper North Fork project. The temporal context for evaluating effects includes the temporal envelope of direct and indirect effects on forest vegetation resources of past, present, and reasonably foreseeable actions in the planning area, as described below (Table 20).

Past actions had an influence on past, existing (2011), and in some cases reasonably foreseeable future conditions. Existing conditions are described by a vegetation database developed for the planning area using field reconnaissance, aerial photo interpretation, and analysis of stand examination data. Database information was informally and qualitatively validated by completing field reviews during 2009-2012, which included walk-through examinations of approximately 15 percent of the stands within the Upper North Fork project forest vegetation analysis area (those stands accessible by ground transportation). In addition to non-anthropogenic disturbances, existing conditions reflect vegetation changes resulting from past fire suppression, timber harvest, fuelwood collection, tree planting and tree thinning using chainsaws. Specifics on these activities are provided in the next section, and in the following Affected Environment section. The temporal bounding of past effects is the era when vegetation management and fire suppression began in the area—approximately 1900.

Present (ongoing) actions were considered when evaluating effects. Reasonably foreseeable future actions were also included in the effects analysis. A 15-year timeframe was utilized to identify which future actions are reasonably expected to occur and have effects that overlap in space and time with the effects of the Upper North Fork project. The Salmon-Challis National Forest utilizes a five-year fuels and timber action plan which identifies areas where the Forest is considering future vegetation management projects. In addition to the five-year timber and fuels plan, the Forest can be reasonably expected to conduct for approximately the next 15 years the fuelwood, fire suppression, and hazard tree removal programs described as present activities above. Any activities that might occur at some future time beyond this planning timeframe are highly speculative and not included in this analysis.

Identification of Desired Conditions

Desired conditions for the Upper North Fork project forest vegetation analysis area were identified through an extensive process of scoping (reference) within the Forest Service and among organizations and individuals outside the agency. Identified desired conditions include the following descriptions for broadly defined plant association groups, which have been allocated into fire groups by Crane and Fischer (1986) and Barrett et al. (2010). The abundance and distribution of Fire Groups within the Upper North Fork forest vegetation analysis area is displayed in table 16.

In the dry upland forest ecosystems (fire group 2), the desired future condition will be a relatively open forest structure/stand composition, dominated by large diameter ponderosa pine and to a lesser degree large diameter Douglas-fir. Understory vegetation will consist of mostly native herbaceous plants, including naturally regenerated shrubs and scattered patches of ponderosa pine seedlings and saplings.

In the warm/moist upland forest ecosystem (fire groups 3, 4, and 5), uneven–aged stands or stands composed of even–aged groups of trees will form a structurally diverse mosaic of age–classes ranging from seedling to mature forests. The stands would contain a mixed species composition of ponderosa pine and Douglas-fir. The trees are vigorous with densely foliaged crowns that are healthy and open to sunlight on 2 or more sides. Douglas-fir dwarf mistletoe disease is absent or limited to spotty infection centers within the stands. Downed woody fuel loading should be approximately 5 to 15 tons per acre with most of the woody material concentrated in larger diameter stems.

In the moist/cold upland forest ecosystems (fire groups 8, 9 and 10), the desired future condition will be a more diverse forest structure/stand composition dominated by lodgepole pine. This ecosystem should be comprised of stands of different age classes, producing a diverse range of tree species, sizes and stocking densities. Spatial heterogeneity can be defined in a wide variety of ways (Turner et al. 2001). For the purposes of the Upper North Fork HFRA Ecosystem Restoration Project, greater structural/compositional diversity is defined as a more equitable distribution and representation of cover types and structural stages across the landscape across both space and time.

Table 16. Fire groups based on plant association groups

Plant Association Group	Fire Group[a]	Acres	Percent of Total
Aspen/ Conifer	0 – Miscellaneous special habitats (deciduous riparian communities)	90	<1
Cottonwood	2 – Warm, dry habitat types that support open forests of ponderosa pine or Douglas-fir. Mature stands in this are characterized by an open forest-to-savanna appearance, with an undergrowth of dry-site grasses and forbs.	20	<1
Douglas-fir/ Grassland		433	1
Ponderosa pine/ Grassland	3 – Warm, moist ponderosa pine habitat types and warm, dry Douglas-fir habitat types usually dominated by ponderosa pine. In the absence of fire, Douglas-fir regeneration beneath the ponderosa pine is capable of taking over the site on the Douglas-fir habitat types.	10,975	30
Douglas-fir/ Lodgepole-gentle	4 – Cool, dry Douglas-fir habitat types. These stands are generally found in the continental climate of the Challis and Open Northern Rockies physiographic sections and elsewhere above the cold limits of ponderosa pine. Douglas-fir is often the only conifer on this site.	564	2
Douglas-fir/ Lodgepole-steep	5 – Moist Douglas-fir habitat types. Douglas-fir generally grows well on these sites and dominates the mature stand, but other species such as aspen and lodgepole pine can be present.	2	<1
Dry Douglas-fir without Ponderosa pine		1,068	3
Dry Douglas-fir with Ponderosa pine		10,934	30
Subalpine fir moist	8 – Dry, lower subalpine habitat types. This is a heterogeneous grouping of subalpine habitat types. Douglas-fir or a mixture of Douglas-fir and lodgepole pine, sometimes followed by spruce, are the major trees in a successional sequence leading toward a subalpine fir climax forest.	3,092	8
Subalpine fir dry-gentle		8,210	22
Subalpine fir dry-steep	9 – Moist, lower subalpine habitat types. These sites are often dominated by Engelmann spruce. Fires are infrequent but often severe, with long-lasting effects. In some stands, spruce is climax and in the subalpine fir habitat types is a persistent seral species.	192	1
Subalpine fir/ White bark pine	10 – Cold, upper subalpine and timberline habitat types. Fires are generally infrequent; the fires that do occur are often limited in extent by discontinuous fuels. Postfire succession is slow, owing to the harshness of the environment.	885	2
White bark pine/ Subalpine fir		425	1

a - Fire groups 1, 6, and 7 are not included in this table because they are made up of habitat types that do not occur on the Salmon-Challis.

Whitebark pine should be one of the primary overstory trees in subalpine elevations at and near treeline ecotones. The stands are structurally even-aged or are composed of even-aged groups of trees within stands. Structural diversity between the stands with tree age classes is more uniformly distributed between stand initiation and mature stages. Species composition should be pure to mixed Douglas-fir/lodgepole pine and/or subalpine fir, with incidental amounts of ponderosa pine or Engelmann spruce. The trees would contain separation between the tree crowns containing dense foliage to provide growing space. Approximately 5 to 15 tons of downed woody fuels will be present with most of the material concentrated in the tree bole material. The lodgepole pine and Douglas-fir dwarf mistletoe diseases are not widespread, and limited to spotty infection centers.

Measureable Indicators Used for Analysis

The following measureable indicators were identified for analysis. These indicators will inform a rational decision based on the project Purpose and Need, comparison of alternatives, and consistency with applicable laws and regulations.

- Forest species composition, measured as cover type of the dominant or plurality tree species or species group.
- Forest vegetation structural classes, measured according to modified criteria based upon O'Hara et al. (1996).
- Forest density, as measured by percent canopy cover.

Changes in these indicators also interact with insect and disease disturbances, as well as fire regime condition class (Barrett et al. 2010). These interactions are discussed within this analysis in qualitative terms.

Environmental Consequences

No Action Effects

There are substantial potential consequences of failing to take action within the Upper North Fork Project forest vegetation analysis area, which are discussed in this analysis following guidance contained within the HFRA Field Guide (USDA Forest Service et al. 2004).

No action on the Upper North Fork HFRA Ecosystem Restoration Project allows previously approved (on-going) activities to proceed, but none of the silvicultural activities included in the Proposed Action would be implemented. The concept of no action is that ongoing disturbance and succession processes influencing vegetation conditions in the Upper North Fork Project forest vegetation analysis area would continue as they have in the recent past. If the purposes and needs described earlier could be addressed by taking no action - it would occur as a result of vegetation changes induced by ecosystem processes other than those associated with implementing silvicultural activities specifically directed at reducing and modifying fuels. Since no new forest vegetation activities would occur, it would not provide an opportunity to address species composition, forest structure, or tree density conditions that are either over- or under-represented with respect to the historic range of variability or fire and fuels management objectives in the Upper North Fork Project forest vegetation analysis area.

While no effects would result because there are no activities proposed, the environmental consequences of taking no action would nonetheless be substantial and important. In short, taking no action would allow successional and disturbances processes to occur without the influence of activities described under alternatives 1 or 2, resulting in different characteristics of vegetation composition, structure, and density within the Upper North Fork project forest analysis area.

These successional and disturbance processes, and the resulting patterns of species composition, density, and forest structure, have been broadly described for forest ecosystems very similar to those in the Upper North Fork area in Powell (2000), and references therein. Site-specific changes, however, would be highly stochastic (unpredictable) and for the purposes of this analysis essentially unquantifiable. Nevertheless, recent experience with wildfires in nearby, similar forest ecosystems provides some reference of spatial distributions of burn severity occurring in an existing era of full fire suppression, and comparisons to recent spatiotemporal burn distributions can be made. By reducing the occurrence of wildfire disturbance within the Upper North Fork forest analysis area, fire suppression and exclusion activities have had—and would have for the foreseeable future—important consequences for forest vegetation. These effects are well-understood and thoroughly described in general terms in Powell (2000)

and references therein. In combination with fire exclusion and suppression, allowing non-anthropogenic successional and disturbance processes to shape present and future vegetation conditions within the Upper North Fork forest analysis area would also have predictable and significant consequences that can be described in general terms. In the near-term, these would likely include:

- Transition toward (and further over-representation[5] of) mid and late-seral species, and further reductions of early seral species abundance and distribution, including aspen, ponderosa pine, and whitebark pine. This would essentially be a continuation of the trends described in the Affected Environment section, such that the cover types described in table 11 would develop along successional pathways toward late-seral compositional arrangements described in Steele et al. (1981) and Crane and Fischer (1986), until future vegetation disturbances occur.
- Transition toward (and further over-representation of) understory reinitiation and old forest (particularly multi-story) structure types, and further reductions of under-represented stem exclusion and stand initiation forest structure types. This would essentially be a continuation of the trends described in the Affected Environment section, such that the structural stages described table 12 would develop along successional pathways described in O'Hara et al. (1994) and Crane and Fischer (1986), until future disturbances occur.
- Transition toward (and further over-representation of) high-density forests, at the expense of under-represented low and moderate-density forests. This would essentially be a continuation of the trends described in the Affected Environment section, such that the forest densities described in table 13 would increase in a manner described in Powell (1999) and Powell (2000), until future disturbances occur.
- Increased susceptibility to high-severity, stand-replacement wildfire over all portions of the landscape. For many ecosystems adapted to low or mixed-severity wildfire, increased susceptibility to high-severity wildfire poses elevated risks of losing key ecosystem components and is outside historic ranges of variability for postfire ecosystem recovery processes (Powell 2000 and references therein, Barrett et al. 2010).
- Susceptibility to (and tree damage/mortality resulting from) insect, dwarf mistletoe, and disease disturbances is expected to generally increase across the Upper North Fork Project forest vegetation analysis area as sites increase in density, canopy layering, and the relative abundance of Douglas-fir, spruce, and true firs (appendix B, Schmitt and Powell 2005, Hessburg et al. 1999a and 1999b, Powell 2000 and references therein). As noted in Powell (2000):

  > Plant succession in combination with human influence and extremes in weather are the primary ingredients of forest health declines; insect outbreaks and disease epidemics may be little more than symptoms of an underlying problem (Sloan 1998).

  Indeed, the biophysical and ecological processes in the Upper North Fork project forest analysis area dictate that in the absence of wildfire or harvest disturbances, biological communities would increasingly function and develop using other disturbance mechanisms—microbial, fungal, and herbivorous (Harvey 1994).

When future disturbances occur as described in the previous two bullet points, the increased susceptibility over larger portions of the Upper North Fork Project forest vegetation analysis area suggests that such disturbances would be of higher severity, intensity, and occur over a greater extent, than occurred within historic ranges of variability (Powell 2000 and references therein). Patch sizes of a given severity—particularly high severity—would be larger (Perry et al. 2011), which can inhibit vegetation recovery by

[5] "over-representation" is a relative term denoting the abundance of a particular attribute (i.e., cover types or vegetation structure classes) relative to a given reference point or scale. In this report, the reference scales are Historic Ranges of Variability of the attribute in question, indicated by Fire Regime Condition Class (Table 15, Figure 4) and also described in (Barrett et al. 2010)

limiting available seed sources and damaging the productivity of upper soil horizons (Graham et al. 2004). Although vegetation recovery following disturbance is always constrained by post-disturbance seed availability and soil productivity (in addition to climatic factors), these constraints would be elevated by taking no action due to the increased disturbance intensities, severities, and extent relating to increased vegetation susceptibility (Graham et al. 2004).

Coniferous trees found at the lower elevations include ponderosa pine and Douglas-fir. Many of the areas in the Upper North Fork Project forest vegetation analysis area landscape are warm, dry ponderosa pine and Douglas-fir ecosystems, and as such experienced mainly low intensity ground fires in the historic landscape (Arno 1991, Arno 1987, Williams 1992, Mutch et al. 1993, Harrington 1990). This pattern of frequent burning in ponderosa pine types has been tracked back at least as far as 1500 A.D. through dating multiple fire scars on trees and to 1000 A.D. or earlier based on charcoal sediments in ponds (Arno 1987). Over-stocking and woody debris accumulation in these warm dry ecosystems has resulted from fire suppression, historic logging, and grazing, placing these ecosystems at much higher risk of high intensity crown fires (Mutch et al. 1993, Arno 1987, Lotan 1984).

Current stand conditions in the Upper North Fork project analysis area have not been influenced by the normal pattern of periodic fires. Most stands in the area have been fire-free since 1919. Existing vegetation conditions have been altered from those that would have historically occurred under natural fire regimes (Havlina et al. 2010). Fire regime condition class has been developed to classify the amount or degree of departure from the historic fire regimes. As shown in figure 4, currently, the vast majority of stands within the analysis area are in condition class 2 (moderate departure), or 3 (high departure).

Based on recent wildfires that burned under similar conditions on the Salmon-Challis National Forest, no action assumes a wildfire will occur in the foreseeable future and include extensive areas dominated by active crown fire and high surface fire resulting in the loss of 75 to 100 percent of overstory vegetation across 50-75 percent of the Upper North Fork Project forest vegetation analysis area. This is in contrast to the 16 percent or so of areas historically dominated by high severity fire regimes. Additional analysis of these wildfires indicated that in steep terrain, similar to the Hughes Creek subwatershed, high fire severity of 50 percent could also be expected in riparian areas (within 300 feet of streams). A detailed description of predicted fire behavior and severity occurring by taking no action is located in the Upper North Fork HFRA Ecosystem Restoration Project Fire and Fuels resource report in the project record.

In addition to elevated fire severity and vegetation mortality resulting directly from wildfires, by taking no action more trees would be weakened and subjected to stress as a result of other factors such as stem damage and a loss of green foliage, than under either alternative 1 or alternative 2. This would occur to a greater extent by taking no action because disturbance severity would also be elevated across larger areas relative to either action alternative 1 or alternative 2. Bark beetle populations are expected to increase with subsequent additional mortality in the conifers.

Other post-disturbance recovery processes would occur along well-understood ecological pathways described in the following paragraphs and in Powell (2000) and Steele et al. (1981) for the alternatives analyzed here. However, the resilience and recovery processes of the forest vegetation analysis area as a result of taking no action would in many areas be impaired, protracted, delayed, inhibited, reduced, and/or prolonged relative to either action alternative (Perry et al. 2011, Powell 2000), due to the large patch sizes of high-severity patches and increased intensity of wildfire disturbances (Graham et al. 2004).

Following future vegetation disturbances, over time stands would become more vigorous than they were prior to low and mixed-severity disturbance events, due to reduced stocking levels and the improved structural diversity that would result from converting many of the closed canopy stands into the re-initiation phase. This would reduce the level of insect activity within the area. Early-seral species can be

expected to reestablish more aggressively in burned over areas than the more shade-tolerant species. Within the Upper North Fork Project forest vegetation analysis area one can expect an increase in ponderosa pine, lodgepole pine and aspen coverage.

Depending on the site and associated species, the time required to re-establish fire-killed stands within the Upper North Fork Project forest vegetation analysis area would vary widely. Aspen regenerates by root sprouts and stands burned would have vigorous young seedlings well established within the next growing season. Lodgepole pine is well-adapted to stand replacing wildfires. This species stores seed produced over several years in closed (serotinous) cones. The seed is held in a seed bank until the cones are opened at high temperatures. This species should be well established within a couple of years on the areas containing a substantial lodgepole component. Lodgepole pine regeneration following fire is dependent on a “one show” effort. In a few years a moderate disturbance, such as a light ground fire, could eliminate the seedling crop. This would dramatically diminish the relative success of lodgepole pine on a burn (Crane et al. 1983).

At lower elevations, the regeneration of Douglas-fir and ponderosa pine would normally be a slow process on the hot westerly and southerly slopes due to shade and moisture limitations. The Douglas-fir/bluebunch wheatgrass and Douglas-fir/Idaho fescue habitat types are representative of these sites. Studies have indicated that these sites are only capable of stocking 50 percent to 70 percent of the area as indicated in normal yield tables (Steele et al. 1981). Due to the extended regeneration period, openings are common on these sites under normal conditions. The process would take considerably longer on areas where there is no seed source within dispersal range. Seedling survival from planting these sites would be substantially limited by available moisture, particularly under likely ranges of projected climatic regimes. Suitable planting sites would normally be moister than the Douglas-fir/Idaho fescue habitat types and would not be excessively rocky.

With suitable soil, the northerly and easterly slopes should rapidly regenerate with trees when a seed source is close. This requires that the openings are less than about 500 feet across. Dense stands of Douglas-fir/lodgepole pine can be expected to regenerate in these smaller openings on the cooler northerly and easterly slopes. Due to the expected intensity and severity of taking no action wildfire, openings in stands previously dominated by Douglas-fir would likely be extremely large with seed sources only existing only near the perimeters of openings. Under those circumstances, the reestablishment with natural regeneration would be expected to take a very long time. A postfire regeneration survey several years after a fire on similar habitat types in Montana found few seedlings present and those present were clumped near the burn edges, surviving trees or serotinous lodgepole pine (Crane et al. 1983). Unless excessively rocky, these sites can be satisfactorily re-established by planting. Within stands dominated by lodgepole pine, seedling germination following a wildfire event would vary widely, depending on fire intensity, pre-fire pine abundance, and post-fire disturbances.

Over time, the boles and root systems of fire-killed trees would begin rotting. In approximately 5 years the trees would begin to fall over. The rate of windthrow would accelerate substantially over the next several years. Most fire-killed trees would fall over within 25 years and only widely scattered trees that are usually short and large diameter would remain standing after approximately 40 years. The crowns of young trees that were established shortly after the fire would provide ladder fuels above accumulated downed woody material.

Under historical conditions, a diverse forested situation was often created by the development of relatively small openings that are readily established with coniferous species at various stages of development. The Upper North Fork area should burn in a manner that would produce large, homogeneous openings on the lower slopes. These openings would likely remain in a deforested state for

a long period of time, and would take a much longer time to restore a diverse forested situation over much of this area.

Alternative 1 (Proposed Action) and Alternative 2 (No New Temporary Road Construction)

The differences between alternatives 1 and 2 are the amount of temporary road construction and harvest systems of units near proposed temporary roads, with identical silvicultural prescriptions. Because there is no difference in the silvicultural prescriptions, the direct, indirect, and cumulative effects of both action alternatives on the forest vegetation analysis area would be identical. The timeframe of direct effects can generally be measured in years and at the spatial scale of a forest stand, while indirect effects occur over longer spans of time (decades) and are more generally described as occurring over groups of stands and across the Upper North Fork forest vegetation landscape.

Direct Effects

Five indicators are used to present pre-treatment and post-treatment trends for vegetation conditions: species composition, forest structural stages, forest vegetation density and canopy cover, and susceptibility to insect and disease disturbances. These indicators will also be summarized in terms of changes to Fire Regime Condition Class, and susceptibility to insect disturbances. The direct and indirect effects on species composition, forest structural stages, and tree density are a consequence of implementing the silvicultural activities described for alternatives 1 and 2. Direct effects are analyzed as occurring within 10 years of project implementation, and thus include the effect of tree and shrub regeneration following the proposed activities.

Forest Vegetation Species Composition

Species composition, as represented using forest cover types, is not expected to change quickly and dramatically in response to implementation of silvicultural activities proposed for alternatives 1 and 2 (table 17). More dramatic changes are expected over the long run in response to altered fire regimes associated with the re-introduction of low and mixed severity regimes across the landscape. In most locations, low thinning and broadcast burning would focus on the removal of late-seral trees in subordinate canopy positions, and leave a well-stocked stand of remaining trees composed predominantly of the original species characterizing the cover type. In other areas, moderate and high-severity fires are expected to regenerate some stands, but in these areas post-fire cover types are expected to be very similar to pre-fire cover types, with some exceptions described below.

Table 17. Direct effects on cover types for the forest affected environment as a result of implementing alternative 1or 2 of the Upper North Fork Project

Cover type	Existing Conditions / No Action with Wildfire		Alternative 1 and 2 Effects			
	Consequences		Post-treatment		Difference from No Action with Wildfire	
	Acres	Percent of total	Acres	Percent of total	Acres	Percent
COT Forest with black cottonwood as the majority tree species	13	<1	72	0	60	<1
DF Forest with Douglas-fir as the majority tree species	13,576	37	2,828	8	-10,747	-29

Cover type	Existing Conditions / No Action with Wildfire		Alternative 1 and 2 Effects			
	Consequences		Post-treatment		Difference from No Action with Wildfire	
	Acres	Percent of total	Acres	Percent of total	Acres	Percent
DF/LP Forest with Douglas-fir as the plurality species, with lesser, but substantial amounts of lodgepole pine	334	1	6,991	19	6,657	18
DF/PP Forest with Douglas-fir as the plurality species, with lesser, but substantial amounts of ponderosa pine	410	1	4,346	12	3,936	11
ES Forest with Engelmann spruce as the majority tree species	758	2	608	2	-150	<1
ES/SAF Forest with Engelmann spruce as the plurality species, with lesser, but substantial amounts of subalpine fir.	36	<1	36	<1	0	0
LP Forest with lodgepole pine as the majority tree species	11,202	30	7,293	20	-3,909	-11
LP/DF	0	0	4,028	11	4,028	11
LP/SAF Forest with lodgepole pine as the plurality species, with lesser, but substantial amounts of subalpine fir	68	<1	9	<1	-59	<1
PP Forest with ponderosa pine as the majority tree species	6,309	17	6,590	18	281	1
PP/DF Forest with ponderosa pine and Douglas-fir as the two dominant species	346	1	315	1	-31	<1
RIPR Riparian Forest with or without cottonwood as the majority tree species	77	<1	77	<1	0	0
SAF Forest with subalpine fir as the majority tree species	2,534	7	2,496	7	-38	<1
SAF/LP Forest with subalpine fir as the plurality species, with lesser, but substantial amounts of lodgepole pine.	185	<1	120	<1	-65	<1
WBP Forest with whitebark pine as the majority tree species	1,278	3	1,317	4	39	<1

Table 17 displays a number of important direct effects resulting from the action alternatives on forest vegetation species composition. First, some cover types with Douglas-fir or lodgepole pine as the single majority species would be converted to Douglas-fir/lodgepole pine or lodgepole pine/Douglas-fir cover types as a result of both existing species composition and preferential selection for retention of large-diameter Douglas-fir—a fire and mountain pine beetle-tolerant species. Other, more minor changes in

forest vegetation cover type would also occur as a result of both existing species composition and preferential selection for retention of large-diameter, fire-resistant tree species. As a result, the direct effects of implementing the proposed activities on species composition within the treatment units would be relatively minor. For some stands, proposed activities would focus on retention of early-seral species (ponderosa pine, quaking aspen, and whitebark pine) and removal of late-seral species (predominantly Douglas-fir) which would result in changes to these cover types as shown in table 17. In some areas currently dominated by lodgepole pine, the direct effects of the proposed activities, in combination with recent mountain pine beetle activity, would increase the relative abundance of Douglas-fir within stands.

In other areas, a reverse trend is expected in which proposed activities would disproportionately kill Douglas-fir, resulting in cover types with an increased and substantial presence of lodgepole pine and ponderosa pine. Stands currently dominated by ponderosa pine are not expected to undergo cover type conversions following the implementation of proposed activities, and the abundance of stands dominated by ponderosa pine but with a substantial amount of Douglas-fir is expected to decrease slightly.

Forest Vegetation Structural Classes

Forest structure, as represented using structural classes, is expected to change in response to implementation of silvicultural activities proposed for alternatives 1 and 2 (table 18). High-severity fires are expected to convert approximately 14 percent of the Upper North Fork Project forest vegetation analysis area to the stand initiation class after a short period as upland meadows/shrublands. Other direct effects on forest structural stages include widespread conversion from mature forest to the understory reinitiation and multistoried forest classes as mature forest canopies are broken up by fire, bark beetle, and mechanical thinning activities, and expected subsequent tree regeneration.

Table 18. Direct effects on forest vegetation structure classes for the forest affected environment as a result of implementing alternative 1 or 2 of the Upper North Fork Project

Structure class	Existing Conditions / No Action with Wildfire		Alternatives 1 and 2 Effects			
	Consequences		Post-treatment		Difference from No Action with Wildfire	
	Acres	Percent of total	Acres	Percent of total	Acres	Percent
Stand initiation	4,000	11	9,116	25	5,239	14
Stem exclusion	1,231	3	1,026	3	-132	<1
Understory reinitiation	2,351	6	11,705	32	9,354	26
Multistoried forest	488	1	3,891	9	2,743	8
Mature forest	29,021	78	11,353	31	-17,668	-47

The abundance of stem exclusion classes would decrease only slightly. Although many areas classified as stem exclusion could be impacted by moderate severity fire or thinning as a result of the action alternatives, they are generally young, extremely vigorous plantations that would quickly reoccupy growing space following disturbance. After a disturbance, like thinning, the crowns would quickly begin to close in and the stand would be fully occupied again. A thinning would not return the stand to the stand initiation stage and the vigorous growth would prevent it from moving into the understory re-initiation stage. Because of this, regeneration would be minimal in most areas. In general, other structural classes would not transition to the stem exclusion class as a result of disturbance (O'Hara et al. 1996, Crane and Fischer 1986).

Table 19. Direct effects on forest vegetation density and canopy cover for the forest affected environment as a result of implementing alternative 1 or 2 of the Upper North Fork Project

Percent canopy cover	Existing Conditions / No Action with Wildfire		Alternatives 1 and 2 Effects			
	Consequences		Post-treatment		Difference from No Action with Wildfire	
	Acres	Percent of total	Acres	Percent of total	Acres	Percent
10	3,353	9	7,381	20	4,029	11
20	1,242	3	5,649	15	4,407	12
30	2,140	6	5,627	15	3,487	9
40	1,939	5	13,682	37	11,743	32
50	3,825	10	2,991	8	-834	-2
60	3,204	9	1,477	4	-1,727	-5
70	9,193	25	269	1	-8,924	-24
80	8,573	23	15	<1	-8,558	-23
90	3,261	9	0	0	-3,261	-9
100	361	1	0	0	-361	-1

Forest Vegetation Density and Canopy Cover

The activities proposed under both action alternatives would have a substantial effect on forest vegetation density and canopy cover across the Upper North Fork Project forest vegetation analysis area (table 19). The general effect of the activities would be to reduce canopy cover, resulting in a distribution shift toward lower density classes. High density classes would decrease, while lower density classes would increase. Important factors driving expected fire severity are related to drivers of historic fire regimes (figure 3), as well as existing local vegetation species composition, density, and structural classes.

Fire Regime Condition Class

Prescribed fire as proposed under either action alternative in a manner that emulates historic fire regimes would, by definition, move all burned areas to a fire regime condition class of 1. Approximately 40-60 percent of the landscape should be affected by the combination of prescribed broadcast burning and cutting activities.

Forest Vegetation Insect and Disease Susceptibility

The direct and indirect effects of the activities proposed under alternatives 1 and 2 are addressed by Forest Service entomologists, whose comments are included in appendix B of the silviculture report, located in the project record. Thinning a lodgepole pine stand increases tree vigor and resistance to mountain pine beetle (Mitchell et al. 1983). Fewer trees are killed in heavily thinned stands as compared to lightly thinned or unthinned stands (Preisler and Mitchell 1993, Schmitz et al. 1989, Whitehead and Russo 2005). Waring and Pitman (1985) also noted that the risk of a mountain pine beetle outbreak “can be greatly reduced by periodic thinning,” and that improved bark-beetle resistance develops within three years of the thinning treatment.

Once trees respond to a thinning (usually 3-5 years after treatment), their improved vigor promotes production of defensive chemical compounds enhancing beetle resistance (Christiansen et al. 1987, Franceschi et al. 2005, Kolb et al. 1998, Mitchell and Martin 1980, Shrimpton 1978). Thinning treatments

contributing to high tree vigor levels could help forestall development of “focus trees” that function as bark beetle attractants (Eckberg et al. 1994).

Stand density influences insects and diseases other than bark beetles, such as tree defoliators. Although changes in the abundance of susceptible host cover types are not expected to appreciably diminish as a result of implementing the activities proposed under alternatives 1 and 2, reductions of overall host tree density are expected to have notable effects on overall susceptibility. Carlson and Wulf (1989) concluded that thinning provided short-term protection against western spruce budworm for treated stands, and that it would presumably contribute to long-term budworm resistance once landscape-size areas were treated. In general, reducing stand density, particularly by separating tree crowns, reduces overall susceptibility to defoliating insects such as the Douglas-fir tussock moth and western spruce budworm (Heller and Sader 1980, Schmitt and Powell 2005, Steele et al. 1996 and references therein, Weatherby et al. 1993). For ponderosa pine infected with dwarf mistletoe, Barrett and Roth (1985) found that wide spacing after thinning allowed residual trees to develop full crowns and acceptable vigor levels, despite heavy infection levels. Similar results were obtained for Douglas-fir dwarf mistletoe (Knutson and Tinnin 1986).

A tendency toward greater tree mortality from root diseases has been observed for stands with high density (Filip et al. 1989c). Thinning increases host vigor and resistance to Armillaria. It can also improve resistance by modifying the proportion of hosts to non-hosts in a stand (Schmitt 1999). In a study involving thinned, fertilized, and untreated stands, Armillaria infection rates were lowest in thinned stands, and highest in fertilized stands where infected Douglas-fir stands were thinned when trees were small rather than large (Entry et al. 1991). Armillaria and other root diseases currently exist in minor, incidental amounts across the Upper North Fork Project forest vegetation analysis area. No major infection centers have been identified in the analysis area.

Indirect Effects

The long-term structural effects of the silvicultural activities proposed under the action alternatives relative to what would occur in the future from taking no action are complex, highly stochastic in nature, and difficult to predict with great certainty in a quantitative and site-specific manner. Nonetheless, more general ecological processes and trends can be identified that would likely occur as a result of implementing either action alternative.

Over time, across the project treatment area, post-treatment processes of ecological succession would continue to favor the dominance of late-seral, shade-tolerant tree species over early-seral, intolerant trees in the absence of fire events (Powell 2000, Agee 1996a). Additionally, forest environments would gradually increase in stem density, except in areas significantly inhibited by a lack of seed source or root sprouts, or climatic or other environmental factors, which are expected to be minor and incidental across the forest vegetation analysis area. Risks of and susceptibility to wildfires, insect activity, disease, or other disturbances would increase over time as described in Powell 2000 (and references therein).

These processes would occur regardless of which alternative (including the taking no action) is adopted. However, in general, the primary indirect effects of implementing the activities proposed under alternatives 1 and 2 would result from any differences in these processes relative to taking no action, and include trends discussed in the following sections.

Forest Vegetation Species Composition and Structural Classes

Areas affected by the action alternative activities and converted to more early-seral cover types, and/or dominated by more fire-resistant species would develop along successional pathways at an earlier phase than if the activities had not occurred (no action)(Steele et al. 1981, Crane and Fisher 1986, O’Hara et al. 1996).

Although assigning structural classes additional temporal or seral attributes can be problematic (Powell 2009b), the forest vegetation structure classes described in this analysis will, under all alternatives, generally develop in a manner similar to that described in O'Hara et al. (1996) until large stand-replacement disturbances occur. Areas converted to early structural stages by actions in alternatives 1 and 2 would transition along growth/successional pathways at the same or a younger stage than if the activities had not occurred (no action)(Crane and Fisher 1986, O'Hara et al. 1996).

These indirect effects would be amplified by insect and disease activities, which often accelerate successional trends and would be higher as a result of taking no action. Conversely, such indirect effects would be reversed following wildfire if no action were taken, since such events would have a higher proportion of elevated disturbance severity, and convert a relatively high proportion of the analysis area to early seral species assemblages and young structural stages. In such cases, however, the ecosystem resilience would be impaired by large disturbance patch size and high intensity, and the analysis area would be just as disproportionately dominated by early seral species assemblages and young structural stages as it currently is by existing late-seral assemblages and late structural stages.

Forest Vegetation Density and Canopy Cover

There would be a range of density and canopy cover reduction, which would generally increase over the near-term (generally one decade or less), but over the long-term (generally one decade or longer) would vary as a result of periodic disturbances—more likely within ranges of variability analogous to those that occurred historically but influenced to some extent by climatic changes. Recent, nearby experience with prescribed burning in riparian areas suggests that reductions in density and canopy cover in riparian and other areas dominated by hardwoods and shrubs would regrow within 1 to 5 years and be dominated by deciduous and other early seral species. This regrowth would quickly restore vegetation function for stream shading, bank stability, etc.

Relative to forest density trends resulting from taking no action, indirect effects of implementing either action alternative would generally result in lower forest densities across the vegetation analysis area in the future until wildfire or other significant disturbance events occur. Because such events would likely be of higher severities over larger areas from no action, they would likely result in initially lower forest densities than would occur under either action alternative, in most cases. Over longer time frames, the relative vegetation and stem densities within the analysis area would change at different rates at different sites due to a range of influences that are not readily predictable, particularly over longer time frames.

Fire Regime Condition Class

The indirect effect of re-introducing fire into the Upper North Fork forest vegetation analysis area mirrors the direct effect: an initial and sustained reduction in fire regime condition class values wherever fire occurs. Over time, if fire events do not occur within intervals and at severities analogous to historic ranges of variability, fire regime condition class values would rise. However, where fire occurs as a result of implementing an action alternative, such increases over multi-decadal intervals would be less than what would have occurred if no action were taken. If no action were taken, once a wildfire event occurs, fire regime condition class values for areas affected by the fire would be expected to fall to condition class 1, but in many areas would likely also result in the loss of key ecosystem components identified in Barrett et al. (2010); including, but not limited to, the full suite of native upland, riparian, and aquatic vegetation and michorrizal species assemblages, large woody debris and associated functions, riparian form and function, etc.

Forest Vegetation Insect and Disease Susceptibility

By mimicking and restoring historic fire regimes, reducing stand density, increasing the abundance of early-seral vegetation species, and reducing canopy layering (as described in the Direct Effects section

above), the indirect effects of implementing either action alternative would result in an initial and sustained decrease of forest susceptibility to all native insect and disease disturbances (Hessburg et al. 1999a, Schmitt and Powell 2005), relative to existing conditions (see Existing Conditions section above) and relative to what would have occurred if no action were taken. The indirect effects of implementing the activities proposed under alternatives 1 and 2 are analogous to the direct effects described above and in appendix B of the silviculture report, located in the project record.

Cumulative Effects

Activities described in appendix C that are pertinent to forest vegetation resources were selected for this analysis to disclose the cumulative effects, in conjunction with the direct and indirect effects of past, present, and reasonably foreseeable future activities, of the silvicultural activities proposed under both action alternatives. Some activities, such as mining activities and fuelwood gathering, may have incidental effects on forest vegetation within the Upper North Fork forest vegetation analysis area, but these effects are expected to be extremely minor across both space and time and are not described. Other activities with more substantial effects are described in table 20 below (along with their likely cumulative effects) using the forest vegetation species composition, forest vegetation structural classes, forest vegetation density, Fire Regime Condition Class, and insect and disease susceptibility measure and indicators.

The amount which the cumulative effects of the activities proposed under the action alternatives are expected to augment or mitigate for the direct and indirect effects of the past and present activities listed in table 20 is reflected in the additive or subtractive value of the direct effects described in table 17 through table 19 on the measures and indicators used in this analysis relative to the existing conditions. For example, if past timber harvest of 100 acres has indirect effects of creating early seral species compositions and young forest structures that overlap in space and time with the direct or indirect effects of the Upper North Fork project, the cumulative effects of the Upper North Fork project would be indicated by the degree to which the Upper North Fork project increases (augments) or decreases (mitigates for) the effects on those 100 acres, which is reflected in the right two columns of table 17 through table 19. In general there will be more acres of mixed conifer forest and less acres of single species dominated forest. There will be a more even distribution of structure stages across the project area overall canopy cover will be reduced. The cumulative effects of the activities proposed under the action alternatives are describe in the cumulative effects column of table 20. Although the future activities listed in table 20 are reasonably foreseeable, the location, extent, and/or timing of precise direct and indirect effects on the measures and indicators utilized in this analysis are not. Therefore, the direct and indirect effects that overlap in space and time with the effects of the activities proposed under the action alternatives are described in general, qualitative terms in table 20, which are in fact the most precise and accurate terms possible at this time.

Table 20. Cumulative effects of the Upper North Fork HFRA Ecosystem Restoration Project direct and indirect effects, in combination with the direct and indirect effects of past, present, and reasonably foreseeable future activities

Activities & actions	Past	Present	Reasonably foreseeable	Cumulative effects
Timber Harvest (last 50 years). Logging activity dates back to settlement years in late 1800s; % basal area removal available in meta data; clear cut and heavy overstory removal (100% basal area was typical practice from 1960-90s; limited helicopter logging in 1970s of select overstory	Pre 1950 5 ac 1950s: 713 ac 1960s: 1932 ac 1970s: 2938 ac 1980s: 1989 ac 1990s: 125 ac 2000s: 0 ac	None currently	Lost Trail Pass Sanitation Salvage Project located within Lost Trail Pass Ski area on the Salmon-Challis National Forest within special use permit (SUP) area; Bitterroot NF (lead FS unit for SUP administration and proposing sanitation/salvage for hazard tree removal and sanitation of forest stands with heavy insect infestation	Past logging activities generally created relatively young stand structures dominated by early seral tree and herbaceous plant species, which would be augmented and prolonged by the creation of similar structures and species assemblages as a result of implementing the Proposed Action. Past activities have resulted in a variety of canopy densities resulting from variable post-harvest regeneration density. Variation of post-harvest density is more or less evenly distributed across the Upper North Fork Project analysis area. Future salvage activities in the Lost Trail Pass area are not expected to have cumulative effects on vegetation structure, composition, or density in combination with the effects of the proposed action. Future pre-commercial thinning is expected to augment and prolong the stand density reductions expected as a result of implementing the Action Alternatives.
Vegetation Management	Reforestation, thinning acres included in harvest info above.	None currently	Pre-commercial thinning	
Fire Suppression	The USDA Forest Service has primary responsibility on public and private lands for fire suppression except for private lands in Gibbonsville and North Fork corridor within NFFPD. Approx. 146 fires have been suppressed in the past 85 years. Six lightning fires occur for every one human-caused fire. Large fire history in the Upper North Fork Project forest vegetation analysis area includes 730 ac in 1919, 178 ac in 1985, 1085 ac in 2000, 1752 ac in 2003. Most forest stands have been fire free since 1919.	Current fires would be suppressed according to strategies determined through application of Appropriate Management Response. The fire occurrence rate for the area averages about two fires per year. The fire rate within and around the Upper North Fork Project forest vegetation analysis area has varied from eight to twenty five fires per decade.	Wildland fires will continue to occur in the area and suppression efforts would be made to control those fires. Suppression related activities would continue to be repaired. It is anticipated that fires would continue to occur at this frequency for the reasonably foreseeable future.	The entire Purpose and Need of the Upper North Fork Project reflects the expectation that the Direct and Indirect Effects of the would reduce, mitigate for and/or in part reverse the effects on forest vegetation species composition, structure, and density created by past, present, and reasonably foreseeable future fire suppression activities. The vegetation trends and suppression effects that would cumulatively be reversed/mitigated/reduced as a result of implementing the proposed action are described in detail in the analysis area and No-Action Alternative effects analysis section. Due to the unpredictable nature of future wildfire disturbances, the quantitative, precise location, degree to, and manner in which the effects would be mitigated are highly uncertain and speculative.
Prescribed Burning and Fuels Reduction.	Records of past burning activities are limited. Common practices and on-site evidence indicates that jackpot and pile burning of logging slash likely occurred on portions of approximately 4,500 acres where timber harvest occurred in the last 50 years.	Pile and underburn completed on Ransack T.S.; prescribed underburn on 130 ac, Gibbonsville T.S. units	Maintenance prescribed burning in 10-15 years on key locations of the Upper North Fork fuels reduction units.	Past burning and fuel reduction activities generally created relatively young stand structures dominated by early seral tree and herbaceous plant species, which would be augmented by the creation of similar structures and species assemblages as a result of implementing the Proposed Action. Past activities have resulted in a variety of canopy densities resulting from variable post-activity regeneration density. Present and future burning and other fuels treatment activities are expected to augment and prolong the changes in vegetation species composition, structure, and density expected as a result of implementing the proposed action.

Compliance with the Forest Plan and other Regulatory Direction

National Forest System lands are managed to comply with laws, regulations, Executive Orders, direction in the Forest Service Manual, and Regional Acceptable Work Standards.

Salmon National Forest Land and Resource Management Plan (Forest Plan)

The Upper North Fork planning area includes six management allocation areas, plus an additional designation for riparian habitat conservation areas adjoining rivers, streams, and other wetlands – this Forest-wide riparian habitat allocation is part of the Pacific Anadromous Fish Strategy.

Forest-wide Direction

Forest-wide direction sets the baseline conditions that must be maintained throughout the Forest in carrying out the Plan. They establish the environmental quality requirements, renewable and finite resource requirements, and mitigating measures that apply to the Forest. Any necessary additions to them are included in the management requirements for the individual management areas. The management requirements listed in the specific Management Area Direction Section (Forest Plan, Chapter IV E) supplement those in the Forest-wide Direction section. Substantive changes which alter the intent of these management requirements may not be made without amending or revising the Forest Plan. Editorial and other minor modifications to these management requirements which do not alter their intent may be made without amending or revising the Forest Plan.

The activities proposed under alternatives 1 and 2 for the Upper North Fork Project are consistent with all applicable Salmon Forest Plan Forest-wide Management Activities, General Direction, and Standards and Guidelines.

Management Area Direction

Table 21 describes the specific Management Areas and the approximate acreage of the Forest assigned to each within the Upper North Fork Project forest vegetation affected environment, while table 22 describes how the project complies with the general direction, management activities, and standards and guidelines for each management area.

Table 21. Management area prescriptions, emphasis, and acreage in the Upper North Fork project area

Prescription Number	Emphasis	Acreage within Upper North Fork Analysis Area
1A	Emphasis is on providing downhill skiing opportunity on existing sites. Presently applies only to Lost Trail Pass Ski Area.	750
2A	Emphasis is on dispersed recreation activity. Semi-primitive motorized recreation opportunities are featured. Minerals and energy activities, grazing, and vegetative manipulation are allowed. No timber harvest is planned.	10,495
3A-4A	Emphasis is on meeting anadromous fish habitat 8.0 needs and providing for big game habitat needs on key big game winter range. Vegetation manipulation is allowed for enhancement of habitats.	3,139
3A-5A	Emphasis is on aquatic habitat management for 74.9 anadromous fish species and producing longterm timber outputs through high investments in regeneration and thinning.	22,955

Table 22. Upper North Fork project consistency with Salmon Forest Plan management area activities, general directions, and standards and guidelines

Mgmt Area	Management Activities	General Direction	Standards & Guidelines	Consistent?	Rationale
1A	Silvicultural Prescriptions	1. Manage forest cover types on the permitted area…..to provide for a healthy forest cover.		Yes	All activities proposed under the Upper North Fork project Proposed Action are designed to provide for a healthy forest cover over the long term (see Effects Analysis section above).
		2. Timber harvest will be scheduled where necessary to meet the direction of the management area.		Yes	All activities proposed under the Upper North Fork Project Proposed Action will be scheduled to be compatible with the direction of this Management Area and adjacent developed site use.
		3. Schedule harvest activities on immediately adjacent sites to be compatible with developed site use.		Yes	
2A	Silvicultural Prescriptions	1. Plan no timber harvest unless the timber is substantially damaged by fire, windthrow or other catastrophe.	a. The timber within the area would be classed as not available for timber management.	Yes	Timber harvests proposed under either Action Alternative occur in areas with timber substantially damaged (>50% timber volume loss) by recent mountain pine and Douglas-fir bark beetle epidemics (appendix C).
2A-1	Silvicultural Prescriptions	1. Plan no timber harvest unless the timber is substantially damaged by fire, wind throw or other catastrophe.	a. The timber within the area would be classed as not available for timber management.	Yes	
3A	Timber Resource Management	1. Manage forest cover types to perpetuate tree cover, provide healthy stands, and high water quality.		Yes	All activities proposed under the Upper North Fork Project Proposed Action are designed to provide for a healthy forest cover over the long term (see Effects Analysis section above).
		2. Timber management activity will be at a level compatible with maintaining aquatic habitat quality tied to sediment levels.		Yes	See hydrology resource report located the Upper North Fork Project project record.
		3. When not in conflict with other standards and guidelines in this prescription, manage forest cover types using the silvicultural and visual resource standards and guidelines in the Timber Management Prescription assigned to the area and in the General Forest Direction, except as shown here.	a. Treatment of individual stands would generally be consistent with a high level of timber management although the overall acreage treated in a given period might be lower.	Yes	See above Consistency Rationale for the silvicultural standards and guidelines in the General Forest Direction described above.

Mgmt Area	Management Activities	General Direction	Standards & Guidelines	Consistent?	Rationale
4A	Silvicultural Prescriptions	1. When not in conflict with other standards and guidelines in this prescription, manage forest cover types using the silvicultural standards and guidelines in Management Prescriptions 5D. 5E. or 5F and in the General Forest Direction except as shown here.	a. Treatment of individual stands would generally be consistent with a medium-high level of timber management although the overall acreage treated in a given period might be lower.	Yes	See above Consistency Rationale for the silvicultural standards and guidelines for Management Area 5D, described below.
5A	Silvicultural Prescriptions	1. Manage Forest Cover Types using the following primary harvest methods: (These would apply about 80% of the time). -Clear-cut and plant or shelterwood in Douglas fir and ponderosa pine-mesic timber classes. - Clear-cut with natural regeneration (or planting) in lodgepole and associated species. - Group shelterwood-selection in the ponderosa pine-xeric Timber Class.	a. A summary of detailed standards and guidelines from the FORPLAN prescriptions is included in the Salmon Forest Plan.	Yes	The silvicultural treatments included in the Upper North Fork Project Proposed Action are consistent with thinning treatments or an early prep-cut as part of an even-aged silvicultural system. They are not inconsistent with clear-cut silvicultural systems in lodgepole pine forests or group shelterwood-selection in the ponderosa pine-xeric timber classes.
		2. For timber management purposes. a cut-over area is considered an opening until such time as:	a. A created opening will no longer be considered an opening when stocking surveys carried on in accordance with Regional instructions indicate prescribed tree stocking at or above 2-1/2 feet in height.	Yes	No openings associated with even-aged management, including openings exceeding 40 acres, are expected as a result of harvest operations within the Upper North Fork Project Proposed Action. Some canopy gaps are expected in order to regenerate and/or release aspen and whitebark pine trees, but would fall under a group selection silvicultural system and are not considered an even-aged silvicultural system. Stocking levels within canopy gaps created under a group selection system are expected to meet the minimum standards and guidelines of this section within one growing season of project implementation.
			b. Prescribed tree stocking varies with the species, site quality, and whether a pre-commercial thinning has been conducted. This stocking is normally 200-300 trees/acre prior to thinning. On harsh rocky sites this may be lowered to a minimum of 100 trees per acre.	Yes	
		3. Timber stands must be large enough to provide dispersal of adjacent openings and to prevent unreasonable treatment and record keeping costs.	a. Normal stand size is greater than 10 acres and wide enough that the regenerated stand will be at least 2 sight distances wide through much of the rotation (about 400 feet wide). Desired stand size is 20-40 acres.	Yes	

Mgmt Area	Management Activities	General Direction	Standards & Guidelines	Consistent?	Rationale
			b. Minimum stand size for mapping and record keeping purposes is 5 acres. This does not preclude intermediate treatments or harvest cuts on smaller areas if the objective is to create a larger stand.	Yes	
5D	Silvicultural Prescriptions	1. Manage Forest Cover Types using the same primary harvest methods as 5A HIGH TM (Base TM).	a. Application of the HIGH TM/WL prescription would vary by timber class and area on the forest the same as HIGH	Yes	The harvest methods included within the Upper North Fork Project Proposed Action are consistent with those described for the 5A Management Area above.
		2. For management purposes, a cutover area is considered an opening until such time as:	a. A created opening will no longer be considered an opening when stocking surveys carried on in accordance with Regional instructions indicate prescribed tree stocking at or above 8 feet in height.	Yes	No openings associated with even-aged management, including openings exceeding 40 acres, are expected as a result of harvest operations within the Upper North Fork Project Proposed Action. Some canopy gaps are expected in order to regenerate and/or release aspen and whitebark pine trees, but would fall under a group selection silvicultural system and are not considered an even-aged silvicultural system. Stocking levels within canopy gaps created under a group selection system are expected to meet the minimum standards and guidelines of this section within one growing season of project implementation.
		3. Timber stands must be large enough to provide dispersal of adjacent openings and to prevent unreasonable treatment and record keeping costs.	a. When possible, stands should be large enough that an individual stand can provide an adequate cover patch (exceeding 600 feet wide and 30 acres) in the future.	Yes	

Table 23. Upper North Fork Project consistency with Salmon National Forest Land and Resource Management Plan Settlement Agreement general directions, and standards and guidelines relevant to designated old growth forests

General Direction	Standards & Guidelines	Consistent?	Rationale	Rate of error following field review
2. Beginning January 1, 2009, and until such time as the Salmon National Forest completes an amendment or revision of its Land and Resource Management Plan ("Forest Plan"), Defendants agree to do the following in all future commercial timber harvest projects on the Salmon National Forest:	a. Evaluate and inventory designated old growth stands within a Upper North Fork Project forest vegetation Affected Environment for old growth characteristics using the Hamilton definition (Hamilton, Characteristics of Old Growth, Vol. 3; SM15197).	Yes	All Designated Old Growth Stands within the Upper North Fork Project forest Affected Environment were inventoried and evaluated using methods described below for old growth characteristics, using the Hamilton definition, in 2009 and 2010.	Statistical calculations for standard error and margins-of-error for variables of interest (trees per acre of given size classes) within individual stands affected by this standard are included in stand examination data outputs within the Forest Service vegetation database (FSVeg)
	b. Evaluate and inventory all proposed harvest units within a Upper North Fork Project forest vegetation Affected Environment for old growth characteristics using the Hamilton definition (Hamilton, Characteristics of Old Growth, Vol. 3; SM15197).	Yes	All proposed harvest units within the Upper North Fork Project forest Affected Environment were inventoried and evaluated using methods described below for old growth characteristics, using the Hamilton definition, in 2009 and 2010.	Statistical calculations for standard error and margins-of-error for variables of interest (trees per acre of given size classes) within individual stands affected by this standard are included in stand examination data outputs within the Forest Service vegetation database (FSVeg)
	c. If necessary, substitute old growth stands within the Upper North Fork Project forest vegetation Affected Environment to ensure that all designated old growth stands meet the Hamilton definition and the Forest Plan minimum size of 80 acres.	Yes	Forest stands totaling 3,562 acres or more were located, inventoried, and found to meet the Hamilton definition of old growth and the Forest Plan minimum size of 80 acres.	
	d. Refrain from commercially harvesting any timber stands on the Salmon National Forest that meet the Hamilton definition and are 80 acres or larger in size.	Yes	Stands that would receive a commercial timber harvest under either Action Alternative 1 or 2 were inventoried and found to not meet the Hamilton definition of old growth and meet or exceed 80 acres in size.	Rate-of-error predictions were calculated as described above for those portions of timber stands that meet the Hamilton definition and are 80 acres or larger in size which would be impacted by a commercial harvest activity. For portions within these stands not impacted by harvest activities, aerial photo interpretation by a trained, experienced silviculturist was utilized in combination with ground-based field data to determine whether or not impacted stands met the Hamilton definition for old growth

Table 24. Upper North Fork Project consistency with Salmon Forest Plan forest-wide Pacific Anadromous Fish Strategy / Inland Native Fish Strategy - related management activities, general directions, and standards and guidelines

Mgmt Area	Management Activities	General Direction	Standards & Guidelines	Consistent?	Rationale
TM-1	Timber Management	Prohibit timber, including fuelwood cutting, in riparian habitat conservation areas, except as described below. Do not include riparian habitat conservation areas in the land base used to determine the allowable sale quantity, but any volume harvested can contribute to the timer sale program.	a. Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in riparian habitat conservation areas only where present and future woody debris needs are met, where cutting would not retard or adverse effects on listed anadromous fish can be avoided. For watersheds with listed salmon or designated critical habitat, complete Watershed Analysis prior to salvage cutting in riparian habitat conservation areas.	Yes	No timber harvest within riparian habitat conservation areas would occur as part of the Upper North Fork Project Proposed Action[a].
			b. Apply Silvicultural practices for riparian habitat conservation areas to acquire desired vegetation characteristics where needed to attain riparian management objectives. Apply silvicultural practices in a manner that does not retard attainment of riparian management objectives and that avoids adverse effects on listed anadromous fish.	Yes	No timber harvest within riparian habitat conservation areas would occur as part of the Upper North Fork Project Proposed Action. Thinning treatments within riparian habitat conservation areas included within the Upper North Fork Project Proposed Action would be conducted in a manner that does not retard attainment of riparian management objectives and avoids adverse effects on listed anadromous fish (see hydrology and fisheries specialist reports located in the Upper North Fork Project project record).

a – Please see project-specific Forest Plan Amendment 3 on page 404 for additional information

Old Growth

An evaluation has been made to insure terms of the Salmon Moose Settlement Agreement (Case 4:07-cv-00452-EJL) have been met. Upper North Fork Ecosystem Restoration Project consistency with the Salmon-Moose Settlement Agreement and related Forest Plan general direction, standards, and guidelines is also described in table 23.

Pacific Anadromous Fish Strategy Riparian Habitat Conservation Areas

Alternatives 1 and 2 of the Upper North Fork HFRA Ecosystem Restoration Project Proposed Action are consistent with Forest Plan general direction, standards, and guidelines related to the Pacific Anadromous Fish Strategy and Inland Native Fish Strategy. Consistency findings, and a rationale for each are described in table 24.

Climate Change, Carbon Cycles, and Silvicultural Practices

The Upper North Fork project planning area is too small for a direct evaluation of potential climate change effects caused by the proposed actions. Current understanding of climate science suggests it is difficult, if not impossible, to establish a cause-and-effect relationship between silvicultural activities and climate change at an individual project scale. Therefore, climate change and carbon cycling were not used or evaluated as issues during the NEPA process, and no indicators were established for comparing climate change or carbon cycle effects between alternatives. At the same time, large and increasing levels of interest among the general public in how large forest management projects interact with climate change and carbon cycling nonetheless suggest there is some value in disclosure of existing understanding, particularly to identify key areas of uncertainty and demonstrate consistency with national and international strategies and objectives. To that end, a science overview is provided in this section.

The proposed actions under alternatives 1 and 2 would affect National Forest System lands by implementing broadcast burn and/or low thinning silvicultural activities. A project of this magnitude would contribute such minimal amounts of greenhouse gas that its impact on global or national climate change would be infinitesimal. Therefore, the Proposed Action’s direct and indirect contribution to greenhouse gasses and climate change would be utterly negligible in the context of long-term climate patterns. In addition, because the direct and indirect effects would be negligible, the Proposed Action’s contribution to cumulative effects on greenhouse gasses and climate change would also be negligible. The minor scope of the Proposed Action suggests it would be inappropriate to attempt to isolate climate change effects that are directly or indirectly attributable to implementation of the Upper North Fork project.

The Intergovernmental Panel on Climate Change has summarized the contributions to climate change of global human activity sectors in its Fourth Assessment Report (Intergovernmental Panel on Climate Change 2007). The top three human-caused contributors to greenhouse gas emissions (from 1970-2004) are: fossil fuel combustion (56.6 percent of global total), deforestation (17.3 percent), and agriculture/waste/energy (14.3 percent). The Intergovernmental Panel on Climate Change subdivides the deforestation category into land use conversions, and large scale deforestation. Deforestation is defined as removal of all trees, most notably the conversion of forest and grassland into agricultural land or developed landscapes (Intergovernmental Panel on Climate Change 2000). The Upper North Fork project does not fall within any of these main contributors of greenhouse gas emissions. Forested land would not be converted into a developed or agricultural condition; in fact, forest stands are being retained and enhanced to maintain a vigorous forested condition that can continue to support trees and sequester carbon long-term.

The 2007 Intergovernmental Panel on Climate Change report also summarizes recommended sector-specific key mitigation "technologies and practices". For the forestry sector, those available include

afforestation, reforestation, forest management, reduced deforestation, harvested wood product management, and use of forestry products for bioenergy to replace fossil fuel use. The Upper North Fork project is consistent with these recommendations because it proposes management of the forest for resistance to disturbance and resiliency in the face of changing disturbances and disturbance regimes. Depending on market factors, some of the products may be used to produce bioenergy and potentially replace fossil fuel use. Land-use changes, specifically deforestation and regrowth, are by far the biggest factors on a global scale in forests' roles as sources or sinks of carbon dioxide, respectively (Intergovernmental Panel on Climate Change 2000).

Climate Change and Silvicultural Management

Climate change already has very likely altered forest fires, insect outbreaks and tree mortality in the U.S. interior west (Ryan et al. 2008), and future effects are expected to be greater (Climate Change Resource Center 2009). Scientists are using models to try to show the possible range of changes that may occur in the future in forests. Model predictions range widely as to the likelihood of specific changes in western American forests within their modeling timelines. There is consensus that while climate is changing, novel ecosystems will arise, as individual species are expected to respond to climate change differently, and not as the currently observed plant assemblages (Ryan et al. 2008). Further, although quantitative models can estimate a range of potential directions and magnitudes of environmental changes and forest responses in the future, models rarely can predict the future with the level of accuracy and precision needed by resource managers (Millar et al. 2007). There is consensus that future forests will be different from those of the past, but different climate models result in a wide variety of possible outcomes, particularly at a local or regional scale. Such models cannot predict future conditions with the level of accuracy and precision needed for resource managers to make some management changes with certainty (Millar et al. 2007, Ryan et al. 2008).

Many climate change scenarios include an increase in winter precipitation but increased temperatures and increased frequency of summer drought, which may result in more moisture stress in forest environments (Spittlehouse and Stewart 2003). This may cause reduced growth and decreased vigor of forest stands. Declines in vigor may make forests more susceptible to large-scale pest attacks and more frequent or severe fires. Existing plant species or genotypes may be poorly adapted to future climate conditions (McKenzie et al. 2004). Being relatively long-lived, the forest trees living today will probably compose much of the forests of the next century. Long-term adaptation to climate changes will require healthy and productive forests in the short term (Millar et al. 2007) and silvicultural systems will need to increasingly take into account unique characteristics associated with declining and disturbed stands (Spittlehouse and Stewart 2003). Efforts to mitigate existing stressors would address current management needs, while potentially reducing future interactions of these stressors with climate change (Joyce et al. 2009).

The Upper North Fork HFRA Ecosystem Restoration Project is designed to restore vegetation communities and reduce fuels across broad portions of the North Fork Salmon River headwaters. The extent to which expected changes in future climate may hinder the efficacy of the activities in action alternatives 1 and 2 depends on the frame of reference. Compared to current conditions, increased temperatures and increased frequency of summer drought may augment wildfire behavior and the length of the fire season (Westerling et al. 2006) and hinder the extent to which hazardous fuels reduction activities reduce wildfire intensity, severity, and risk. On the other hand, relative to future climate/fuels conditions anticipated if no action is taken, expected climate changes are not expected to diminish the efficacy of fuels reduction activities at all. Furthermore, relative to both taking no action and existing conditions, climate changes that may inhibit seedling germination and reduce overall forest productivity are expected to compliment the density reduction objectives of the Upper North Fork Project, and prolong the efficacy of fuels reduction and restoration of lower-density structures. Anticipated climate changes are expected to also compliment the efficacy of restoration treatments by promoting drought-tolerant, early-

seral species (such as aspen, whitebark pine, and ponderosa pine) germination and survival (Powell 2000).

Forest managers require management options to choose from, even as they face uncertainty of future climate conditions in their regions. Although no single adaptation approach will fit all forest regions, in general, practices can focus on forestalling climate change effects by building resistance and resilience into current ecosystems, and on managing for change by improving adaptive capacities and opportunities for plants, animals, and ecosystems. Better and more widespread implementation of known practices that reduce the impact of existing stressors represents a strategy that can be used even while uncertainty about future conditions is high. Increased emphasis on current efforts to reduce the impact of existing stressors on National Forests represents a kind of ‘‘no regrets’’ strategy.

Compatibility with climate change mitigation and adaptation

Two general strategies are used to address climate change: mitigation and adaptation. Mitigation involves reducing greenhouse gas emissions now in order to minimize the current pace and magnitude of climate change. Adaptation accepts that climate change will occur (and already is occurring), so it involves making ecosystems more resistant and resilient to the predicted effects of future climate fluctuations. Although all the direct, indirect, and cumulative effects of the alternatives described above have been assessed, analyzed, and described after taking into account likely climatic changes expected to occur over approximately the next 15 years within the Upper North Fork forest vegetation analysis area, this section provides additional information on Upper North Fork project compatibility with climate change mitigation and adaptation strategies.

The silvicultural activities included in the Upper North Fork proposed action are considered to be compatible with a mitigation strategy (Baron et al. 2008, Nabuurs et al. 2007, Reyer et al. 2009, Salinger et al. 2005) – intermediate cutting (thinning and improvement cutting) contributes to a “maintain forest area” mitigation objective (i.e., ensure that lands currently supporting forest continue to support forest in the future) (Nabuurs et al. 2007). Yet while mitigation is crucial, adaptation to climate change is increasingly viewed as a necessary and complementary strategy (Joyce et al. 2009). Table 25 includes a list of adaptation strategies proposed for the National Forest System as a whole, and strategies pertaining to forest vegetation (these are shown in the left column).

Certain principles and concepts of climate change can be used to assess whether silvicultural activities included in the Upper North Fork proposed action would be expected to maintain or enhance forest adaptation to the predicted effects of climate change. Table 25 also describes how silvicultural activities included in the Upper North Fork proposed action could be compatible with the adaptation strategies (shown in right column). Proposed silvicultural actions are expected to improve the “adaptive capacity” (Olsson et al. 2004) of forest stands in the Upper North Fork planning area, particularly by (at least temporarily) alleviating the chronic stress associated with high tree density levels and by re-introducing wildfire disturbance regimes to which local native vegetation species are adapted (Allen et al. 2002); and under which they can continue to evolve and adapt (Joyce et al. 2009 and references therein). Improvements in adaptive capacity are important for helping forest vegetation deal with the direct effects of warming temperatures and reduced precipitation, as well as the indirect effects caused by climate-influenced disturbance processes.

The Intergovernmental Panel on Climate Change concluded with high confidence (8 chances out of 10) that “disturbances such as wildfire and insect outbreaks are increasing and are likely to intensify in a warmer future with drier soils and longer growing seasons, and to interact with changing land use and development affecting the future of wildland ecosystems” (Parry et al. 2007, page 56). This Intergovernmental Panel on Climate Change conclusion demonstrates that climate change involves more

than just the direct effects of warming temperatures and variable precipitation – it includes the indirect effects of climate change on wildfire, insect outbreaks, and other biotic and abiotic disturbance processes.

Table 25. Compatibility of silvicultural activities and climate change adaptation strategies

Climate Change Adaptation Strategies Related to Forest Vegetation	Predicted Compatibility of Strategy with Upper North Fork Proposed Silvicultural Activities
Improve the capability of ecosystems to withstand uncharacteristically severe drought, wildfires and insect outbreaks at landscape scales.	Rationale for the silvicultural activity proposals is based largely on insect and disease susceptibility and the potential to reduce wildfire intensity and severity, particularly for dry-forest sites.
Facilitate natural (evolutionary) adaptation through silvicultural treatments that shorten regeneration times and promote interspecific competition.	Relative to taking no action, the activities proposed under alternatives 1 and 2 would facilitate and improve natural (evolutionary) adaptation through broadcast burning treatments that increase opportunities for vegetation regeneration, and thereby shorten regeneration times and promote interspecific competition.
Where ecosystems will very likely become more water limited, manage for drought- and heat-tolerant species.	Specifications for how the silvicultural activities would be implemented account for species-specific life history traits influencing drought and heat resistance. Drought-tolerant species are preferentially retained during intermediate cutting.
Reduce homogeneity of stand structure and synchrony of disturbance patterns across broad landscapes by promoting diverse age classes and species mixes, stand diversities, and genetic diversity.	Relative to taking no action, the activities proposed under alternatives 1 and 2 would increase opportunities and occurrences of fire disturbances of varying severity, and thereby promote more diverse age classes and species mixes, stand diversities, and genetic diversity.
Reset ecological trajectories to take advantage of early successional stages that are adaptive to present rather than past climates.	The Intergovernmental Panel on Climate Change action alternatives are expected to favor early seral species, particularly those that are more suited for warmer, drier climates.
Use historical ecological information to identify environments buffered against climate change and which would be good candidates for conservation.	Low and moderate-density structures dominated by early-seral tree species are likely to be more resilient to predicted climate change. Proposed silvicultural activities are directed toward conserving these structures and early-seral tree species where they currently exist, or restoring them if important biological legacies (such as large trees) are not currently present. The action alternatives would increase heterogeneity and create more resilient tree density levels across all biophysical environments.
Encourage local industries that can adapt to or cope with variable types of forest products because of the uncertainty about which tree species will prosper in the future.	It is anticipated that some portion of the silvicultural activity involving timber harvest (intermediate and regeneration cutting) would be accomplished using stewardship authority or another alternative that would not involve a standard timber-sale contract. Local stewardship or biofuel/bioenergy industries are capable of dealing with unconventional species or product types.
Reforestation after disturbance may require different species than were present before the disturbance to better match site-level changes associated with climate change.	No reforestation activities are proposed under any alternatives; however, expected natural regeneration occurring after action alternative activities are implemented would be expected to favor genotypes and species better suited for site-level changes associated with climate change, if seed sources are available.
Plan for higher-elevation insect outbreaks, species mortality events, and altered fire regimes.	The silvicultural activities occurring as a result of either action alternative anticipate possible accelerated mortality of subalpine fir (which may occur due to future possible infestations of balsam woolly adelgid, an introduced, non-native insect species) and whitebark pine (resulting from white pine blister rust). The project is intended to counteract trends favoring alterations of fire regimes by attempting to actively promote fire regimes more similar to those that occurred historically, as well as create associated landscape patterns of structure and species composition which would interact with historic fire regimes in a positive feedback.

Sources/Notes: the climate change adaptation strategies pertain to forest vegetation only and were derived from Joyce et al. (2008, 2009) and West et al. (2009).

The information in table 25 indicates that silvicultural activities addressing the vulnerability of stands to uncharacteristic levels (levels outside historic ranges of variability to which native species have adapted) of wildfire, along with other climate-related changes in disturbance regimes, could meet multiple goals of near-term mitigation and mid-term adaptation even as practices also reflect goals for other ecosystem services such as late-old forest vegetation structure and water quality (Joyce et al. 2009).

The silvicultural activities included in the Upper North Fork proposed action have considerable relevance to predicted changes in future temperature and precipitation for a large region containing the Upper North Fork planning area. Climate modeling suggests that drought conditions will be more common in the future because mid-summer temperatures are expected to be substantially higher than at present. Dense tree stands already exist in a sort of perpetual physiological drought because there is not enough soil moisture to meet the water needs of all trees; intermediate cutting and broadcast burning are used to alleviate this moisture stress and allow the residual trees to survive and continue growing.

It is expected that future climate conditions would have demonstrably more impact on dense stands than is produced by the current climate. Therefore, the need for thinning and related intermediate treatments is expected to be much greater in the future than at present because thinning improves physiological vigor, and trees with improved vigor produce more of the resins used to repel insect and disease attacks (Kolb et al. 1998, Mitchell et al. 1983, Pitman et al. 1982, Safranyik et al. 1998). Thinning also disrupts canopy fuel continuity, which could help address future crown-fire risk (Agee 1996b, Powell 2010a). Insect outbreaks and wildfire are both predicted to occur at significantly higher levels in a warmer and dryer future than at present (Canadell and Raupach 2008, Kurz et al. 2008a, Westerling et al. 2006). Thus, in light of predicted temperature and precipitation changes at a regional scale (the Pacific Northwest), the silvicultural activities included in the proposed action adequately anticipate future climate change, appropriately provide for future ecosystem resiliency and integrity, and reasonably realign existing conditions to be more sustainable under future climate conditions (Dale et al. 2001).

Adaptive management is essential to managing for uncertainty. Although general principles will emerge, the best preparation is for managers and planners to remain informed both about emerging climate science as well as land-use changes in their region, and to use that knowledge to shape effective local solutions (Millar et al. 2007). Adaptive management can make use of new information, and this information may be useful for adjusting desired conditions and guidelines in the future.

Climate Change and Historic Range of Variability

The historic range of variability is defined as the range of conditions and processes likely to have occurred prior to settlement by Euro-American emigrants (Landres et al. 1999). Historic range of variability is an analytical process for evaluating inherent variation in vegetation composition, structure, and density, reflecting recent evolutionary history and the dynamic interplay of biotic and abiotic factors (Morgan et al. 1994). In the context of forest vegetation analyses for the Upper North Fork area, historic range of variability was used as a broad reference point when evaluating the environmental effects of implementing alternatives (see previous sections of this chapter). Historic range of variability has been and is used as a tool to help us understand present forests and why they respond as they do when exposed to silvicultural activities – it uses the past to help us understand the present, to understand which forces affect vegetation response, to gain insight into possible trajectories of future forests, and to integrate this information when proposing management alternatives (Millar and Woolfenden 1999).

> Some feel that historic range of variability may no longer be a viable concept for managing lands in the future because of expected climate warming and increasing human activities across the landscape. Today's climates might change so rapidly and dramatically that future climates will no longer be similar to those climates that created past conditions. Climate warming is expected to trigger major changes in disturbance processes, plant and animal species dynamics, and

> hydrological responses to create new plant communities and alter landscapes that may be quite different from historical analogs.
>
> At first glance, it may seem obvious that using historical references may no longer be reasonable in this rapidly changing world. However, a critical evaluation of possible alternatives may indicate that historic range of variability, with all its faults and limitations, might be the most viable approach for the near-term because it has the least amount of uncertainty (Keane et al. 2009, page 1034).

This is particularly true as compared to the uncertainty associated with the magnitude, timing, scale, and spatial extent of climate change impacts.

> Given the uncertainties in predicting climatic responses to increasing CO2 and the ecological effects of this response, we feel that historic range of variability time series derived from the past may have significantly lower uncertainty than any simulated predictions for the future. We suggest it may be prudent to wait until simulation technology has improved to include credible pattern and process interactions with regional climate dynamics and there has been significant model validation before we throw out the concept and application of historic range of variability.
>
> In the meantime, it is doubtful that the use of historic range of variability to guide management efforts will result in inappropriate activities considering the large genetic variation in most species and the robustness inherent in regional landscapes that display the broad range of conditions inherent in historic range of variability projections (Keane et al. 2009, page 1034).

Carbon cycling

Increasingly, land managers are being asked to consider the potential carbon consequences of forest management activities. This section discusses issues associated with carbon storage and sequestration, carbon stocks and fluxes, and possible interactions between activities that would be expected to cause short-term reductions in carbon stocks (such as thinning and prescribed fire) in order to avoid potentially large carbon emissions from wildfire and other stand-replacing disturbance processes in the future. The interactions of future disturbances with the direct, indirect, and cumulative effects of the activities proposed under action alternatives 1 and 2 are extraordinarily complex, highly stochastic, and unpredictable in nature. In very basic terms, the action alternatives are expected to both increase carbon emissions over the short term relative to taking no action or present conditions (through combustion emissions of biomass carbon and decomposing harvest activity “slash”) and decrease emissions over the long-term relative to taking no action (through avoiding high-severity wildfire, and reducing wildfire severity). The effects of thinning plus burning a particular forest in the spring or fall (relative to mid-summer burning only) would be more instantaneous carbon emissions to the atmosphere of more stems and branch carbon rather than prolonged decomposition of that material over the course of several decades following mortality from wildfire. More detailed descriptions of these basic processes and effects are described and referenced in the following paragraphs.

Increased burning of fossil fuels (coal, oil and its refined products including gasoline, and natural gas) since the beginning of the industrial revolution has resulted in increased levels of carbon dioxide (CO_2) in the atmosphere. As carbon dioxide, methane and other greenhouse gases accumulate, they contribute to a host of changes referred to as the greenhouse effect, global warming, or climate change.

Terrestrial carbon sequestration involves processes through which carbon dioxide from the atmosphere is absorbed by trees, plants and crops through photosynthesis, and then stored as carbon in biomass (tree trunks, branches, foliage, and roots) and in soils(Homann et al. 2005). The term “sink” is also used to refer to forests, croplands, and rangelands and their ability to sequester carbon. Since agriculture and forestry activities can also release carbon dioxide to the atmosphere, a carbon sink occurs when carbon sequestration is greater than carbon release over a given time period. When more carbon dioxide is being

released than sequestered, an activity or condition is considered to be a carbon source in contrast to a carbon sink (Fahey et al. 2009).

The potential to store additional carbon in Pacific Northwest forests is among the highest in the country (Depro et al. 2008) and the world (Hudiburg et al. 2009). However, these levels (if reached) may be unstable in high-frequency fire regions, a factor that many studies have not included in their calculations. Because old forests steadily accumulate biomass for centuries, they contain large amounts of carbon and function as a carbon sink (Rhemtulla et al. 2009). However, the cumulative probability of disturbance is higher for stands with high aboveground biomass, so old forests tend to be less common than young or mid-age stands, even in unmanaged landscapes (Lesica 1996, Luyssaert et al. 2008).

Forest ecosystems are an important part of the global carbon cycle since they are estimated to sequester about 80 percent of the aboveground terrestrial carbon pool (Waring and Running 1998). For this reason, forests and their management are at the forefront of efforts and programs to address global climate change because they might provide one of the most efficient and effective options for offsetting carbon dioxide emissions from fossil-fuel consumption (Bonan 2008, Canadell and Raupach 2008, Salinger et al. 2005, Winnett 1998).

Wildfire and other disturbance processes (insect outbreaks, disease epidemics, windthrow episodes, avalanches and debris flows, etc.) can release a forest's stored carbon as carbon dioxide emissions, either directly by burning the wood or indirectly by killing trees that are eventually decomposed by microbes, with carbon dioxide emissions being produced during microbial decomposition of standing or down dead wood (Goetz et al. 2012 and references therein, Hicke et. al 2010, Liu et al. 2011). Traditionally, it was believed that the main atmospheric emissions of carbon and other nutrients during a fire was in a gaseous form (as carbon dioxide, nitorigen dioxide, and water), but recent research shows that much of the loss occurs as particulate matter carried in the smoke plume (Bormann et al. 2008). The surprisingly large loss of soil nutrients from fire not only contributes to greenhouse gas emissions, but the research suggests it will lower productivity and carbon sequestration rates for a substantial period after burning (Bormann et al. 2008).

Disturbance effects are often indirect – fire can change the albedo (reflective characteristics) of the soil surface, which then allows more solar energy to be absorbed and increases decomposition rates for decades into the future (Running 2008). Since a young forest might become established after fire and develop for 100-300 years, eventually recapturing an equivalent amount of carbon to what was released by the fire, forests can be "carbon-neutral" when evaluated across long timeframes. If climate change or other factors alter these post-fire successional relationships, however, it is possible that forests could disappear altogether following wildfire (Adams et al. 2009), in which case the system would obviously not be carbon neutral. Insect outbreaks or wildfires that affect post-disturbance forest density (Kashian et al. 2006) and net ecosystem productivity (Kurz et al. 2008a, Pfeifer et al. 2011) can also affect the carbon balance over the long term (Goetz et al. 2012 and references therein).

Other research indicates that fire causes accelerated decomposition rates after burning, perhaps related to soil warming from the albedo changes described above. Auclair and Carter (1993), for example, calculated that post-wildfire carbon release after a high-intensity fire, presumably related to microbial decomposition rates, was approximately three times greater than the direct release of carbon dioxide during the fire itself. In a drier ponderosa pine ecosystem, direct carbon flux measurements found higher carbon dioxide emissions from a high-intensity burn area than an adjacent unburned area, even ten years after the fire (Dore et al. 2008).

Fire and carbon relationships are complex because fire has an important influence on the vegetation baseline against which climate change and carbon effects are measured. Climate plays an important role

in determining fire patterns (particularly regarding temporal trends in the El Nino-Southern Oscillation and Pacific Decadal Oscillation climate patterns) and, in turn, fire influences the climate system via the release of greenhouse gases. Fires influence the natural cycle of primary production and respiration, and if climate and fire regimes equilibrate, then fire-induced atmospheric carbon dioxide emissions are balanced over the long term by uptake from surviving vegetation or regeneration (Bond et al. 2005, Bowman et al. 2009, Kashian et al. 2006).

Forests in the United States sequester about 10 percent of the annual human-caused carbon dioxide emissions (Woodbury et al. 2007). Wildfires are increasing both in size and severity (Miller et al. 2009, Westerling et al. 2006) and they produce large direct carbon dioxide emissions on the order of 4 to 6 percent of annual U.S. human-caused carbon dioxide emissions (Spracklen et al. 2007, Wiedinmyer and Neff 2007). As the amount of burned acreage increases, fire suppression costs routinely exceed $1 billion a year and this is causing managers to consider a policy where some fires would be allowed to burn when doing so would provide ecosystem benefits (such as wildland fire use) and reduced suppression costs (Donovan and Brown 2005, 2007, 2008).

Since wildfires represent a substantial potential source of future carbon dioxide emissions, much of the recent forest management emphasis is directed at either reducing fire susceptibility or improving fire resistance (Sohngen and Haynes 1997). Mitchell et al. 2009 concluded that the application of fuel reduction treatments may be essential for ecosystem restoration in forests with uncharacteristic levels of fuel build-up, as is often the case in xeric forest ecosystems east of the Cascades. One of the objectives of using mechanical thinning, prescribed fire, or a combination of both activities to reduce fuel loadings is to produce relatively small carbon releases now in an effort to preclude or minimize large carbon dioxide wildfire emissions in the future (Canadell and Raupach 2008). And climate change research suggests that the area burned by wildfire could increase 78 percent by 2100, with much of the increase due to a 44 percent increase in lightning ignitions (Price and Rind 1994).

A recent study found that significant increases in fire resistance can be achieved by removing only smaller ladder fuels (vegetation structure providing vertical fuel continuity between the forest floor and overstory tree crowns) and fire-sensitive intermediate trees without reducing the majority of the live-tree carbon pool associated with intermediate pines and large trees of all species. This study concluded that thinning and prescribed fire have a positive influence on forest development by redirecting tree growth resources and carbon storage into large-diameter trees, a more stable carbon stock, and large trees which are more resistant to mortality and other potentially detrimental fire effects (Hurteau and North 2009, North et al. 2009). This project is consistent with research recommendations to maintain terrestrial carbon pools in the context of the potential impacts of climate change because it avoids deforestation and protects most forests, on balance, from high-severity disturbances; does not convert old growth forests to short-rotation plantations; does not include clear-cutting harvest prescriptions; and involves exclusively low or moderate levels of thinning-from-below (Harmon et al. 1990, Krankina and Harmon 2006).

Other research suggests that historic stands with a low density of large trees supported more biomass (and carbon) than contemporary, fully-stocked, fire-suppressed old growth forest (DeLuca and Aplet 2008). An explanation for this seemingly counterintuitive result is that on a proportional basis, one large tree has a higher carbon content than many small trees – according to Fellows and Goulden (2008), a single large tree (over 90 cm) contains the same amount of carbon as 60 small (10 to 30 cm) trees. Another explanation is that large trees mostly use deep soil water (over 70 cm), whereas small trees and shrubs rely on shallow soil water (under 50 cm) that is rapidly depleted during the growing season (Arkley 1981, North et al. 2009). A thick zone of weathered bedrock is particularly important for supplying the water needed by large trees on sites where the overlying soils are relatively thin (less than 1 m), especially for summer-dry (Mediterranean) ecosystems (Witty et al. 2003).

Similar carbon emission concerns exist for disturbance processes other than wildfire – climate mitigation through forestry also carries the risk that carbon stocks may return to the atmosphere after disturbances such as landscape-scale insect outbreaks (Breshears et al. 2005, Carroll et al. 2004, Fleming and Volney 1995, Logan et al. 2003, Macias Fauria and Johnson 2009, Morehouse et al. 2008, van Mantgem et al. 2009, Williams and Liebhold 1995). A recent and dramatic increase in areas affected by mountain pine beetle and other bark beetles has helped drive Canadian forests from a carbon dioxide sink (before 2000) to a carbon source that is expected to persist for at least two or three more decades (Kurz et al. 2008a, 2008b).

Recent research could perhaps be interpreted as suggesting that an unintended benefit of the successional changes spawned by fire suppression is an increase in forest biomass (Myneni et al. 1997), and that this biomass has sequestered carbon that might otherwise have contributed to climate change (Fellows and Goulden 2008, Houghton et al. 2000, Hurtt et al. 2002). This interpretation is problematic in several respects, however, because fuel-loaded forests are susceptible to large carbon emissions when they eventually and inevitably burn in a stand-replacing wildfire (Hurteau et al. 2009). And in forests that historically burned with high frequency and low severity (fire regime 1), adding to the carbon baseline by increasing stocking levels to sequester more carbon (Myneni et al. 1997) may exacerbate the recent trend toward an increased amount of uncharacteristic, high-severity fire on dry-forest sites, attributed largely to fire suppression (creating more fuel) and climate change (creating a longer and more severe fire season) (Miller et al. 2009, Westerling et al. 2006). There are also synergistic effects among climate change, insect-caused tree mortality, and wildfire (Bentz et al. 2010, Raffa et al. 2008).

All fuels and vegetation treatments create carbon emissions to some extent, but overall carbon emissions can be reduced and future carbon stocks increased by modifying treatments to reduce surface fuels (Harmon and Marks 2002), small understory trees, and intermediate-sized, fire-sensitive species (North et al. 2009). With proper fuels treatment activities that appropriately consider carbon stocks and fluxes, it is possible to create favorable forest conditions for increasing large-tree growth. This strategy is based on the concept that by accepting repeated but small reductions in carbon stocks (associated with the treatments), it is possible to create or maintain a substantial future carbon sink by sequestering carbon in relatively stable, long-lived forest structure in the form of large-diameter trees (Harmon and Marks 2002, Hurteau et al. 2008, North et al. 2009, Stephens et al. 2012). An expansive survey of several common western conifer forests found highly significant differences between the amount of total live tree carbon susceptible to wildfire-induced mortality occurring under 97.5 percentile weather conditions for untreated stands versus stands that were mechanically treated and burned, or burned only.

The ecological rationale for a fuels treatment strategy on dry sites is that forests thinned to approach presettlement tree density and structure (as represented by the historic range of variability) contain substantially more carbon after wildfire than adjacent dense stands that have not been restored to a presettlement condition (Hurteau et al. 2008). And because the Salmon National Forest has no explicit objective to manage forests for carbon sequestration purposes, perhaps the most important benefit of completing proper fuels treatment activities is restoration of late-old structure and associated ecosystem function, particularly for dry forests where the historical composition, structure, and density were maintained by a short-interval, low-severity fire regime (Mutch et al. 1993).

A life-cycle analysis for a second-growth forest in the Pacific Northwest indicates that allowing a harvested stand to grow and sequester carbon resulted in less emission of carbon dioxide than resulted from harvest and storage in wood products. However, when the effect of substituting wood for concrete and steel was also considered, then the harvest scenarios resulted in less carbon dioxide emission than was produced from the no-harvest scenario (Perez-Garcia et al. 2005). The option of using wood as a

construction material in place of concrete or steel, or as an energy source to replace fossil fuels, has consistently been shown to offer significant carbon benefits (Eriksson et al. 2007, Gustavsson et al. 2006).

The overall carbon budget for both durable products and wood-based energy depends on fossil fuel use associated with harvest, transport, and processing. Houses constructed primarily of wood have 20 to 50 percent lower emissions of greenhouse gases over their entire life cycle (typically assumed to be 80 to 100 years) than comparable dwellings whose aboveground walls were framed with concrete or steel (Miner and Perez-Garcia 2007).

Using woody debris to produce energy has the potential to address two issues: (1) it reduces demand for coal, oil, natural gas and other fossil-fuel derivatives; and (2) if the wood comes from densely stocked, overgrown forests, its removal reduces the threat of wildfire and an associated emission of greenhouse gases (and wildfire typically emits more methane, a potent greenhouse gas, than would occur from a bioenergy facility).

The analysis of existing and historical forest vegetation conditions in the analysis area suggests that certain vegetative conditions (particularly species composition and tree density) reflect the effects of fire suppression. On dry forest sites, fire suppression caused a multi-decade period of infilling (encroachment) by small trees beneath large overstory trees, and many of the regenerating trees consist of shade-tolerant and fire-sensitive species.

An expected outcome of adopting either action alternative 1 or 2 of the Upper North Fork project is producing timber that could then be converted into durable wood products for house construction, or utilized as an energy source. Both of the project's proposed action alternatives would respond to fire suppression effects and other forest vegetation issues (see chapter 2) by using timber harvest and prescribed fire activities to remove varying amounts of woody biomass. Since about half the volume of woody biomass consists of carbon (Birdsey 1992, Jenkins et al. 2003, Smith et al. 2006), these activities are expected to reduce the amount of carbon stored in the treated stands. For the timber harvest proposals, a portion of the removed carbon will remain stored for a relatively long period of time in durable wood products, or in landfills.

Intermediate cutting and broadcast burning would initially reduce carbon storage in the treated stands, but it is unclear whether the reductions would be substantial enough to transform the activity units from a net carbon sink to a net carbon source. Whether or not units are transformed into long-term sinks or sources of atmospheric carbon depends in part on future disturbance regimes, and the extent to which treated fuels are masticated on site or utilized for short-lived forest products (which could result in units being sources of atmospheric carbon), or long-term forest products, which could result in the units being carbon neutral or becoming atmospheric carbon sinks (Finkral and Evans 2008). The enhanced growth (carbon sequestration) by remaining trees also partially compensates for the decomposition of stumps, belowground roots, and harvest residues (Harmon and Marks 2002, Waring and Running 1998 and references therein), but this effect may vary depending on the temporal and spatial scale of analysis (Harmon 2001).

The expected overall balance of accelerated tree growth, harvest residues, and utilization for short and long-term forests products for the Upper North Fork project suggests that the expected effects of the activities proposed under alternatives 1 or 2 are very unclear and dependent on a host of unpredictable variables such as future climate and disturbance regimes, the fate of converted forest products, belowground carbon cycling processes, and the extent to which forest products substitute other more carbon-intensive products such as fossil fuels, concrete, steel, etc. And on dry forest sites, future application of prescribed fire and intermediate cutting activities could continue to maintain aboveground

carbon stocks and net ecosystem productivity at a lower level than would occur if the stands were permitted to continue accumulating biomass indefinitely (which is basically until the next wildfire).

Fire and Fuels

Wildfire exclusion has increased risk for large severe wildland fires in many ecosystems (Busenberg 2004, Agee and Skinner 2005). Private property losses related to wildland fires became nationally recognized in 1985 (Cohn 2008). Since 2000, several documents have been published providing direction and/or guidance on hazardous fuels around communities, including the National Fire Plan (2000), Federal Wildland Fire Management Policy (2001), 10-Year Comprehensive Strategy (2001), Healthy Forests Initiative (2002), Healthy Forest Restoration Act (2003) and the Cohesive Fuels Treatment Strategy (2006). The community of Gibbonsville in the Upper North Fork Project Area is listed as a community that is within the vicinity of federal lands that is at high risk from wildfire (Federal Register 2001).

The overriding fire and fuels concerns are fire hazard and fire risk. Past management activities have resulted in areas with dense vegetation conducive to large fire growth. Accumulated fuels through time heighten concerns over fire effects to resources (e.g. wildlife habitat, soils, human uses, hydrology, air quality), public and firefighter safety, and fire behavior potential within and adjacent to the wildland-urban interface. Since 1910, seven large (over 100 acres) wildfires have burned within the project area. The fires of 2000 burned through a portion of Lost Trail Ski Area and threatened the main lodge. The 2003 Frog Pond Fire burned roughly 1900 acres of lodgepole pine/mixed conifer at the north end of the project area, threatening Moose Creek Estates and almost resulted in closing Highway 93. It made a downhill run of approximately four miles in one afternoon. Approximately half of this fire (876 acres) burned as high intensity; high severity forest crown fire.

Affected Environment

Existing Condition

Striking changes in structural and functional components of the Upper North Fork ecosystem have occurred since around 1910, largely due to alternations in the pre-Euro-American settlement. Today unnatural fuel accumulations occur in many fire-dependent forest ecosystems along with associated increases in forest stand densities. With these shifts have come changes in fire regime characteristics including large stand-replacing fires not always distinctive for a specific area. Altered fire frequencies caused by successful fire exclusion over the past 100 years in ponderosa pine forests characterized by a frequent low-intensity fire regime, coupled with prolonged drought and epidemic levels of insects and diseases have coincided to produce extensive forest mortality and the eventual increase in forest fuels and has contributed to greater stand densities and an increase of crown fire potential. The occurrences of such severe large fires are well outside the natural range of variability and thus considered detrimental to Upper North Fork ecosystem. Annual wildfire acres in the western US have increased over the last century, and on the Salmon-Challis National Forest the severity of these fires are increasing dramatically. Recent scientific research has shown a trend towards increased large fire frequency, longer wildfire durations and longer wildfire seasons since the mid-1980s (Westerling et al. 2006). The authors suggest that this may involve both climate change and previous land-use effects in the western United States. Recent patterns indicate an increase in spring and summer temperatures and an earlier spring snowmelt. In the absence of vegetation management, there is an increased potential for further loss of biological diversity in the advent of future high severity large fires that damage or eliminate components of the ecosystem (Martin and Sapsis 1991). “No treatment” or “passive management” can perpetuate the potential for high severity fire (Stephens et al. 2009).

Wildland-Urban Interface

The Upper North Fork project area is almost entirely (90 percent) within the wildland-urban interface and is within the Lemhi County Wildfire Protection Plan area. Research (Cohen 2000a) has shown that homes most often ignite via one of two processes, direct flame contact with the structure and lofted firebrands landing on receptive fuel such as a house.

Proposed treatments for this project are designed to reduce a wildland fire's intensity so that it remains a surface fire and does not develop into a crown fire with a flaming front that can ignite structures directly, or carry firebrands onto structures. A crown fire will loft more firebrands into the air than a surface fire due to the amount and type of fuel being consumed; and would likely be more intense, thus producing more wind and convective heating. These forces alone or combined will carry firebrands half a mile or more (Cohen 2000a).

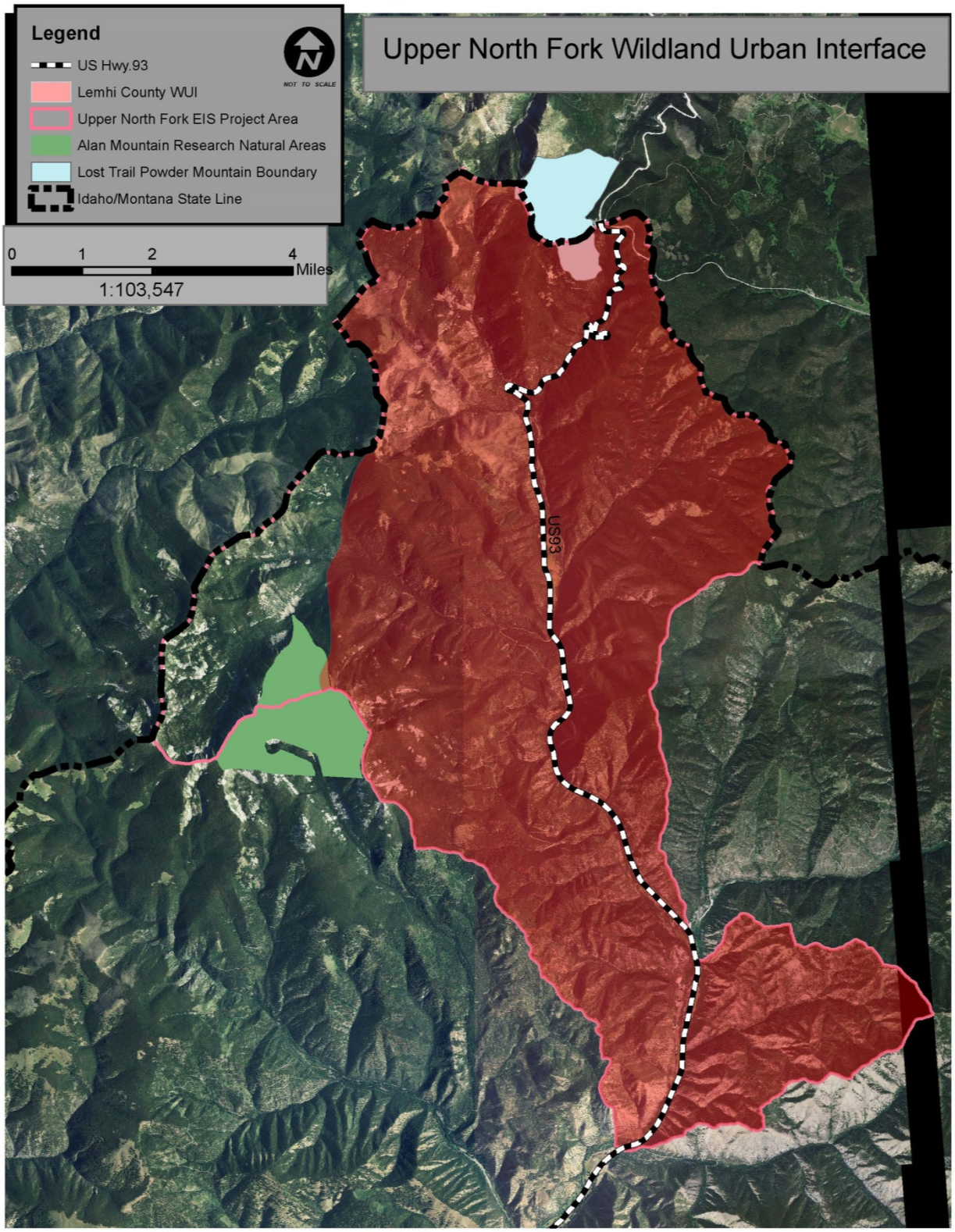


Figure 5. Upper North Fork project area wildland-urban interface map

Fire Hazard

Fire hazard can be characterized by how a fire will burn or fire behavior. Fire behavior is the product of the natural environment or the unique combination of topography, weather and fuels (Countryman 1972). Topography and weather are factors on which humans have little effect but fuels can be altered through human intervention or natural processes such as fire (rapid) or decomposition (very slow). Therefore, when assessing fire hazard, the focus is fuels and the associated fire behavior, determined by characteristics such as rate of spread, flame length, fireline intensity, torching, crowning, spotting, fire persistence and resistance to control. Resistance to control is a relative measure of the capabilities of firefighting resources to suppress a wildland fire. All aspects of firefighting (aerial and ground) are more successful as fuel loading and fuel-bed depth decrease.

Flame lengths are a measure of how intense or severe a fire may become and a proxy for ease of fire suppression. Table 26 is from appendix B of the Fireline Hand Book (NWCG 2006) that is used as a general guide to determine fire hazard or degree resistance to control as it refers to fire suppression.

Table 26. Resistance to control, or difficulty in obtaining fire suppression objectives

Resistance to control	Flame Length (feet)	Fireline Intensity (BTU/FT/S)	Possible Methods of Attack	Minimum Types of Resources and Location of Control Lines
Low	0-4	0-100	Direct	Hand/ground crews at fire edge.
Moderate	4-8	100-500	Direct/Indirect	Mechanized equipment supported by hand/ground crews at fire edge.
High	8-12	500-1000	Indirect	Primarily an indirect attack with line construction away from fire edge using a combination of aerial resources, mechanized equipment and hand/ground crews.
Extreme	>12	>1000	Indirect	Indirect attack is only option with line construction away from fire edge using a combination of aerial resources, mechanized equipment and hand/ground crews.

Fire History

Prior to European settlement, a combination of lightning fires and Native American ignitions accounted for all fire occurrences. European settlement in the region affected the fire regimes by eliminating the prehistoric patterns of Native American ignitions (Pyne 2000).

Fire suppression began in the region in early 1900s and became increasingly effective over time. As fire suppression effectiveness increased, shade tolerant species became established in the understory and forest density increased. Existing vegetative conditions are altered from those that would have historically occurred under natural fire regimes. This departure from the historical range is primarily caused by fire suppression, and conversion of forests for human use (e.g. homes, roads, mining, etc.). Deviation from historical fire regimes caused by fire suppression has had the most impact on drier forest types where fires of low-intensity (non-lethal surface fires) should limit regeneration of shade-tolerant tree species (Arno and Allison-Bunnell 2002) and promote fire-tolerant species. Today, these dry forest types in the analysis area have an accumulation of understory fuels and vegetation, increased ladder fuels, fewer large trees, and an increased potential for crown fires.

Fire Trends

From 1995 until 2010 there have been a total of 44 fires recorded within the analysis area. Thirty-five fires were extinguished within the initial attack phase at less than one acre and nine fires escaped the initial attack phase. The largest was the Frog Pond Fire of 2003 that burned roughly 1900 acres.

Recent scientific research has shown a trend towards increased large fire frequency, longer wildfire durations and longer wildfire seasons since the mid-1980s (Westerling et al. 2006). Recent patterns indicate an increase in spring and summer temperatures and an earlier spring snowmelt. In the absence of vegetation management, there is an increased potential for further loss of biological diversity in the advent of future high severity large fires that damage or eliminate components of the ecosystem (Martin and Sapsis 1991).

The North Zone of the Salmon-Challis National Forest has experienced several large fires since the mid-1980s that have made atypical runs in one burn period (Table 27).

Table 27. Recent large fires with extreme fire behavior

Fire Name	Year	Acres burned in one burn period
Clear Creek	2000	28,500
Shellrock	2000	35,000
Tobias	2003	10,500
Withington	2003	7,500
Saddle Complex	2011	17,500
Mustang Complex	2012	23,390

Fire Regimes and Fire Return Intervals

Fire return intervals in the project area generally fall into natural fire regime group I and III in the stands below 6,000 feet (ponderosa pine/Douglas-fir) and fire regime groups IV and V in the stands over 6000 feet (subalpine fir/lodgepole). The natural fire regime is a general classification of the role fire would play across the landscape in the absence of modern human intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). The natural or historical fire regimes are classified by number of years between fires (frequency) and the severity of the fire on the dominant overstory vegetation. Fire regime groups I through V are defined in table 28. Figure 2 on page 4 displays the fire regime groups on the landscape.

Table 28. Fire regime group definitions

Fire Regime Group	Historic burn severity
I – 0 to 35-year frequency; low to mixed severity	Low (0-25% canopy cover loss) Mixed (25-75%)
II – 0 to 35-year frequency, high severity	High (75-100%)
III – 35 to 100+-year frequency; mixed severity	Mixed (25-75%)
IV – 35 to 100+-year frequency; high severity	High (75-100%)
V – 200+ year frequency; high severity	High (75-100%)

From National Wildfire Coordinating Group website glossary http://www.nwcg.gov/pms/pubs/glossary/f.htm

Fire Regime Condition Class

Fire regime condition class is a qualitative measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings.

Table 29. Fire regime condition class descriptions

Fire Regime Condition Class	Description
1	Less than 33 percent departure from the central tendency of the historical range of variation (HRV): Fire regimes are within the natural or historical range and risk of losing key ecosystem components is low. Vegetation attributes (composition and structure) are well intact and functioning.
2	33 to 66 percent departure: Fire regimes have been moderately altered. Risk of losing key ecosystem components is moderate. Fire frequencies may have departed by one or more return intervals (either increased or decreased). This departure may result in moderate changes in fire and vegetation attributes.
3	Greater than 66 percent departure: Fire regimes have been substantially altered. Risk of losing key ecosystem components is high. Fire frequencies may have departed by multiple return intervals. This may result in dramatic changes in fire size, fire intensity and severity, and landscape patterns. Vegetation attributes have been substantially altered.

The project area is almost entirely in the wildland-urban interface (90 percent of the project area). The Healthy Forest Restoration Act authorizes expedited fuels treatments in areas classified as condition class 3 within all fire regimes and in condition class 2 in fire regimes I, II, or III that are threatening a water shed. As a result of the 2004 fire regime condition class assessment (Hann and Long 2004) and knowledge of current frequency of fire and expected fire severity, it has been determined that the fire regime condition class at the project landscape is highly to moderately altered from the natural range across the project area (fire regime condition class 3 and 2). Table 30 is a breakdown by percent of fire regime condition class across the project area. Figure 2 on page 4 displays the fire regime condition classes on the landscape.

Table 30. Fire regime condition class across the project area

Fire Regime Condition Class	% of project area	Acres of Project Area (41,423)
1	1%	414
2	40%	16,569
3	59%	24,440

Existing Fire Conditions

Fire frequency is shifting away from historical fire regimes; towards a pattern of infrequent higher severity fires due to the fuels buildup caused by a century of fire suppression, and insect and disease mortality (see the silviculture section for additional information on insects and disease). Existing fuel conditions (dense, unnatural fuel loads, ladder fuels and regeneration); have increased the potential for high severity crown fires, which are considered the main threat to ecological and human values and are one of the biggest challenges of fire management.

Fire Severity

High-severity or stand-replacing fires kill the canopy trees, in contrast to low-severity fires, which do not kill overstory trees. High-severity fires typically burn the treetops (crown fires) but may also kill trees through very hot surface fires.

Fire is an essential aspect of the Salmon National Forest mixed conifer ecosystem, however, at the project level under the current fuel conditions coupled with the complex weather, topography and wildland-urban interface on the Salmon-Challis National Forest the effects can be detrimental.

Table 31 displays the severity of recent large fires on the Salmon-Challis National Forest which included an uncharacteristic increase in the extent of stand-replacing (‘‘high severity’’) fire over that predicted by fire regime. Recent data shows that the magnitude of departure (fire regime condition class) is increasing with time. There is a lack of historical (pre 1984) information on the size or distribution of high-severity fires in the mixed conifer forest. However, fire scar data has been analyzed back to 1650, which indicates fires occurred infrequently and were related to drought cycles, which would create larger areas of highly flammable vegetation. Currently in the project area, if a fire is not contained in the initial attack phase past experience demonstrates it will burn with high intensity and severity as seen with the Pond Fire of 2003.

Table 31. Recent fire severity within the project area

Severity	Black Frog (2003)	Clear Creek (2000)	Tobias (2003)	Withington (2003)	Saddle Complex (2011)	Mustang Complex (2012)
	Acres					
Unburned to low	310	67,572	7233	3963	2,771	67,962
Low	434	26,081	3,338	1,423	3,160	77,442
Moderate	490	22,141	1,551	1,489	6,920	57,604
High	809	48,509	1,234	2,423	3,849	45,309
Total	2,043	170,306	13,359	9,303	16,700	248,317

Surface Fuels

Fuels in the analysis area include surface and aerial fuels. Surface fuels include all combustible material lying beneath or on the forest floor, including, roots, rotten buried logs, duff, and woody debris. Aerial fuels consist of trees, shrubs, and low-growing branches on trees that allow fires to move from the surface to the tree canopy.

Observations of past fire behavior shows that small woody material, less than 3 inches in diameter, has the most substantial influence on fire behavior (such as spread rates and fire intensity), which can be accurately predicted with surface fire behavior models. However, large woody fuels greater than 3 inches, can contribute to large fire development and high fire severity. The greater the fuel loading of this large material, coupled with the size and decay rate, can greatly influence fire severity (effects to soil, water, other forest resources) – this is generally due to smoldering and persistent burn periods (Brown, Reinhardt, Kramer 2003).

Canopy Characteristics

Crown Fire Potential

Crown fire potential is generally based on the amount of surface fuels, the amount of ladder fuels, and the density and spacing of the canopy. Heavy surface fuels generally contribute to longer flame lengths. Low canopy base heights can carry surface fires into the crowns. Once established the crown fire may persist. The more spaced the canopy, the greater the wind necessary to move fire from one crown to the next. Dense canopies would obviously require much less wind speed to support crown fire.

The forested ecosystems in Lemhi County are characterized by a dominance of closed canopy multilayered forest fuel structures. These high risk fuel structure that dominate the landscape combined with the typically very hot and dry weather patterns of the fire season, the unique funneling pattern of lightning storms (ignitions) in the river canyons, the steep terrain, and the persistent winds that result from canyon and river terrain, make Lemhi County a demonstrated location for some of the most extreme fire behavior in the northwestern United States. Extreme crown fire behavior has been a common occurrence in Lemhi County since the later portion of the last century resulting in more than 200 firefighter entrapments since 1979. Crown fire behavior is observed on almost all of the wildfires over 1,000 acres in size occurring in forested areas. Some crown fires can become very large and turn into extreme crown fire events in a short period of time. When large crown fires move out into the sagebrush ecosystems they can they can spread fire over a large fire front and throw fire brands over long distances, resulting in large fast moving sagebrush fires that can quickly overwhelm fire suppression crews even in sagebrush fuel types.

A crown fire risk GIS layer was developed by the Salmon-Challis National Forest in cooperation with the EROS Data Center (USGS), North Wind, Inc., and Salmon Field office – BLM. It is intended to be a planning tool to assist in estimating where extreme fire behavior and high severity fires in conifer forests may occur in a landscape with similar conditions to the Clear Creek Fire of 2000. Table 32 summarizes the crown fire risk for the project area, and figure 6 displays low, high and extreme fire risk across the project area. The Salmon River terrain is known for some of the most extreme fire behavior in the Western United States. More than 206 wildland firefighters have been entrapped by wildfire on the Salmon-Challis National Forest since 1979. Fire Risk in the project area is 61 percent within forested areas as supported by the following documentation. Lemhi County incorporated the use of state-of the art fire risk mapping, the Crown Fire Risk Map and Trends products that identifies risk of extreme fire behavior in a map-able format, and is built from collaborative efforts with County Fire Districts, Forest Service, BLM, EROS Data Center, and the National Park Service fire specialists. The Crown Fire Risk Map and Trend products use documented local fire behavior, terrain, weather patterns, ignition patterns, fuel profiles, and field verification of base layers and fire severity.

Table 32. Crown fire risk

Risk	Percent of Project Area	Acres of Project Area (41,423)
Extreme	31%	12,879
High	63%	26,111
High (non-forested/brush)	.8%	335
Does not support Crown Fire	5%	2,098

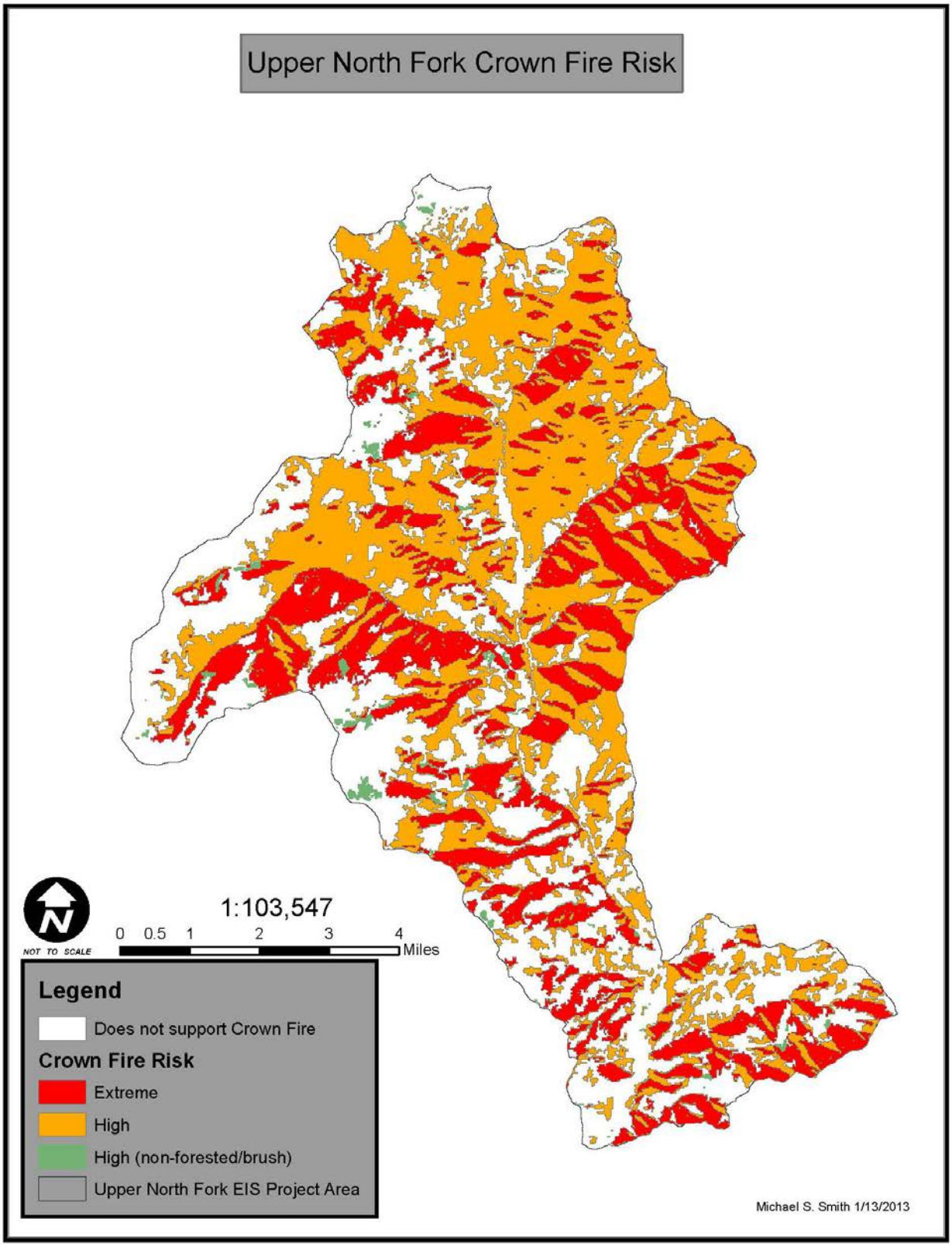


Figure 6. Crown fire risk displayed in red, yellow and green

Canopy Base Height

Figure 7. Low canopy base heights

Canopy base height is the lowest height above the ground where there is a sufficient amount of canopy fuel to move a fire from surface fuels into the tree crowns (Scott and Reinhardt 2001). Canopy base heights were calculated across the project area using the Rapid Refresh LANDFIRE data. The structure and species composition of the stands – specifically subalpine fir and Douglas-fir with low growing crowns, as well as dense understory trees – are contributing to low canopy base heights. In these forest types, the continuity of fuels from the surface fuels to the crown fuels has created an environment where fire can move easily from the ground to the crowns of the overstory trees. Fire behavior modeling for this project indicates that stands with canopy base heights of less than 4 feet are susceptible to higher crown fire potential.

Canopy Bulk Density

Canopy bulk density is the mass of available fuel per unit of canopy volume (kg/m^3). It is a bulk property of a stand, not an individual tree. Canopy bulk density is an important crown characteristic that predicts crown fire spread. The lower the canopy bulk density, the lower the potential for active crown fire. At a design condition of a drought summer fuel conditions it is estimated that the maximum canopy bulk density is approximately 0.10kg/m^3. Canopy bulk density higher than 0.10kg/m3 under the right wind conditions would most likely support a crown fire. Table 33 is a summary of the canopy base heights and canopy bulk density.

Table 33. Canopy base height and canopy bulk density

Canopy Base Height		Canopy Bulk Density (kg/m3)	
<4 feet	7,047 acres	0-0.05 kg/m3	9,084acres
4-8 feet	13,957acres	0.05-0.1 kg/m3	17,678 acres
8-12 feet	10,901acres	0.1-0.2 kg/m3	14,479acres
>12 feet	9,518 acres	>0.2 kg/m3	182 acres

Management Direction

Regulatory Framework

Federal Policy

The key point outlined in the National Fire Plan, that is critical to the successful implementation of the National Fire Plan and to the goals of the action alternatives of this project, is as follows (National Fire Plan 2011):

Reducing hazardous fuels (dry brush and trees that have accumulated and increase the likelihood of unusually large fires) in the country's forests and rangelands.

The following guiding principles of the Federal Wildland Fire Management Policy are pertinent to the goals of the action alternatives of this project (NWCG 2001):

1) Firefighter and public safety is the first priority in every fire management activity.

2) The role of wildland fire as an essential ecological process and natural change agent will be incorporated into the planning process.
3) Fire management plans, programs, and activities support land and resource management plans and their implementation.
4) Sound risk management is a foundation for all fire management activities.
5) Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives.
6) Fire management plans and activities are based upon the best available science.
7) Fire management plans and activities incorporate public health and environmental quality considerations.

Healthy Forest Initiative, Healthy Forest Restoration Act (HFRA), and the Wildland-Urban Interface

The Healthy Forest Restoration Act of 2003 (HFRA 2003) directs agency personnel to improve forest conditions through hazardous fuels reduction activities. In short, it improves of the Forest Service's capability to

> … conduct hazardous fuels reduction projects … aimed at protecting communities, watersheds, and certain other at-risk lands from catastrophic wildfire, to enhance efforts to protect watersheds and address threats to forest and rangeland health, including catastrophic wildfire, across the landscape, and for other purposes.

In the Healthy Forest Restoration Act it defines reducing wildfire risk to communities at-risk, where at-risk communities are identified in the Federal Register, in addition to what constitutes a wildland-urban interface zone.

Lemhi County Community Wildfire Protection Plan

The Lemhi County Community Wildfire Protection Plan identifies areas of the county that are vulnerable to the threat of wildland fire based on: past fire occurrence, wildland fuel conditions, number of people affected and local fire suppression effectiveness. The community wildfire protection plan identifies and ranks areas 1 through 20, with 20 having the highest risk to wildland fire. The Upper North Fork Drainage received the highest score of 19. The community wildfire protection plan identifies three mitigation strategies with action items in an effort to reduce the threat of wildland fire; education, preparedness/response and fuels reduction. The number one action item in the community wildfire protection plan under fuels reduction for Upper North Fork is for hazardous fuel treatment on National Forest, BLM, State and adjacent to moderate/high-risk areas.

Salmon National Forest Plan

The most aggressive fuels treatment projects are situated in the "Suppression, Wildland Urban Interface" fire management unit along the North Fork Salmon River corridor where high fuel continuity and private dwellings complicate protection. Treatments remove ladder fuels and reduce surface fuels to improve firefighting efficiency. Wildland-urban interface areas are managed so appropriate suppression response can be made on all wildfires on all management areas. Pre-suppression and fuel abatement activities are conducted where appropriate and cost-effective. Levels of suppression activities are weighed against cost of suppression and potential for resource damage. Fire management within wilderness includes the use of fire to restore and perpetuate natural ecosystems (Salmon Forest Plan, p.III-4).

The following are the criteria for treatment objectives.

- Fuels that will sustain an average of 4-foot flame length (the flame length against which ground crews can safely/successfully conduct direct attack) under 97th percentile fire weather conditions.

- Surface and ladder fuels removed as needed to meet design criteria retaining at least 5 tons/acre of downed woody material to meet Salmon National Forest coarse woody debris requirements for site productivity (Salmon Forest Plan pg. IV-17 to18).
- Tree crowns thinned so there is less than 20 percent probability of crown fire initiation under 97th percentile weather conditions.
- Permit lightning caused fires to play, as nearly as possible, their natural ecological role within the Upper North Fork project boundary. This would require a site specific forest plan amendment.

Salmon National Forest Fire Management Plan

The Forest Fire Management Plan quotes the Forest Land Management Plan directly for conditions, direction and guidance. It also identifies the project area as Fire Management Unit 2 (Suppression-Wildland Urban Interface). A Fire Management Unit is a land management area defined by a unique set of management strategies, objectives and attributes (e.g. constraints, values at risk, fuel types) (Salmon Forest Plan p.III-4, IV-69, IV-70).

Methodology

Environmental data, specifically weather parameters and fuel moistures, were developed using historical weather records for the primary fire season, June 15th through September 30th over the last 10 years (2001-2010) to evaluate moderate to extreme conditions conducive to fire spread.

The intent of modeling fuel treatments is to show relative changes in fire behavior between the no action and the action alternatives. The outputs are not absolutes and are bound by the assumptions and limitations of data collection methods and individual models. They do though allow for comparison of changes associated with different levels of fuel treatments.

For a comparison of the effects to fuels, predicted fire behavior was modeled to demonstrate the changes to potential fire behavior characteristics for the comparison of taking no action and the action alternatives based on the measureable indicators. Details of the fire and fuels methodology can be found in the fire and fuels report located in the project record.

Best Available Science

The techniques and methodologies used in this analysis consider the best available science. The analysis includes a summary of credible scientific evidence which is relevant to evaluating reasonably foreseeable impacts. The analysis also identifies methods used and references the scientific sources relied on. The conclusions are based on a scientific analysis that shows a thorough review of relevant scientific information. For this analysis there was not any incomplete or unavailable information that would be necessary for this determination.

Spatial and Temporal Context for Cumulative Effects Analysis

The spatial context for specific treatments and the cumulative effects boundary is approximately 135,385 acres. This boundary is the North Fork of the Salmon River Hydrological Unit Code 5. It was selected because it encompasses the full extent of the direct and indirect effects of the proposed action and alternatives (figure 8).

The timeframe for cumulative effects is the same as for direct and indirect effects as proposed project treatments are completed over the next 10-15 years. By looking at current conditions for fire and fuels, we capture the residual effects of past human actions and natural events, regardless of which particular action or event contributed to those effects.

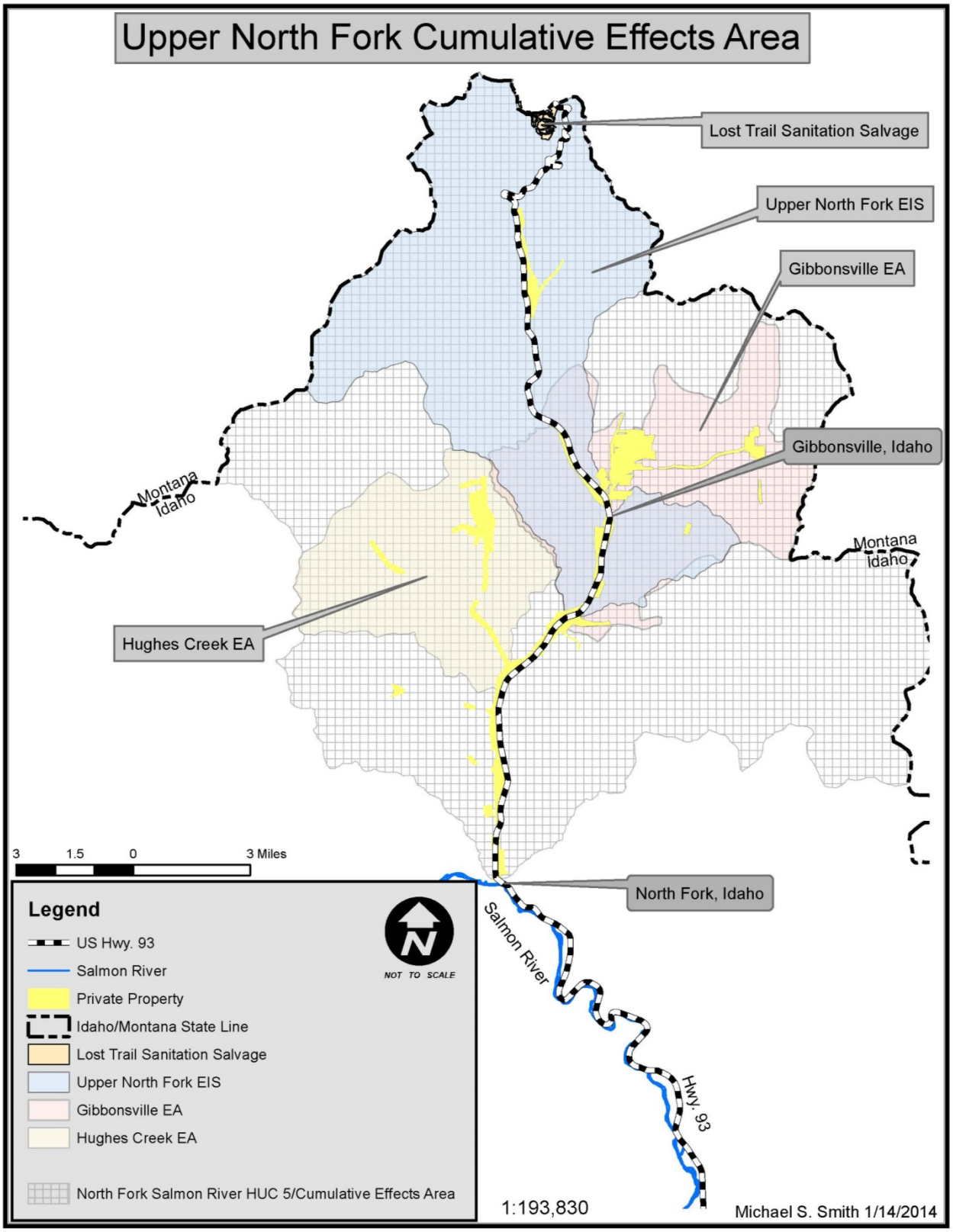


Figure 8. Fire and fuels cumulative effects boundary

Measurement Indices

Measurement indices to determine whether an alternative meets the needs for the project were developed for this analysis. To address the needs for the project the following measurement indices were considered - flame lengths, torching index, and fire type.

Flame length is a measurement of the average distance from the base of the flame to its highest point and is an indicator of the relative ease to which a fire can be successfully attacked by resources (table 26). To meet the needs for the project, the desired conditions for flame length for the wildland-urban interface defense zone and shaded fuel breaks is to have resultant conditions after treatment that would produce no greater than a 4 foot flame length. A 4 foot flame length can successfully be attacked by ground resources and commonly exhibit reduced fireline intensities, reduced rates of spread and surface fire behavior characteristics as stated in the desired condition for the wildland-urban interface.

Torching index is the 20 foot wind-speed at which some kind of crown fire is possible measured in miles per hour. From my report, the desired condition for the project is to have stand conditions that would result in a torching index greater than the 97 percent wind-speed of 20 miles per hour. Torching index was modeled for each fuel type within each unit. If any fuel type generated a torching index less than 20mph the assumption was made the entire unit could have the potential to support a surface fire to propagate vertically into the canopy.

Fire type is a measurement of flaming front patterns that are characteristic of a fire, and is indicated by surface fire, active crown fire, passive crown fire and conditional crown fire. By definition conditional crown fire can occur where canopy characteristics are there that will support active crown fire but surface fuel loading is insufficient to propagate fire vertically into the over-story canopy. To meet the needs for the project, the desired condition for fire type within all treatment areas is to have resultant conditions that would exhibit surface fire characteristics.

Environmental Consequences

No Action Effects

In taking no action there would be no new proposed treatments. Fire suppression would continue. Natural processes would continue and accumulation of forest debris would increase natural fuel loadings. Forest stands would remain overstocked and ladder fuels would continue to fill-in and crowd the overstory. The drier forest stands would continue to lose vigor due to competition from a dense understory of shade tolerant species. This understory would serve as ladder fuels that would permit a surface fire to expand into the canopy of overstory trees. This would result in the mortality of many of the existing overstory trees that would have otherwise survived a surface fire of lower intensity. The modeling is based on 97th percentile weather conditions. Modeling results indicate 81 percent of forested ecosystems incurring a high severity wildland fire within the analysis area. High severity includes crown fire and high severity surface fire resulting in the loss of 80 to 100 percent of overstory vegetation (table 34). Over time there would be a proportional decrease in the torching index to the increase in vegetation. Stands that have a torching index lower than 12 mph have the potential for some type of crown fire. (Refer to appendix A of the fire and fuels report, located in the project record for a unit-by-unit analysis).

“No treatment” or “passive management” can perpetuate the potential for high severity fire (Stephens et al. 2009). The historical low and mixed severity fire regimes would remain in a mixed-severity and high severity fire regime. Modeling results indicate that fires starting under the 97th percentile weather conditions inside the project area or starting outside and moving into the project area would likely be more expensive, difficult, and dangerous to suppress.

Table 34 shows fire type across the analysis area. Modeling for the analysis area indicates that approximately 81 percent of the area is subject to some type of crown fire, should initial attack actions fail. Table 35 displays the anticipated or predicted flame lengths and fire hazard in the analysis area. Table 36 displays the torching index for the project area if no action is taken. Less than one percent of the project area would have a torching index over 20.

Table 34. Fire type within the analysis area by alternative

Fire Type	Percent of project area	Acres of Project Area (41,423)
No action		
Non-burnable	<1%	<1
Surface	19%	7,870
Passive	28%	11,598
Active	27%	11,184
Conditional	26%	10,770
Alternative 1		
Non-burnable	<1%	<1
Surface	98%	40,622
Passive	2%	800
Active	0	0
Conditional	0	0
Alternative 2		
Non-burnable	<1%	<1
Surface	98%	<1
Passive	2%	40,622
Active	0	800
Conditional	0	0

Table 35. Flame lengths and resistance to control (hazard) by alternative

Flame Lengths	Hazard	Percent of project area	Acres of Project Area (41,423)
No action			
Non-burnable	N/A	<1%	<1
0-4 feet	Low	44%	18,226
4-12 feet	Moderate-High	28%	11,598
> 12 feet	Extreme	28%	11,598
Alternative 1			
Non-burnable	N/A	<1%	<1
0-4 feet	Low	98%	40543
4-12 feet	Moderate-High	2%	879
> 12 feet	Extreme	0	0
Alternative 2			
Non-burnable	N/A	<1%	<1
0-4 feet	Low	98%	40543
4-12 feet	Moderate-High	2%	879
> 12 feet	Extreme	0	0

Table 36. Torching index by alternative

Torching Index	Percent of Project Area	Acres of Project Area (41,423)
No action		
>20	< 1%	<1
Alternatives 1 and 2		
>20	94%	39016

In the event of a wildland fire, fuel loadings and characteristics across the landscape would be immediately altered in the short term. Crown fire potential would remain low in areas that experienced a high fire severity burn for 1 to 2 decades until regeneration is well established. Other areas where fire severity was low or did not burn would see a persistent crown fire risk unless other actions were taken to reduce the potential. Characteristics of future prescribed fires or wildfires in the project area following a severe crown fire would be less intensity, less resistance to control, and perhaps more of a safety margin for firefighters and residents.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Taking no action means there would be no treatment to reduce hazardous fuels or manage vegetation to reduce the potential for high severity fire, which would not help meet the goals of the management areas within the analysis area. It would not help develop cost-effective fire programs because it is reasonable to expect more intense fire behavior than in treated stands, thus control would be more difficult and likely require a greater number and type of suppression resources.

The continued succession of fuels and vegetation, mortality from insects and disease, and the exclusion of fire would create areas where the trend in fire behavior characteristics would in time be inconsistent with the goals, objectives and standards established in the Forest Plan.

- The ability to suppress fire would not be increased, because flame lengths would require mechanized equipment and indirect firefighting tactics would be needed for control. (Refer to the section on fire hazard.) Modeling indicates 56 percent of the project area would support flame lengths greater than 4 feet (table 35), and 55 percent of the area is subject to passive or active crown fire (table 34).
- Firefighter safety would not be improved because of flame length and crown fire potential. Modeling indicates 56 percent of the project area would support flame lengths greater than 4 feet (table 35), 55 percent of the area is subject to passive or active crown fire (table 34), and the torching index is well below the 97 percent wind-speeds for some fuel models in the majority of the treatment units (table 36). (For details see appendix A of the fire and fuels resource report located in the project record).
- Risk to life and property within the project area would not be improved because flame lengths would be such that mechanized equipment and indirect firefighting tactics, larger firefighting organization would be needed for control. Torching index is well below the 97 percent wind-speeds for some fuel models in the majority of the treatment units (table 36). (For details see appendix A of the fire and fuels resource report located in the project record).
- The risk to resource values is not reduced because we are not reducing the accumulation of hazardous fuels that have the potential for high severity impacts. Fifty-five percent of the area is subject to passive or active crown fire (table 34).
- Taking no action is inconsistent with National Fire Plan and Healthy Forest Initiative because we are not reducing the accumulation of hazardous fuels within the wildland urban interface.
- Taking no action does not decrease the potential for high severity fires because we are not increasing canopy base height, reducing ladder fuels and reducing the amount of surface fuels. The torching index would remain low in portions of almost all treatment units (table 36).

Alternative 1, Proposed Action and Alternative 2 No New Temporary Road Construction Direct and Indirect Effects

From a hazardous fuels perspective related to the fire and fuels needs for this project, little difference exists between alternatives 1 and 2. From a fire behavior standpoint the treatments and combination of treatments would produce similar results. (Refer to appendix A of the fire and fuels report, located in the project record for a unit by unit breakdown).

Reducing ladder fuel (shrub/small tree stratum) through the action alternatives would break up the horizontal and vertical continuity from the surface fuels to the canopy fuels by increasing canopy base height, and reducing canopy bulk density thus reducing the likelihood of crown fire ignition (table 34). (Refer to appendix A of the fire and fuels report, located in the project record for a unit by unit breakdown). Aerial fuels separated from surface fuels by large gaps are more difficult to ignite, requiring higher intensity surface fires, surface fires of longer duration, or ignition from spotting to ignite the crowns, and higher wind speeds (table 34 through table 36).

Surface fuel reduction would occur through piling, pile burning, broadcast or underburning. Reducing the depth and continuity of surface fuels reduces the likelihood that overstory canopies would ignite during a wildfire. This would modify fire behavior so wildfires can be suppressed more easily (table 35) (Graham, McCaffrey, Jain 2004). Experience has shown that landscape level burning proposed with this project would burn in a mosaic burn pattern characteristic of the historical disturbance regime.

The length of individual treatment effectiveness would range from 7 to 15 years dependent on initial treatment levels (Finney et al. 2006, Graham et al. 2004). Refer to the silviculture specialist report, located in the project record, for a complete length of effectiveness description.

Dead and Down Fuels (Surface Fuel Loading)

Surface fuel loading would be reduced by up to 70 percent. These treatments would reduce the amount of shading on surface fuels, increase the wind speeds to the forest floor, reduce the relative humidity at the forest floor, increase the fuel temperature, and reduce fuel moisture. These factors may increase the probability of ignition over current conditions. However, reducing fuel levels and their arrangement would reduce fire severity and intensity, and increase opportunities for safe and effective fire management actions. Refer to the modeling results for a comparison of taking no action to alternative 1 and 2 (appendix A of the fire and fuels report, located in the project record).

Crown fire risk would be reduced to low potential in all fuel models associated with alternative 1 with the exception of isolated pockets of grass and shrub fuel models post-treatment. These grass and shrub fuel models indicate the potential to support passive crown fire in alternative 2. However, due to their isolated conditions, fire would most likely go to ground when it burned into adjacent fuel models post-treatment (table 34).

Cumulative Effects for both Alternatives 1 and 2

Recent and ongoing activities include thinning, pile and broadcast burning, and other vegetation management activities within the cumulative effects boundary. These activities have reduced fuels by removing material or vegetation. However, they have not addressed landscape level fuels management and the urban interface protection needs in the Upper North Fork Project Area. Refer to table 42 for a summary of on-going activities and appendix C for a complete list of past, present and reasonably foreseeable activities considered in this analysis.

Existing and foreseeable future actions include Hughes Creek timber harvest and thinning, pile and broadcast burning, Gibbonsville broadcast burning, cattle grazing, private property thinning and pile burning, Lost Trail Sanitation Salvage, wildfire and fire suppression.

In areas where fuel treatments overlap with other completed and planned projects there would be a cumulative benefit in the form of reduced fire behavior.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Alternatives 1 and 2 would be consistent with the Forest Plan as well as meeting the intent of the Healthy Forests Restoration Act of 2003 and the National Fire Plan. It would use prescribed fire to help meet the goals of the management areas within the project area. These alternatives would reduce potential flame lengths and rates of spread, which would help protect human life and property within and adjacent to the project area in the event of a wildfire. Reducing fuels would also help the initial attack organization meet their suppression objectives because fuels would be treated to reduce fire intensities that allow for safe direct attack. These alternatives would promote cost-effective fire programs by reducing potential wildfire intensity and therefore the costs of controlling potential wildfires.

- Fire suppression ability would be increased, because flame lengths would be reduced. Flame lengths would generally be less than 4 feet and fireline intensities would be low enough to allow for more direct firefighting tactics when compared with taking no action (table 35). (For details see appendix A of the fire and fuels report, located in the project record).
- Firefighter safety would be improved because of reduced flame length, which would generally be less than 4 feet high (table 35) (For details see appendix A of the fire and fuels report, located in the project record), and fire type would be surface or passive (table 34). These would reduce potential fire behavior and increase the torching index - meaning a higher wind speed would be required to initiate any type of crown fire (table 36).
- Risk to life and property adjacent to and near the project area, would be improved because post treatment conditions would allow safe fire suppression management actions due to low flame lengths (less than 4 feet high), and surface fire type (table 34 and table 35).
- The torching index is increased, meaning higher wind speeds would be required for any kind of crown fire (table 36).
- Risk to resource values would be reduced because we are reducing the potential for high severity wildfire on both action alternatives.
- Proposed fuel treatments would mitigate factors that tend to increase fire behavior potential, such as increased wind penetration and increased grass and brush growth, by reducing horizontal and vertical fuel continuity, surface fuel accumulation and ladder fuels.
- Consistent with National Fire Plan, Forest Land and Resource Management Plan, Fire Management plan, and Healthy Forest Initiative because we are reducing the accumulation of hazardous fuels within the wildland urban interface.

Conclusion

In the wildland urban interface, there is a high level of risk associated with fire. The primary risk is associated with public and firefighter safety, capital investments and natural resource values. Fire history tells us that all of the Salmon-Challis National Forest has experienced fire. It’s not a question of if but when. Implementing the proposed action reduces the risk by the largest margin. The National Fire Plan and 10-Year Comprehensive Strategy exist to assist fire suppression planning and implementation efforts to protect communities and the people who live in them. By modifying fuels to reduce fire behavior, action alternative 1 or 2 would help meet these goals. Taking no action would not.

Irreversible and Irretrievable Commitments of Resources

There would be no irreversible or irretrievable commitment of resources as a result of implementing either action alternative.

Air Quality

Wildfires and prescribed burning, especially broadcast burning, produce smoke. Under certain atmospheric conditions, smoke settles in areas where people live, work, or recreate. Smoke can cause respiratory problems for some people, and can create a safety hazard by limiting visibility. Smoke can also degrade the air quality in Class 1 Wilderness Areas.

Air quality is measured by the amount of tiny particulates in the air called particulate matter (PM). Particulate matter can cause health problems, especially for people suffering from respiratory illnesses. Smoke affects the clarity of the air by reducing visibility, and is measured in microns (One micron equals one millionth of a meter). Particles 50 microns and larger tend to settle out of the air quickly and are less likely to affect public health. Particles 10 microns and smaller (PM_{10}) can be inhaled deep into the lungs and pose a threat to visibility and public health. Fine particles 2.5 microns and smaller ($PM_{2.5}$) are of the highest of concern and are generally emitted from activities such as industrial and residential combustion, wildland fire, agriculture burning and vehicle exhaust.

Affected Environment

Existing Condition

Weather

The upper air wind pattern in the area is dominated by westerly winds. However, surface winds are heavily influenced by topography with wind funneling very common. A number of canyons and valleys in the area are aligned with the predominant winds and this has a marked influence on fire behavior. Local winds are also influenced by surface heating so up slope/up valley breezes are common during the summer months. July through September are the months of highest fire danger when the largest fires of the season occur.

The project is within Airshed 17 and is regulated by the Montana/Idaho Airshed Group which works closely with the forest service to prevent smoke impacts while using fire to accomplish land management objectives.

The air quality in Airshed 17 is usually good to excellent. Currently, the Airshed is classified by both the federal and state standards as in attainment for all criteria pollutants. However, when wildland fires take place, whether planned or unplanned, smoke emissions can pose a major health risk. It is primarily made up of small particles, gases, and water vapor, with trace amounts of hazardous air pollutants. Most harmful are the particles (or particulate matter) smaller than 2.5 micrometers in diameter (70 micrometers is the diameter of a human hair). If these particles are inhaled deeply into the lungs, they can damage lung tissue and cause respiratory and cardiovascular problems (DEQ 2011).

The major pollutant of concern regarding public health hazards in smoke is particulate matter, particularly PM_{10} and $PM_{2.5}$. Eighty to ninety percent of wildfire smoke (by mass) is within the fine particle size class ($PM_{2.5}$), making public exposure to smoke a significant concern (NWCG 2001). Table 37 is a summary of sensitive receptors that have been affected by smoke from both planned and unplanned fires in the project area.

Table 37. Sensitive receptors

Sensitive Receptor Type	Location
Towns, Communities	Gibsonville, Sheep Creek and North Fork and Salmon.
Recreation Areas	Lost Trail Ski Area
Campgrounds	Twin Creek Campground and Lost Trail Rest Area
FS Work Center/Ranger Station	North Fork Ranger District and Hughes Creek Work Center
Roads	US Hwy 93, State Hwy 43, Forest Service and County Roads
Class I Federal areas	See table 38 for Class I areas
Other	Private lands within and adjacent to the project area

Sources of Air Pollution

The largest producer of carbon monoxide and nitrogen oxides in the project area are on-road motor vehicles. Particulates ($PM_{2.5}$ and PM_{10}) are emitted into the air by sources including off-road vehicle use, fires, and agricultural activities.

Management Direction

Air Quality Laws, Rules and Regulations

Air quality in Airshed 17 is good to excellent. The airshed is classified by both the federal and state standards as in attainment for all criteria pollutants (DEQ 2011).

The Clean Air Act

The U.S. Congress passed the Clean Air Act in 1970 and two amendments in 1977 and 1990 (USEPA 1990). The Clean Air Act was enacted to protect and improve air quality while ensuring the protection of public health and welfare. It established National Ambient Air Quality Standards as one measure to define acceptable air quality. The Clean Air Act sets the framework under which industries and government agencies, including the Forest Service, are to operate in order to maintain these standards.

Federal Conformity Requirements

The Clean Air Act as amended in 1990 requires that all projects receiving federal funds must conform to the appropriate State Implementation Plan. Federal actions are subject to either the Transportation Conformity Rule (40 CFR 51[T]), which applies to federal highway or transit projects, or the General Conformity Rule (40 CFR 51[W]), which applies to all other federal actions. Because the Upper North Fork Ecosystem Restoration Project is not a federal highway or transit project, it is subject to the General Conformity Rule.

General Conformity Rule Requirements

The purpose of the General Conformity Rule is to ensure that federal actions conform to applicable state implementation plans so that they do not interfere with strategies employed to attain the National Ambient Air Quality Standards. The rule applies to federal actions in areas designated as nonattainment, or in some cases maintenance, for any of the six criteria pollutants.

National Ambient Air Quality Standards

The National Ambient Air Quality Standards were established to set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly, as well as to

protect against decreased visibility, damage to animals, crops, vegetation, and buildings. The Environmental Protection Agency set National Ambient Air Quality Standards for six principal pollutants referred to as “criteria” pollutants. These pollutants are lead, sulfur dioxide, nitrogen dioxide, ozone, particulate matter less than 10 microns in diameter (PM_{10}), and carbon monoxide. The Environmental Protection Agency has also issued standards for 2.5 micron-size particulate matter ($PM_{2.5}$) which is the largest component of smoke from wildland burning. Federal agencies conducting activities that produce air emissions must adhere to both federal and state standards.

Air quality in a given location is defined by pollutant concentrations in the atmosphere and is generally expressed in units of parts per million (ppm) or micrograms per cubic meter (µg/m3). The National Ambient Air Quality Standards represent maximum acceptable concentrations. Some states have additional standards but Idaho adheres to the National standards only.

Smoke Management

The Idaho Department of Environmental Quality is the state agency tasked with ensuring clean air, water, and land in the state and protecting Idaho citizens from the adverse health impacts of pollution. They work with federal and state agencies, local governments, businesses and industries, community organizations, and citizens to identify and implement cost-effective environmental solutions (DEQ 2011).

The Environmental Protection Agency has delegated authority to Idaho to issue air quality permits and enforce air quality regulations in the state. Idaho is authorized to develop plans to achieve, maintain, and enforce the standards. Jointly, the state rules and these plans are known as a State Implementation Plan (DEQ 2011).

In Idaho, land managers who conduct a "major" amount of prescribed burning participate in a bi-state smoke management program with Montana. The program is managed by the Montana/Idaho State Airshed Group (composed of state, federal, tribal and private member organizations divided into three units - Montana, North Idaho, and South Idaho) which was formed to limit the impacts of smoke generated from necessary forest and rangeland burning (DEQ 2011).

Prevention of Significant Deterioration, Visibility Protection and Regional Haze

Prevention of significant deterioration provisions were written to prevent areas that are currently cleaner than is allowed by the National Ambient Air Quality Standards from being polluted up to the National Ambient Air Quality Standards . Two Class 1 areas are located within airsheds 4 and 7 in Montana (table 38 and figure 9). The 1977 amendment to the Clean Air Act set a national goal of remedying existing, and preventing any future human-caused impairment of visibility in class 1 areas. The 1999 regional haze regulations call for states to establish goals for improving visibility in Class 1 national parks and wildernesses and to develop long-term strategies for reducing emissions of air pollutants that cause visibility impairment (Peterson 2001).

In areas where fuel treatments overlap with other completed and planned projects there would likely be a cumulative benefit in the form of reduced fire behavior; flame lengths would be reduced, torching index would increase and the fire type would likely be a ground fire. The fuel treatment objectives in the other and planned projects share similar goals and objectives consistent with hazardous fuels reduction within the wildland-urban interface.

Table 38. Federal Class 1 areas

Class I Air-Shed	Proximity to Project Area
Selway-Bitterroot Wilderness	Boundary approximately 20 miles northwest of project area.
Anaconda-Pintlar Wilderness	Boundary approximately 12 miles northeast of the project area.
Frank Church River of No Return Wilderness	Exempt since established after August 7, 1977 Boundary approximately 25 miles west of the project area.

Salmon-Challis National Forest Land and Resource Management Plan Standards and Guidelines

The Salmon National Forest Land Management Plan (Forest Plan) provides the standards and guidelines for air quality. It states that "Forest comply with State and Federal Air Quality Standards" (Forest Plan 1983, pg. IV-71).

Methodology

For the purpose of this analysis, the smoke impact spreadsheet model was used to determine emissions. Since the Environmental Protection Agency recognizes 2.5 micron-size particulate matter ($PM_{2.5}$) as the largest component of smoke from wildland burning, the smoke impact spreadsheet model is a perfect tool for calculating $PM_{2.5}$ emissions and airborne concentrations downwind of natural or managed wildland fires. The smoke impact spreadsheet model calculates $PM_{2.5}$ emissions and airborne concentrations downwind of natural or managed wildland fires. As a screening model, the smoke impact spreadsheet provides conservative (that is, tending toward higher-than-actual) predictions of the downwind air concentrations at user-selected receptors for comparison with appropriate federal or state air quality standards for $PM_{2.5}$ emissions (Air Sciences Inc. 2003).

The outputs are not absolutes and are bound by the assumptions and limitations of data collection methods and individual models. They do though allow for comparison of changes associated with different levels of fuel treatments.

Assumptions

For prescribed fire it is assumed fire moves downwind at a constant rate and for wildfire the fire starts upwind and moves downwind at a constant rate. The National fire danger rating system fuel model used was G-short needle (heavy dead). Wildfire size was modeled at 2000 acres and prescribed fire at 1000 acres. Typical meteorological data for the area was used for a fall prescribed burn (October) and for a summer wildfire (August). Elevation was 6000 feet. For this assessment, the following assumptions were made for fuel moistures for both wildfire and prescribed fire.

Table 39. Fuel moisture assumptions

Burn Type and Season	10-Hour Fuel Moisture Content (%)	1000-Hour Fuel Moisture Content (%)	Duff Moisture Content (%)
Drought-Year Wildfire	4	10	50
Fall Prescribed Fire	10	20	100

Model limitations

- The model assumes continuous, uniform, and homogeneous fuel beds.
- Assumes that the entire area of concern experiences fire (no mosaic of burned and unburned areas).
- Season of burn has no effect on fuel consumption or emissions.

Measurement Indicators

The primary measure for this issue is the tons of particulate emissions ($PM_{2.5}$). Emissions will be modeled for $PM_{2.5}$ particulate matter using the smoke impact spreadsheet. $PM_{2.5}$ is the measurement indicator because it composes 80 to 90 percent of smoke in wildland fires. Modeling smoke emissions for this project will show relative changes in smoke emissions between no action and the action alternatives.

Elemental carbon, organic carbon and particulate matter make up smoke. Of the three, $PM_{2.5}$ is most efficient at impairing visibility. Monitoring $PM_{2.5}$ and visual monitoring are the primary measures for visibility.

Spatial and Temporal Context for Effects Analysis

The spatial context for specific treatments and cumulative effects for emissions is typically the airshed boundary. The Upper North Fork boundary sits at the apex of Airshed 17 in Idaho which borders Airsheds 4 and 7 in Montana. Because of this, a ten mile radius was selected from the project boundary for the spatial context for specific treatments and cumulative effects (see figure 9). The direct and indirect effects would occur as proposed treatments within the project area are completed over the next 10 to 15 years. The cumulative effects would occur within this same time period as the treatments proposed for this project and similar vegetation management treatments within the airshed are completed.

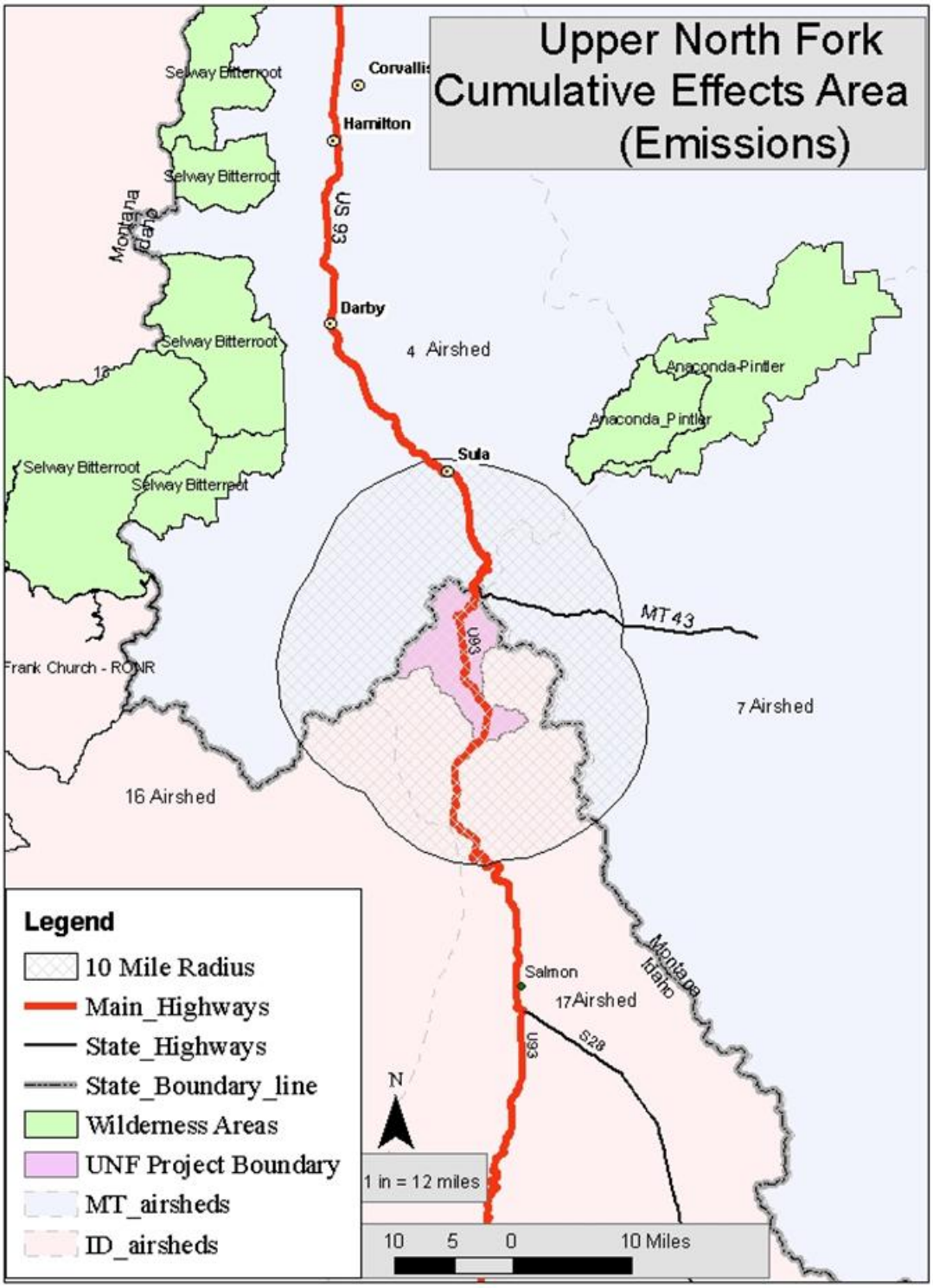


Figure 9. Air quality cumulative effects boundary

Environmental Consequences

No Action Effects

Taking no action would have no immediate effects on air quality. However, in the event of a wildfire the potential effects would be a large quantity of smoke-based pollutants or emissions degrading air quality and reducing visibility.

There would be no treatment in the analysis area. Natural processes would continue, and existing wildfire suppression tactics would persist. There would be no controlled burning. If a wildfire did occur the amount and dispersal of smoke may not be controlled if the fire is not contained immediately. Concentrations of pollutants from a wildfire would most likely exceed federal air quality standards producing nuisance smoke. The standards include both visibility and particulate emissions. The visibility in the Selway-Bitterroot and Anaconda-Pintlar Wilderness Areas could be degraded for the duration of a wildfire. The air quality for the places listed in table 37 may be degraded both visually and from a human health stand point. Visibility on the roads listed in table 37 could become a safety issues if wildfire did occur.

Daily particulate loads from a wildfire would be more than those from prescribed burning and smoke would last as long as it takes to suppress the fire. Modeling a wildfire in mid-August under dry conditions with fuel loadings estimated for the project area yields approximately 40.4 $\mu g/m^3$ of $PM_{2.5}$ over a 24 hour period up to 3.8 miles away. This would exceed the National Ambient Air Quality Standards for sensitive groups. The Environmental Protection Agency indicates that $PM_{2.5}$ emissions over 40.5 $\mu g/m^3$ are unhealthy for sensitive groups (NWCG 2001).

In addition to health concerns associated with particulate matter and other emissions, particulate matter would impair visibility several miles from the projected wildfire. Significant visibility impairment can lead to highway accidents. Visibility would be significantly reduced if a wildfire did occur in the project area on several major road systems and in the Selway-Bitterroot and Anaconda-Pintlar Wilderness Areas. This could result in a high risk of traffic accidents and road closures along US Hwy 93 and State Hwy 43 in addition to impacts to residents and popular recreational sites in the Forest. Table 40 is a summary of emissions for a wildfire. See appendix A of the air quality report, located in the project record, for complete smoke impact spreadsheet emissions model.

Table 40. Wildfire smoke emissions pounds per acre

Pollutant	Emissions Flaming	Smoldering	Total
PM_{10}	12	285	297
$PM_{2.5}$	10	242	252
Methane	3	147	150
Carbon Monoxide	25	3,221	3,246
Carbon Dioxide	6,744	13,110	19,854
Nitrogen Oxides	12	0	12
Sulphur Dioxide	4	11	15

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Taking no action would meet specific Forest Plan goals, standards and guidelines for air quality.

Taking no action would also meet local and state regulations including the Clean Air Act of 1970 and its amendments in 1997 and 1990 and the direction from the Montana/Idaho Airshed Group Smoke Management Program.

Alternative 1, Proposed Action and Alternative 2 No New Temporary Road Construction Direct and Indirect Effects

From an air quality perspective, little difference exists between alternatives 1 and 2. The treatments and combination of treatments would produce similar air quality results. See appendix A of the air quality report, located in the project record, for complete smoke impact spreadsheet emissions model. The direct effects on air quality from implementing either of the action alternatives would be the particulate matter and haze produced by all the burning activities as well as fugitive dust and exhaust from vehicles, heavy equipment and chain saws. The impacts to the air from these activities are usually minimal and fall well below Environmental Protection Agency standards. Road dust would increase under this alternative in the dry months and would be minimal if dust abetment techniques were utilized or if work is done during the wetter seasons. Constructing, maintaining and decommissioning roads would also create dust; however it would be short in duration and it is limited spatially to the immediate project area. Dust abatement would minimize road dust.

If a wildland fire were to occur in the project area during critical fire season, smoke production would be approximately 2 times greater than would be produced from prescribed burning on an acre-per-acre basis. The smoke impact spreadsheet was used to model a prescribed fire in October under normal fall conditions with fuel loadings estimated for the project area. The model yields approximately 29.5 $\mu g/m^3$of $PM_{2.5}$ over a 24 hour period, 3.8 miles away. This would be in attainment with the National Ambient Air Quality Standards.

Visibility could be reduced. This could result in an increase in the likelihood of traffic accidents along US Hwy 93 and State Hwy 43, and impact residents and popular recreational sites in the Forest. Table 41 summarizes emissions for a prescribed fire. See appendix A of the air quality report, located in the project record, for complete smoke impact spreadsheet emissions modelling.

Table 41. Prescribed fire smoke emissions in pounds per acre

Pollutant	Emissions Flaming	Smoldering	Total
PM_{10}	6	647	653
$PM_{2.5}$	6	549	555
Methane	2	333	335
Carbon Monoxide	14	7,311	7,325
Carbon Dioxide	3,761	29,757	33,518
Nitrogen Oxides	7	0	7
Sulphur Dioxide	2	24	26

Indirect affects to air quality associated with implementing the proposed action would be caused by smoke drifting out of the project area. These impacts would vary based on atmospheric conditions during and shortly after burning and would be directly related to the amount of material burned. Short-term smoke impacts may affect the local area, especially during stable atmospheric conditions, particularly at night. This could include reduced visibility along travel corridors adjacent to the project area, as well as reduced visibility and the smell of smoke. Smoke may be visible from adjacent air-sheds including Airsheds 13 and 16 in Idaho, and 4 and 7 in Montana. Only under the rarest of circumstances would it

affect air quality standard attainment in those airsheds, and most likely would not affect the air quality at all other than the potential to see upper elevation smoke in the distance.

Cumulative Effects

Cumulative effects include those from reasonable and foreseeable activities producing pollutants in the same general area predicted for the proposed project. This area lacks large industry capable of contributing significant particulate matter and other pollutants. Emissions from this project combined with existing and foreseeable conditions in table 42 could increase the amount of pollutants in areas described in this analysis.

Table 42. Summary of cumulative effects considered in project area

Agency	Present Project	Foreseeable Future Project
US Forest Service	•Hughes Creek EA (Pile/Broadcast Burning) •Gibsonville EA (Pile/Broadcast Burning)	•Lost Trail Sanitation Salvage (Pile/Broadcast Burning) •Wildfire
Lemhi County	Private Property (Pile Burning)	Private Property (Pile Burning)
Private Residences	Wood Stove/Fire Place	Wood Stove/Fire Place

Prescribed fire and wood-burning stoves are the most substantial contributors as other potential sources of particulate matter and pollutants. Fall and winter burning would contribute the most to cumulative smoke effects. Even so, this increase in emissions should not be significant enough to reach nonattainment status. In order to mitigate and reduce cumulative effects to air quality, prescribed burning would be closely coordinated with the Montana/Idaho Airshed Group. All recommendations from the Group would be strictly followed.

Small emission particles can travel great distances and add to regional haze issues. Regional haze can sometimes be the result of multiple prescribed burns and wildfires or wood stove smoke occurring at the same time. During days of poor ventilation the haze has a tendency to become concentrated at low altitudes. The action alternatives would contribute very little to regional haze in the affected airshed. Timing, coordination and monitoring, emission reduction techniques and other factors previously mentioned would minimize regional haze. Prescribed burning would occur only on days approved by the Montana/Idaho Airshed Group.

The Upper North Ecosystem Restoration Project has been determined to conform to the Clean Air Act and the State implementation Plan All the predicted emissions are less than the conformity thresholds. Prescribed fire smoke emissions, and similar activities like pile burning, are included in an approved smoke management program and are therefore presumed to conform to the State implementation plan. On the basis of the foregoing, it is my determination that I have considered the best available science relevant to the effect of this project to the air resources of the Salmon-Challis National Forest.

Global Climate Change

Activities related to prescribed burns without question involve the production of greenhouse gases including carbon dioxide which is understood to contribute to global climate change. However, project level emissions alone are insufficient to cause climate change. Greenhouse gas emissions produced on the North Fork Ranger District as a result of implementing this project may contribute to the cumulative effects of such gases on climate change. The current state of the science does not allow for specific measureable analysis of the impacts of greenhouse gas emissions at the local or regional level. Any analysis of the impacts from this project on climate change would be speculative. See the section Climate

Change, Carbon Cycles, and Silvicultural Practices beginning on page 54 for additional discussion on climate change.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The project meets the Salmon National Forest Land and Resource Management Plan forest wide standards and guidelines for air quality.

The project also meets local and state regulations including the Clean Air Act of 1970 and its amendments in 1997 and 1990 and the Montana/Idaho Airshed Group Smoke Management Program.

Irreversible and Irretrievable Commitments of Resources

There would be no irreversible or irretrievable commitment of air quality resources from implementing either action alternative.

Soils and Hydrology

Affected Environment

Existing Condition

Hydrology

The North Fork watershed has a branched or dendritic pattern of streams. The main stem of the North Fork Salmon River flows through the middle of the analysis area. Major tributaries of the North Fork include Moose Creek, Pierce Creek, and Twin Creek. Surface hydrologic features are composed of an ephemeral, intermittent and perennial stream network, many small seeps and wetlands, and a few small ponds primarily in the headwaters.

The North Fork watershed has a snowmelt dominated streamflow pattern. Peak flow occurs in May and June and the lowest flow period occurs in late fall and winter.

Flows are regulated by the amount of snowpack, the rate of snowmelt, the amount of early spring rain, the movement of water through the watershed to the valley bottom and the condition of the riparian area and stream channel.

Streams in the analysis area can be grouped into three types:

1) Source reaches high in the drainage; steep, deep and narrow, with high bank erosion rates, and often intermittent;

2) Transport reaches at mid-elevation connecting the upper reaches with lower ones; of moderate gradient, depth and sinuosity, with generally stable channels due to large woody debris and vegetation; and

3) Response reaches along the valley bottom adjust to the variety of flows and sediment loads; meandering and slightly entrenched with width to depth rations varying from moderate to high.

Riparian areas are a wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface water of subsurface water influence. Riparian wetland areas are grouped into two major categories; 1) lentic, which are standing water habitats such as lakes, ponds, seeps, bogs, and meadows, and 2) lotic, which are running

water habitats such as rivers; streams, and springs. Both riparian types have been identified in the Upper North Fork HFRA Ecosystem Restoration analysis area.

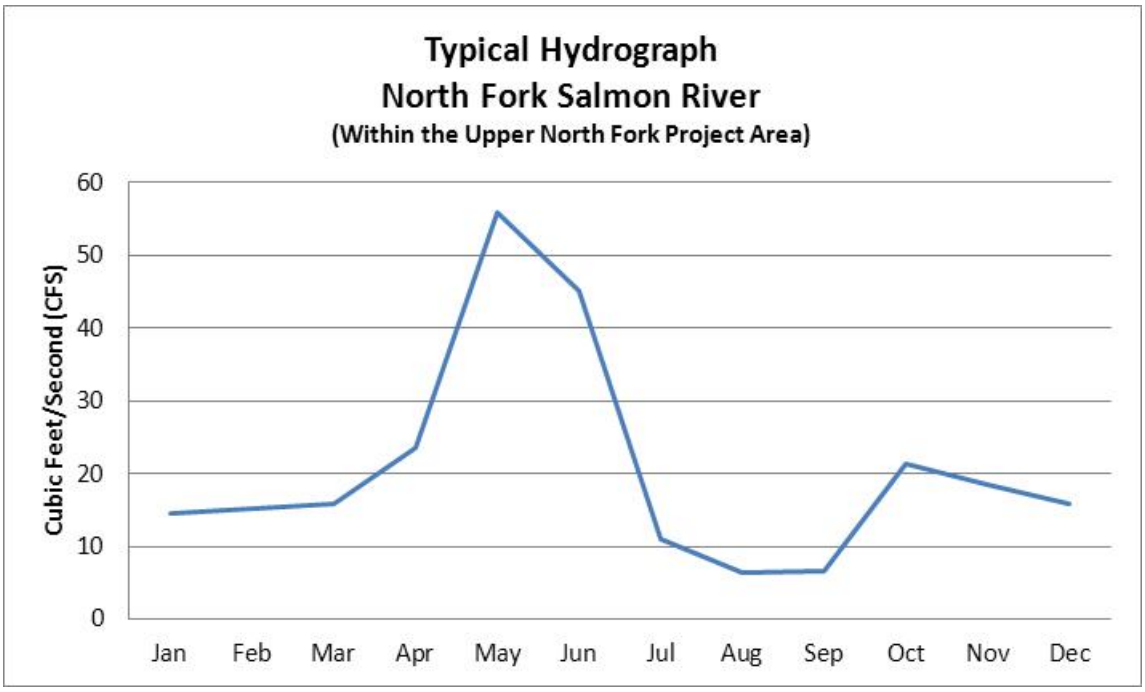


Figure 10. Typical hydrograph for the North Fork Salmon River

Water Quality

The Idaho Department of Environmental Quality has designated the following beneficial water uses for the North Fork Salmon River; domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary contact recreation and secondary contact recreation. The North Fork Salmon River has also been designated as a Special Resource Water. This designation, as defined in the Idaho Water Quality and Wastewater Treatment Requirement, identifies specific segments or bodies of water needing intensive protection to preserve outstanding of unique characteristics or to maintain current beneficial use. Beneficial water uses have not been designated for any other streams with in the analysis area. Surface waters not classified are designated as primary contact recreational waters, unless the physical characteristics of a water body prevent primary contact recreation. In those cases, the water body is designated as a secondary contact recreational water.

Sediment in the analysis area ranges from small suspended material to cobble size bedload. Fine sediment is produced in the source reaches and transported to the response reaches during all flows except the lowest ones. The transport reaches are also adding sediment through bank erosion. Fine sediment should be transported through the response reaches at bankfull flows and deposited in the response reaches with low flows. Bedload is transported mainly during peak flows and is deposited at a bankfull or low flow. In addition, most streams in the analysis area have some amount of bank erosion. (Bank stability measurements are discussed in more detail in the soils and hydrology specialist report, located in the project record.)

Instream core sampling is used to monitor trend and to determine the amount (percent) fine sediment in the stream's substrate. Streams that have the potential to support anadromous fish are cored to a depth of 6 inches (the amount of substrate material an anadromous fish could move when preparing a red) and resident fish streams are cored to a depth of 4 inches using a McNeil core sampler. The percent fines at depth are used in determining the stream's biotic potential (Stowell et al. 1983). Biotic potential is the condition of spawning substrate quality which maximizes survival and emergence of fish embryos.

303(d) Streams

The Clean Water Act requires that the states and tribes restore and maintain the chemical, physical and biological integrity of the nation's waters. As mandated by the Clean Water Act the State of Idaho is required to conduct a comprehensive analysis of Idaho's water bodies to determine whether they meet state water quality standards and support beneficial uses or if additional pollution control measures are needed.

The 2010 Integrated Water Quality Monitoring and Assessment Report (IDEQ 2011) guides the current direction for water quality management for the project area. The integrated report serves as a guide for developing and implementing water quality improvement plans to protect water quality and achieve federal and state water quality standards. Assessment units are groups of similar streams within a subbasin that have similar land use practices, ownership, or land management. Representative streams or reaches were monitored within each assessment unit to determine whether or not the streams within the assessment unit are fully supporting their designated beneficial uses. Table 43 identifies the assessment units and streams within the analysis area that are listed on the 2010 Integrated Report. No TMDL (Total Maximum Daily Loads) have been prepared for this assessment unit.

Table 43. Assessment units and 303(d) listed streams

Assessment Units and 303(d) Listed Streams Within the Upper North Fork HFRA Ecosystem Restoration Analysis Area in the 2010 Integrated Report For Idaho.			
Assessment Unit	**Streams Not Supporting Beneficial Uses**	**Pollutants**	**Basis for Listing**
ID17060203SL078_02 North Fork Salmon River-source to Twin Creek (17.46 miles)	None	None	Full Support of cold water aquatic life, domestic water supply, primary contact recreation, and salmonid spawning
ID17060203SL077_02 North Fork Salmon River-Twin Creek to Dahlonega Creek (15.71 miles)	None	None	Full Support of cold water aquatic life, domestic water supply, primary contact recreation, and salmonid spawning
ID17060203SL072_02 North Fork Salmon River-Dahlonega to Sheep Creek (6.96 miles)	None	None	Not Assessed
ID17060203SL080_02 Twin Creek-source to mouth (14.28 miles)	None	None	Full Support of cold water aquatic life, secondary contact recreation, and salmonid spawning
ID17060203SL079_02 Pierce Creek-source to mouth (10.34 miles)	None	None	Not Assessed

Soils

Landforms within the analysis area include dissected mountain slopelands, canyonlands, glacial troughs and headlands, cirque basinlands, and valley bottomlands. The dominant parent materials are quartzite, granite, and a small intrusion of volcanics. Mixed alluvium derived from these sources is found along the valley bottom of both the North Fork Salmon River. Soils within the watershed vary from shallow (less than 20 inches deep) to moderately deep (20 to 40 inches deep) in the mountains to very deep (greater than 60 inches deep) along the valley bottom.

Landtypes are portions of the landscape resulting from geomorphic and climatic processes with defined characteristics having predictable soil, hydrologic, and vegetation patterns. Hydrologic and soil erosion and stability analysis and interpretations were completed for the landtypes within the Upper North Fork Project boundary. See the soils and hydrology report, located in the project record for a detailed description of landtypes and maps displaying the location of the different landtypes and proposed treatment units.

Potential harvest and prescribed burn units were surveyed to quantify the amount of detrimental disturbance remaining and recovery rates from past management activities. Some class one disturbance was observed with no detrimental disturbance observed in the surveyed units.

Detrimental Disturbance

Previously harvested units (activity areas) were stratified by landtype association and treatment type to gain an understanding of the amount of detrimental disturbance existing in the activity areas from past disturbances. Some class one soil disturbance from past activities was observed however no detrimental disturbance was found. Characteristics of a class one disturbance might include: faint wheel tracks or slight depressions, forest-floor layers present and intact, surface soil has not been displaced and shows minimal mixing with subsoil, soil compaction is shallow (0 to 4 inches slightly greater than under natural conditions), if burned- low burn severity with litter slightly charred or partially consumed, duff largely intact, water repellency is similar to pre-burn conditions.

Total Soil Resource Commitment

Total soil resource commitment for the Upper and Middle North Fork were quantified using GIS analysis. System and non-system roads and trails make up the majority of total soil resource commitments on the landscape. In the Upper North Fork subwatershed there are 53 miles of road and trails amounting to approximately 0.5 percent of the area in a nonproductive state. The Middle North Fork subwatershed has134 miles of roads and trails contributing to a total of 1.8 percent of the area in a nonproductive state.

Management Direction

Regulatory Framework

Salmon Land and Resource Management Plan

Hydrology

Maintain watershed condition and water quality such that downstream beneficial uses are protected and compliance with State standards is achieved. Conduct management and resource development within riparian zones in a manner compatible with protection of water quality and fish habitat.

- Maintain favorable instream flows and protect public property and resources.
- Improve and maintain water quality to meet State water quality standards.

- Conduct nonpoint source activities in accordance with applicable best management practices.
- Activities with significant soil disturbing activities will not be permitted on lands with high mass stability hazard.
- Appropriate R-4 regional soil and water management guidance will be followed.
- Long term water quality will be maintained or improved in all municipal watersheds.
- Soil disturbing projects with moderate or higher erosion potential will be seeded with protective vegetation.
- Rehabilitate disturbed areas that are contributing sediment directly to perennial streams as a result of management activities.
- Limit use of chemical agents as part of management activities.
- Maintain channel stability and capacity.
- New land use facilities will not be located within the 100-year floodplain.
- Prevent stream channel instability, loss of channel cross-sectional areas, and loss of water quality resulting from activities that alter vegetative cover.
- Maintain sediment yield within threshold limits.
- Avoid channelization of natural streams.
- Treat disturbed areas resulting from management activities in the shortest possible time to meet water quality objectives.
- Riparian zones will be managed in a manner compatible with protection of water quality and fish habitat.

Soils

Maintain soil productivity, minimize man-caused soil erosion, and maintain the integrity of associated ecosystems.

Identify at the project level, filter strip requirements immediately adjacent to streams, in order to reduce sediment delivery from roads or other major surface disturbance.

Specific Forest Plan Standards include:

Total site potential will be protected and/or maintained at a level equal to or greater than 90 percent of natural. This is to be met through:

- Managing for a minimum of 80 percent of an activity area that is to remain in a non-detrimentally disturbed condition. Activity areas for this standard are defined as land areas within individual treatment units for the proposed action. It does not include intensive developments such as campgrounds, mines, drill sites, aggregate source areas, and water developments.
- Managing for activity areas to have 5 percent or less of total or essentially total soil resource commitment. Activity areas for this standard are defined as individual treatment units of the proposed action. Total soil resource commitment includes use of land areas for more than 50 years or in a non-productive (vegetation) condition. Areas included are system roads, haul roads, some landings, stock driveways, campgrounds, mining areas, trails, and other land areas where vegetation production is not the goal of the land use.

Clean Water Act

The Federal Water Pollution Control Act of 1972 (Public Law 92-500) as amended in 1977 (Public Law 95-217) and 1987 (Public Law 100-4) is also known as the federal Clean Water Act.

This Act provides the structure for regulating pollutant discharges to waters of the United States. The U.S. Environmental Protection Agency administers the Act, but many permitting, administrative, and enforcement functions are delegated to state governments. In Idaho, the designated agency is the Idaho Department of Environmental Quality.

Certain sections of the Act have special importance in management of nonpoint source pollution. Sections 208 and 319 of the Act recognize the need for control strategies for nonpoint source pollution.

Section 305(b) of the Act requires states to assess the condition of their waters and produce a biennial report summarizing the findings. Water bodies on the 303(d) list (known as Water Quality Limited waters) are to be targeted, and scheduled, for development of water quality improvement strategies on a priority basis.

These strategies are in the form of Total Maximum Daily Loads, or TMDLs, which technically consist of the quantity of pollutants that may be delivered to a water body without violating water quality standards. In practice they are plans to improve water quality in a listed water body until water quality standards are met (i.e., until designated uses are fully supported).

Section 404 of the Act outlines the permitting process for discharging dredge or fill material into waters of the United States, including wetlands. The U.S. Army Corps of Engineers administers the 404 program. Under Section 401 of the Act, states and tribes may review and approve, set conditions on, or deny Federal permits (such as 404 permits) that may result in a discharge to State or Tribal waters, including wetlands.

The Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974

(16 U.S.C. 1600-1614) (as amended by National Forest Management Act (NFMA) of 1976 (16 U.S.C. 472a). States that the development and administration of the renewable resources of the National Forest System are to be in full accord with the concepts for multiple use and sustained yield of products and services as set forth in the Multiple-Use Sustained Yield Act of 1960. The Act requires the maintenance of productivity of the land and the protection of soil and water resources. It requires the Secretary of Agriculture to ensure, through research and monitoring, that forest management practices will not produce substantial and permanent impairment of the productivity of the land.

Forest Service Manual, Water Resources Management, sections 2532.02, 2532.03

Sections 2532.02 and 2532.03 of the Manual describe the objectives and policies relevant to protection (and, where needed, improvement) of water quality on National Forest System Lands so that designated beneficial uses are protected. Guidelines for data collection activities (inventory and monitoring) are also described.

Forest Service Handbook, Soil and Water Conservation Practices Handbook 2509.22

The objective of this handbook is to present a process to develop site specific conservation practices for use on national Forest System lands to minimize effects of management activities on soil and water resources, and to protect water-related beneficial uses. It describes the application, monitoring, evaluation, and adjustment of these conservation practices.

Executive Order 11988, Floodplain Management

This Executive Order requires that agencies avoid, to the extent possible, adverse impacts associated with occupancy and modification of floodplains. It applies to all floodplain locations, as a minimum to areas in the 100-year, or base, floodplain.

Executive Order 11990, Protection of Wetlands

This Executive Order states that agencies shall minimize destruction, loss, or degradation of wetlands and shall preserve and enhance their natural and beneficial values. Agencies are to avoid construction in wetlands unless it is determined that there is no practicable alternative and that all practicable measures are taken to minimize harm to wetlands.

Idaho Water Quality Standards-IDAPA 58, Title 01, Chapter 2

This state law defines the State's obligations to enforce water quality standards. A copy of the standards is in the project file.

The Pacific Anadromous Fish Strategy (PACFISH) / Inland Native Fish Strategy (INFISH) Guidance

In 1994 the Pacific Anadromous Fish Strategy Environmental Assessment determined that Salmon-Challis Forest Plans requirements be superseded by instituting riparian management objectives, in order to "maintain or restore" watersheds (Forest Service 1995). The Pacific Anadromous Fish Strategy guidance includes goals, riparian management objectives, riparian habitat conservation areas, and standards and guidelines for riparian areas.

Wild and Scenic Rivers Act

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations.

Water right from Idaho Department of Water Resources

Idaho Department of Water Resources manages water in the State of Idaho via water allocation and distribution processes. Water rights authorize the use of public water by private individuals and organizations. The right to use water for a beneficial use must be obtained from the Idaho Department of Water Resources before a project is implemented.

Stream Channel Alteration Permit from Idaho Department of Water Resources and the U.S. Army Corp of Engineers- IDAPA 37, Title 03, Chapter 07

To alter a stream channel or conduct any work below the high water mark, the Forest Service must file a joint-agency stream alteration permit and receive approval from the Idaho Department of Water Resources and the U.S. Army Corps of Engineers.

Water Quality Standards Short Term Activity Exemption- IDAPA- 58, Title 01, Chapter 02

Agencies proposing activities that minimally impact water quality and are short term or temporary lasting no more than one year must apply for a Short Term Activity Exemption from the Idaho Department of Environmental Quality.

Methodology

Best Available Science

The techniques and methodologies used in this analysis consider the best available science. The analysis includes a summary of credible scientific evidence which is relevant to evaluating reasonably foreseeable impacts. The analysis also identifies methods used and references the scientific sources relied on. The conclusions are based on a scientific analysis that shows a thorough review of relevant scientific information. For this analysis there was no incomplete or unavailable information that would be necessary for this determination.

The relevant science considered for this analysis consists of several key elements. For water resources the elements of science used are:

- Data collection documenting existing and past conditions
- Use of scientific and regulatory literature
- Modeling using currently accepted analysis
- The collective knowledge of the project by Interdisciplinary Team members through integration of science with local conditions
- Comparative analysis considering other local similar projects and past monitoring data

The determinations reached in this resource analysis are based upon ground reconnaissance of the proposed project area, previous monitoring of similar types of activities on National Forest System lands, and a review of literature that is cited in the soils and hydrology specialist report, located in the project record. Finally, the potential effect of the Upper North Fork HFRA Ecosystem Restoration Project on water resources is predictable and well documented. In my professional opinion, there are no significant scientific uncertainties of risks associated with this proposal. On the basis of the foregoing, it is my determination that I have considered the best available science relevant to the effect of this project on water resources of the Salmon-Challis National Forest.

Water Erodion Prediction Project (WEPP) Fuels Management Erosion Analysis and Disturbed WEPP

The Water Erodion Prediction Project (WEPP) is a physically-based soil erosion model that can provide estimates of soil erosion and sediment delivery, considering the specific soil, climate, ground cover, and topographic conditions. The accuracy of the projected rates is, at best, plus or minus 50 percent. Any predicted runoff or erosion value, by a model, will be within only plus or minus 50 percent of the true value (Elliot, 2000). Erosion and sediment delivery values are used to compare relative differences between alternatives. Additional information on WEPP modeling can be found in the soils and hydrology report located in the project record.

Stream flow Information

Mean annual flow has been calculated based on the procedure outlined in the Water-Resources Investigations Report 01-4093, “Estimating Monthly and Annual Streamflow Statistics at Ungauged Sites in Idaho” by Jon E. Hortness and Charles Berenbrock (Hortness and Barenbrock 2001). Peak flows have been calculated based on the procedures outlined in the Water-Resources Investigations Report 02-4170, “Estimating the Magnitude of Peak Flows at Selected Recurrence Intervals for Streams in Idaho” by Charles Berenbrock (Berenbrock 2002). In these reports hydrologic regions are identified for different geographic areas of the State of Idaho. The hydrologic region encompassing the project area is identified and the appropriate regression equations are selected to calculate mean annual flow and peak flows.

Cumulative Watershed Effects and Watershed Risk Assessment

The existing condition, watershed sensitivity and degree of management within a watershed or subwatershed affect the potential to experience adverse effects to watershed and aquatic resources. Based upon a watershed risk assessment presented in the document *Determining the Risk of Cumulative Watershed Effects Resulting from Multiple Activities* (USDA Forest Service 1993), road density and percent of the subwatershed covered with "hydrologically immature" vegetation are used as indicators of potential effects on water yield and timing as well as erosion and sediment potential. Additional information on cumulative watershed effects and watershed risk can be found in the soils and hydrology report located in the project record.

- Road density expressed as miles per square mile provides an index of the overall potential for roads to affect watershed function.
- Watershed relief was calculated for all subwatersheds in the project area and all had watershed relief less than 30 percent.

Water Yield Analysis

Young stands, resulting from harvest or natural ecosystem components such as fire or disease, are indicative of the potential effects on the magnitude and timing of runoff from the watershed. The term "hydrologic immaturity" is used to indicate forested stands in which root structure and canopy density have not reached the level of water use and influence created by mature stands. A process and model is presented in the report Software for Calculating Vegetation Disturbance and Recovery by Using the Equivalent Clearcut Area Model (Ager and Clifton, 2005). The Equivalent Clearcut Area model uses on set of coefficients to describe the proportion of the total basal area removed for different disturbance types, including harvest prescriptions, wildfire, prescribed fire, roads, and insect mortality. A second set determines how fast the treated acres recover to 100 percent of potential leaf area or canopy closure, at which point the acre is assumed to have hydrologic function the same as an untreated acre. The physical model behind equivalent clearcut area as a cumulative-effects measure is that vegetation removal changes water yield characteristics (peak flow, timing, total yield) in rough proportion of leaf area or basal area removed from the site. Several studies have shown that timber harvest affects water yield by reducing water associated with interception and evapotranspiration, or by changing snow distribution and melt rates (Stednick 1996). The hydrologic changes may lead to destabilized stream channels and other adverse ecological effects (Reid 1993). The equivalent clearcut area statistic (percentage of area in equivalent clearcut condition) is typically used in conjunction with climactic data to evaluate the cumulative effects of vegetative removal on water yields and peak flows. The equivalent clearcut area statistic may also be used as a general guide to overall watershed condition when coupled with site-specific evaluations.

Forest Service Soil Disturbance Protocol (detrimental soil disturbance)

The Forest Service Soil Disturbance Protocol (Napper et al. 2009) was used to estimate the areal extent of existing detrimental soil disturbance of a sample set of proposed action activity areas (treatment units).

Total Soil Resource Commitment

An estimate of existing total soil resource commitment by each activity area was determined using existing GIS data layers and personal knowledge of existing locations of land uses that are in a non-productive (vegetative) commitment of soil resources.

Spatial and Temporal Context for the Effects Analysis

The Upper North Fork HFRA Ecosystem Restoration Project direct, indirect and cumulative effects analysis area for hydrology and soil resources is approximately 40,274 acre (63 square miles) in size and includes the Upper North Fork-Salmon River (170602030601) subwatershed and the Middle North Fork Salmon River (170602030602) subwatershed excluding the Dahlonega drainage. The area selected for direct, indirect, and cumulative analysis is selected because it encompasses all proposed activities and is geographically bound. Using watershed boundaries allows for the effects of proposed activities to be evaluated from the ridgetops to a single outlet point at the mouth of the drainage. The effects analysis uses two different temporal boundaries. The first temporal scale focused on short term direct and indirect effects is the year following treatments. The year following the majority of activities will best describe the peak of direct and indirect effects. For cumulative effects a much longer time period spanning 70 years from 1960 (see appendix C for a comprehensive list of past activities and events), when modern harvesting began, to 15 to 20 years beyond the proposed activities when there should be little trace of the proposed activities.

Measurement Indicators

- Compliance with State water quality standards and maintenance of beneficial uses (yes, no)
- Probability of erosion and sediment delivery to streams (percent probability)
- Potential for changes in timing and magnitude of water yield (yes, no)
- Detrimental soil disturbance (percent detrimental disturbance)
- Percent activity areas in total soil resource commitment
- Cumulative effects watershed risk rating combining existing condition, watershed sensitivity and degree of management as a comparison of the potential to experience adverse effects to water resources (low, moderate, high)

Table 44. Summary comparison of alternatives and how they meet direction in the Forest Plan

Forest Plan Direction	No Action (Wildfire)	Alt 1-Proposed Action	Alt 2- No New Temporary Road Construction
1-Compliance with State water quality standards	Not consistent with Forest Plan direction or desired future condition.	Meets	Meets
2-Fine Sediment levels	Not consistent with Forest Plan direction or desired future condition.	Meets	Meets
3-Water yield increases	Not consistent with Forest Plan direction or desired future condition.	Meets	Meets
4-Soil detrimental disturbance	Not consistent with Forest Plan direction or desired future condition.	Meets	Meets
5-Total soil resource commitment	Meets	Meets	Meets

Environmental Consequences

Proposed activities that could potentially affect soil and water resources include timber harvest, yarding and hauling forest products, road management, culvert replacements, stream habitat improvements, fire line construction and burning. Each alternative will be analyzed for the impacts of associated treatments in addition to past, present and reasonably foreseeable future actions. Each alternative considers the projected loss of vegetation due to insect, disease and catastrophic fire.

No Action Direct and Indirect Effects

The effects of taking no action relate to the build-up of fuels in the project area. The probable long-term consequence of not treating fuels is a large scale, high intensity wildfire. Predicting actual long-term effects from a major fire is difficult due to variability in location of fire and fuel types. The worst case scenario would concentrate a major wildfire in the Middle and Upper North Fork subwatersheds, in heavy timber, and remove the majority of vegetation which would create hydrophobic soil conditions in areas with heavy fuel accumulation. Appreciable changes in slope stability, runoff, and sediment delivery are likely to occur following a large-scale, high intensity wildfire.

Compliance with State Water Quality Standards and Maintenance of Beneficial Uses

The direct water quality effects of wildfire are usually associated with burned material or air dropped retardant entering a waterbody and potentially elevating water temperature or nutrient levels. The indirect effects include possible decreases in interception and infiltration, with possible increases in surface and mass erosion, nutrient loading, and sedimentation. Fire that includes significant amounts of high burn severity can greatly increase erosion rates. Elevated turbidity (suspended sediment) could also degrade water quality. Erosion and sedimentation rates due to wildfire typically recover to normal levels in 3 years for low severity fires, and 7 to 14 years for moderate and high severity fires, respectively (Robichaud et al. 2000).

In watersheds where fire suppression and succession have allowed forests to reach mature stages, water yields may approach a minimum level and decrease the amount of water available for irrigation. However, continued fire suppression may result in fuel buildups that could result in catastrophic fires that could ultimately impact channels through post-fire flood flows (Farnes et al. 2000).

Post-fire changes in streamflow regime could result due to changes in snow accumulation and melt patterns and evapotranspiration. Increased streamflow could result in short-term increases in the amount of water available for irrigation.

Modeled Probability of Erosion and Sediment Delivery

Wildfires burn indiscriminately without regards to mitigation normally associated with prescribed burning including buffer strips, fuel loadings and burn severity. Wildfires usually burn late in the summer when relative humidity and fuel moistures are low; even in the riparian areas. Because the buffer strips burn under these extreme conditions there would be a greater chance for the eroded materials to enter stream courses. The increased risk of sediment yield to streams is represented in the high probability of sediment yield predicted by the water erosion prediction project WEPP model (table 45, figure 11).

Table 45. Water erosion prediction project (WEPP) fuel management (FUME) modeling results

Unit Description			Sediment Yield (ton/year)					
			High Severity Wildfire		Moderate Severity Wildfire		Wildfire + Road Use	Prescribed Burn + Road Use
Burn unit	Acres	Road Density	Year of Event	Average Annual	Year of Event	Average Annual	Average Annual	Average Annual
1	2502.9	0.5	361.9	7.2	25.0	1.2	7.8	0.6
2	5657.3	1.2	2134.0	42.7	133.4	6.7	52.1	9.4
3	5450.8	0.7	1688.4	33.8	108.9	5.4	38.0	4.3
4	3556.6	0.6	1458.9	29.2	71.2	3.6	32.0	2.8
5	2617.3	2.1	1020.9	20.4	52.4	2.6	27.4	7.0
6	1136.3	1.1	341.8	6.8	22.8	1.1	8.3	1.4
7	2541.9	4	736.8	14.7	50.8	2.5	25.5	10.7
8	1660.7	3.3	663.0	13.3	33.2	1.7	20.8	7.5
9	2420.5	2.4	1040.3	20.8	48.4	2.4	29.9	9.1
10	1938.4	3.6	775.7	15.5	38.8	1.9	24.9	9.4
11	1615.9	5	451.6	9.0	16.1	0.8	18.1	9.1
12	1337.4	0.1	588.5	11.8	26.8	1.3	12.0	0.2
13	2991.9	0.4	1195.5	23.9	59.8	3.0	25.3	1.4
14	1940.2	1.3	620.5	12.4	38.8	1.9	15.4	3.0
15	2457.3	0.9	688.1	13.8	245.8	12.3	16.1	2.3

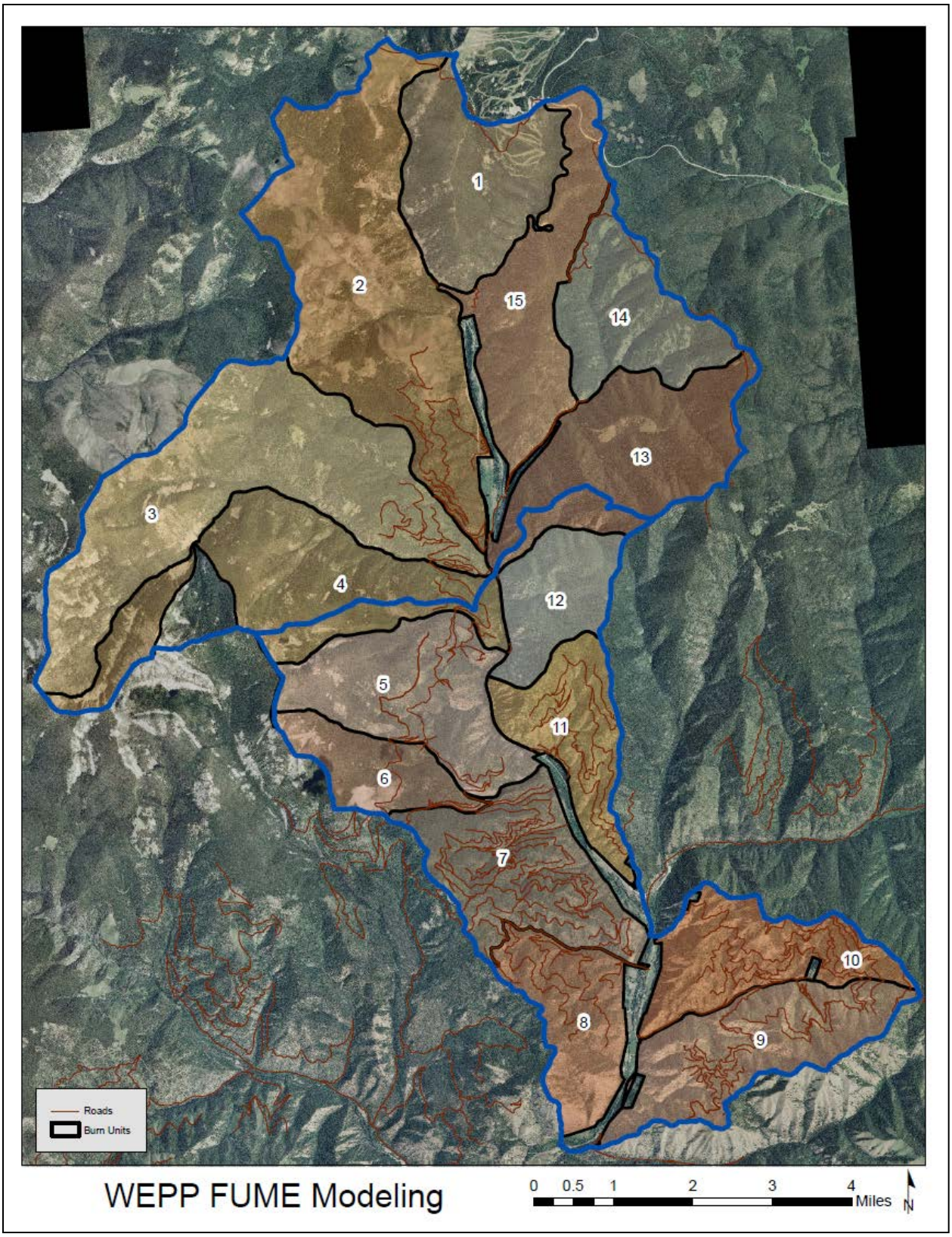


Figure 11. Water erosion prediction project (WEPP) fuel management (FUME) modeling prescribed burn units

The potential for adverse impacts to soil and water resources is greatest on landforms that have high inherent erosion hazard in combination with a high fire risk. The WEPP fuel management (FUME) module predicts that in a worst-case scenario of high severity wildfire there would be as much as a 350 percent increase in average annual sediment delivery over a prescribed fire scenario (table 45). In the event of a large-scale fire, effects would not be confined to the treatment units or the project area, and the magnitude of effects could result in detrimental impacts to the North Fork of the Salmon River.

Changes in streamflow regime due to changes in snow accumulation and melt patterns and evapotranspiration can also result. The significance of effects may vary as a function of parameters including but not limited to fire intensity and duration, soil characteristics, precipitation patterns, vegetative cover types, slope, and aspect. Any discussion addressing the effects of fire will relate to changes in slope and channel stability. A distinction should be drawn between prescribed burning and wildfire. Prescribed fire is a planned event designed to minimize effects to soil and water function. In watersheds where fire suppression and succession has allowed forests to reach mature stages, water yields may approach a minimum level. However continued fire suppression may cause fuel buildups that could result in catastrophic fires that ultimately impact channels through post-fire flood flows (Farnes et al. 2000).

Observations after the Clear Creek Fire of 2000 show that stream substrate sediment levels greatly increased over pre-fire conditions. Pre-fire data consisted of eight years of McNeil core sampling information, which identifies levels of fine materials (less than 0.64 cm in diameter) within spawning gravels. Pre-fire monitoring identified an average of 19 percent fines at depth. During the summer following the fire, a high intensity storm event carried fines from the burned hillslopes into Clear Creek, elevating levels of fines to 83 percent. Follow-up monitoring during July of 2002 indicated that substrate sediment levels at depth had recovered to 24 percent. A second high intensity storm event later that year once again increased depth fines to 83 percent. In 2003 the site became unmeasurable due to a much larger event that inundated the site with sediment and rerouted the channel.

Potential for changes in timing and magnitude of water yield

If no action is taken, the project area equivalent clearcut area would continue to decrease as stands mature to 30-years of age and older. In the subwatersheds where fire suppression and vegetative succession have allowed forests to reach mature stages, water yields (baseflows and peakflows) may approach a minimum level. Continued fire suppression may result in fuel buildups that could result in catastrophic fires and ultimately impact channels due to post-fire flood flows and sediment delivery (Farnes et al. 2000).

There is potential for a large increase in equivalent clearcut area in the event of large scale, stand-replacing fire in the project area. Post-wildfire increases in equivalent clearcut area could result in changes in the magnitude and timing of spring-early summer peakflows, and late summer-fall baseflows. Increases in the magnitude and duration of peakflows could result in channel morphology changes and streambank erosion. Decreased baseflows could result in low flow fish migration barriers and increased water temperatures.

In the wildfire scenario described for no action, it is expected that 50 percent of the forested ecosystems would experience high fire severity and increase the equivalent clearcut area from less than 5 percent to over 50 percent of the subwatershed.

The effects of high severity wildfires and runoff and erosion are generally much more severe than the effects of prescribed fires. High severity fires are of particular concern because protective cover is lost and soils develop fire-induced water repellency which can induce severe flooding and erosion even after moderate rain events. In most cases, the decline in soil water repellency and vegetative regrowth means

that these large increases in runoff and erosion diminish quite rapidly. Most long-term studies show no detectable increase in erosion by about 4 years after burning.

Analysis of Haul Routes

There would be no direct effects because no hauling would occur. In the event of a wildfire some routes would be opened with bulldozers and receive moderate to heavy traffic during fire suppression activities. Fire suppression activities have the potential to increase the road density, drainage density (the network of channels draining a watershed can be increased by midslope capture of water on improperly built roads altering the time of travel though the system) and contribute to stream sedimentation. It is not possible to quantify these effects without knowledge of the fires location, size, and suppression tactics.

Detrimental Soil Disturbance

With a wildfire scenario there is potential for a large increase in detrimental soil disturbance. The Mustang Fire of 2012 resulted in 18 percent high severity fire with high heat pulses damaging the soil. A similar percentage of the project area would be expected to be detrimentally disturbed if a wildfire occurred in the project area.

Total Soil Resource Commitment

If taking no action, there will be no building or decommissioning of system and non-system routes or construction of landings. The percent of total soil resource commitment for each subwatershed will remain the same as the current condition at 0.5 percent for the Upper North Fork subwatershed and 1.9 percent for the Middle North Fork subwatershed.

Cumulative Effects and Watershed Risk Rating

A watershed risk rating based on watershed relief, road density, channel stability, and equivalent clearcut area was used to calculate the current cumulative effects for hydrologic and aquatic resources in each project subwatershed (Table 46).

Table 46. Watershed risk rating for the Upper North Fork Ecosystem Restoration Project

	No Action Current Condition	**No Action Wildfire**	**Alternative 1 Proposed Action**	**Alternative 2 Proposed Action**
Subwatershed	**Risk Rating**	**Risk Rating**	**Risk Rating**	**Risk Rating**
Upper North Fork	Low basin relief <30% road density 1.4mi/mi^2 Equivalent Clearcut Area <5%	High basin relief <30% road density 1.4mi/mi^2 Equivalent Clearcut Area >50%	Low-Moderate basin relief <30% road density 1.2mi/mi^2 Equivalent Clearcut Area 10-15%	Low-Moderate basin relief <30% road density 1.2mi/mi^2 Equivalent Clearcut Area 10-15%
Middle North Fork	High basin relief <30% road density 5.0mi/mi^2 Equivalent Clearcut Area <5%	High basin relief <30% road density 5.0mi/mi^2 Equivalent Clearcut Area >50%	Moderate-High basin relief <30% road density 2.9mi/mi^2 Equivalent Clearcut Area 15-20%	Moderate-High basin relief <30% road density 2.9mi/mi^2 Equivalent Clearcut Area 15-20%

Taking no action would treat nothing, and would not cumulatively impact watershed function. Under the no action scenario considering a large wildfire event the risk of cumulative impacts becomes much higher. When the effects of no action with wildfire scenario are combined with the past and foreseeable future

effects of management activities (see appendix C for a comprehensive list of past, present and foreseeable activities and events), insects and disease there is potential for increased impacts to soil and water resources. The loss of vegetation from insects and disease can reduce evapotranspiration and interception, which in turn reduces detainment and storage of rainfall and changes snow distribution, accumulation, and melt rates. The risk of effects from wildfire can be amplified by the high rates of mortality resulting from a mountain pine beetle epidemic. A heat pulse to the soil would likely be greater due to the accumulation of fuels from beetle-killed trees. With the increased tree mortality there would be a higher risk of crown fire making a larger burn area more likely and amplifying the hydrologic effects.

Alternative 1- Proposed Action

Direct and Indirect Effects

Compliance with State Water Quality Standards and Maintenance of Beneficial Uses

Proposed activities such as cutting vegetation and prescribed burning have the potential to disrupt the nutrient cycle and may accelerate dissolved nutrient leaching and loss via streamflow. Exposing sites to direct sunlight may increase the amount of nitrogen mineralization. Phosphorous is commonly associated with eroded soil particles and sediment and may be lost from the site. Usually, there is minimal opportunity for a buildup of these nutrients in the stream system after a harvest because of the normally brief period of increased nutrient flux to the stream. Throughout the United States, studies have found that nutrient losses from silvicultural activities are minimal and water quality was not affected.

In general, nutrient mobility from disturbed forests follows the order; nitrogen-potassium-calcium-magnesium-phosphorous. Thus, forest harvesting or other disturbances, such as fire, generally produce larger differences in nitrogen concentrations in streamwater than in other constituents.

If vegetation is reestablished quickly, nutrient exports are short-lived and do not represent a threat to water quality or site productivity. Minimization of site disturbance areas would reduce potential soil erosion and allow for quick vegetation establishment. Pacific Anadromous Fish Strategy riparian habitat conservation area buffers proposed for this project have proven to be effective in removing sediment from upslope overland flows and nutrients from surface and subsurface flows.

Prescribed burning would occur in the spring or fall when the soil moisture conditions would minimize heat conductivity into the soils. Pacific Anadromous Fish Strategy riparian habitat conservation area buffers along stream channels would provide shade for stream temperatures and provide filter strips for sediment and nutrients maintaining state water quality standards and protecting downstream beneficial uses.

The proposed activities include aquatic habitat improvements and culvert replacements, which if implemented, would enhance beneficial uses within the analysis area. Culvert replacements are proposed on Hammerean Creek, Deep Creek and Johnson Creek to allow for aquatic organism passage including all life stages of fish. The new culverts would be designed with a natural stream substrate bottoms and bankfull channel widths to allow continuity of channel morphology and floodplain process through the structure. Large flow events (100 year) and debris would pass easily reducing the need for annual maintenance. In addition to culvert replacements, stream restoration activities would be conducted on the North Fork River to help restore spawning and rearing habitat for Chinook salmon, steelhead and rainbow trout, bull trout and westslope cutthroat. The rock structures would enhance salmonid spawning and coldwater aquatic biota beneficial uses by creating pool and pool tailout habitat needed for spawning and rearing salmonids.

Modeled Probability of Erosion and Sediment Delivery

The proposed activities have the potential to increase the probability of erosion and sediment delivery to streams. In order to estimate to the potential effects and evaluate differences between alternatives the Forest Service Disturbed WEPP Interface for the WEPP model was used to estimate erosion and sediment delivery from treatment units. WEPP is a physically-based soil erosion model that can provide estimates of soil erosion and sediment delivery, considering the specific soil, climate, ground cover, and topographic conditions and treatment.

Best management practice reviews of past projects have shown that Forest Plan filterstrips provide effective buffers (undisturbed soil and vegetation) to capture sediment before it reaches a stream in the event that there is erosion and transport from the treatment unit. However, the Pacific Anadromous Fish Strategy (USDA Forest Service 2005) was amended to the Forest Plan, and the riparian habitat conservation area buffers in the Pacific Anadromous Fish Strategy are often wider than the Forest Plan filterstrips. The riparian habitat conservation area buffers provide sediment filtering as well as other ecological functions (e.g. large woody debris recruitment, riparian habitat, floodplain function, insect production, and instream detritus).

In the Proposed Action, harvest units were designed so that the standard Pacific Anadromous Fish Strategy buffers were excluded from the treatment units with the exception of units where a road prism in combination with the Forest Plan filter strip would intercept overland flow before it reached a stream channel. WEPP modeling of a typical hillslope profile (figure 12) shows that the majority of sediment transported from a treated slope and road prism cutslope would be deposited on the road surface and that the forested filter strips are effective in capturing any additional sediment leaving the road prism.

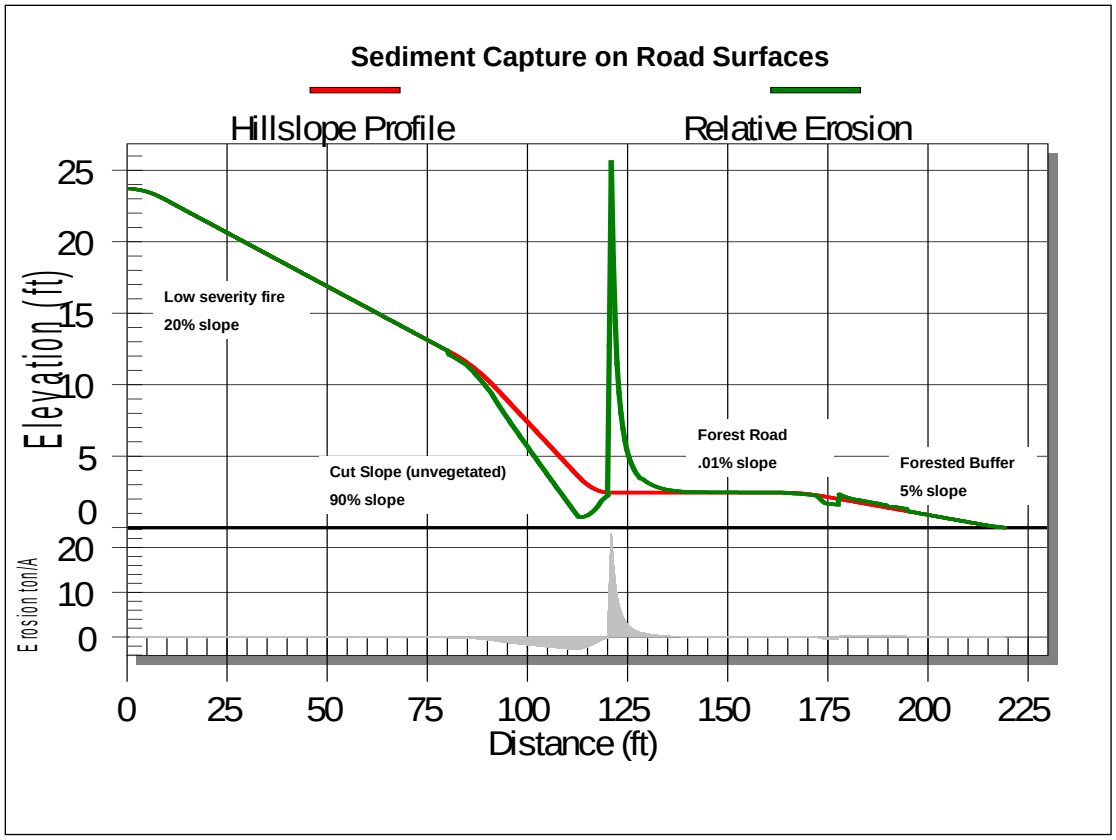


Figure 12.Typical slope profile displaying deposition on road surface and effectiveness of forested buffer

Harvest activities within the delineated riparian habitat conservation areas of these units would maintain the Pacific Anadromous Fish Strategy riparian management objectives for pool frequency, water temperature (i.e. no measurable increase in maximum water temperature), large woody debris (i.e. more than 20 pieces/mi, over 12 inches diameter, over 35 feet long), bank stability (more than 80 percent stable), lower bank angle (more than 75 percent with less than 90° angle), and channel width to depth ratios (under 10). The Pacific Anadromous Fish Strategy riparian management objectives were designed to protect aquatic habitat and channel morphology, and promote desired channel, riparian, and floodplain characteristics.

The WEPP model uses the buffer length, soil type, average slope, percent ground cover, and climate data to predict the probabilities of erosion and sediment yield occurring within the first year following treatment when the units would be most vulnerable to the effects of high intensity storms. The objective of the unit buffers was to minimize the percent probability that there would be sediment delivery in the first year following treatment.

Mean annual averages, probabilities of occurrence in the first year following disturbance, and buffer effectiveness during large storm events were estimated for a representative hillslope profile for each treatment unit.

Results of the analysis predict that average probability of sediment reaching a stream channel the first year following a disturbance would be less than 1 percent, values ranged from 0 to 4 percent probability. Buffer effectiveness was shown to be highly effective with an average of 93 percent effectiveness. See table 8 in the soils and hydrology report, located in the project record for a unit-by unit breakdown.

Given the unit layout and design criteria of the proposed activities there is a high probability of success for minimizing erosion and retaining or capturing any sediment before it can enter streams within the Upper North Fork Project area.

Potential for Changes in Timing and Magnitude of Water Yield

The proposed action includes the removal of forest cover and has the potential to decreases interception and transpiration, and increase annual water yields. The increases in annual water yield following forest harvest are usually assumed to be proportional to the amount of forest cover removed, but at least 15 to 20 percent of the trees must be removed to produce a statistically detectible effect (Stednick 2010). In areas where the annual precipitation is less than 18 to 20 in, removal of the forest canopy is unlikely to significantly increase water yields (Stednick 2010). In drier areas, the decrease in interception and transpiration is generally offset by the increase in soil evaporation, and there is no net change in runoff as long as there is no change in the underlying runoff process (Stednick 2010). No measurable increase in runoff can be expected from thinning operations that remove less than 15 percent of the forest cover or in areas with less than 18 in of annual precipitation (Stednick 2010). Since evapotranspiration rapidly recovers with vegetative regrowth in partially thinned areas, any increase in runoff due to thinning operations is likely to persist for no more than 5 to 10 years (Stednick 2010). The Upper North Fork subwatershed has an average annual precipitation of 25 to 40 inches and would treat between 10 to 15 percent of the forested area and is not likely to see measurable change in water yield. The Middle North Fork subwatershed has an average annual precipitation of 15 to 25 inches of precipitation and would treat between 15 to 20 percent. The modeling suggests that the Middle North Fork subwatershed is on the verge of showing a detectible change in flows. There will not likely be a measurable change in flows in the Upper North Fork subwatershed as a result of the proposed activities. The Middle North Fork subwatershed has the potential to show a statistically detectable change in flow as a result of the proposed activities. The change may be detectable but will be small and short lived and is not expected to alter channel morphology or stream temperatures.

The potential for changes in timing of increases in runoff due to the proposed activities is important because of the potential impact on water supplies, sediment transport capacity, bank erosion, and aquatic ecosystems. In snow-dominated environments like Upper North Fork, nearly all of the increases in runoff would occur in early spring. Forest harvest reduces summer evapotranspiration and increases the amount of soil moisture carryover. Less snowmelt is needed for soil moisture recharge, so more of the early season melt is converted into runoff. The reduction in forest canopy also increases the amount of solar radiation that reaches the surface of the snowpack and the transfer of advective (conveyance via air movement) heat, and these changes increase the rate of snowmelt and may slightly accelerate the timing of peak runoff. Some change in timing would be expected from both the beetle epidemic and proposed activities, however effects would be minimal based on the silviculture prescription and design of this project.

Research suggests (Stednick 2010) that light to moderate prescribed fire has little effect on streamflow. This is largely because only a small percentage of the vegetation is affected and net changes in infiltration characteristics are minimal. Since the major components of the water balance are not substantially altered, there is little or no effect on streamflow.

One can conclude that fuel reduction treatments in forested watersheds would probably have little detectable impact in water yields either on-site or downstream. Most prescriptions are not likely to remove the 20 percent of basal area that is needed in most areas to generate a detectable change in flow. In cases where there would be a detectable hydrologic response to fuel management treatments, the observed response would be greatest in wet years and smallest or non-detectable in dry years. Fuel reduction treatments that are carefully implemented and do not induce overland flow as a result of skid trails or compaction should generally have little or no detectable effect on peak discharges.

Figure 13 and figure 14 display the pre-project and post-project equivalent clearcut area as a percentage of the Upper North Fork and Middle North Fork Creek subwatersheds. The equivalent clearcut area in Middle North Fork peaked in 1982 with about 27 percent of the subwatershed in a hydrologically immature condition. With less opportunity for harvest the equivalent clearcut area in Upper North Fork peaked in 2005 with about 6 percent of the subwatershed in a hydrologically immature condition. Recovery has outpaced harvest allowing trees in both subwatersheds to mature. Currently more than 95 percent of the subwatersheds encompassing the project area are in a mature condition. The equivalent clearcut area in Middle North Fork could reach as high as 15 percent and the Upper North Fork as high as 10 percent depending on the timing of harvest and burning. Because these estimates are below the 20 percent threshold no measurable changes in water yield are expected.

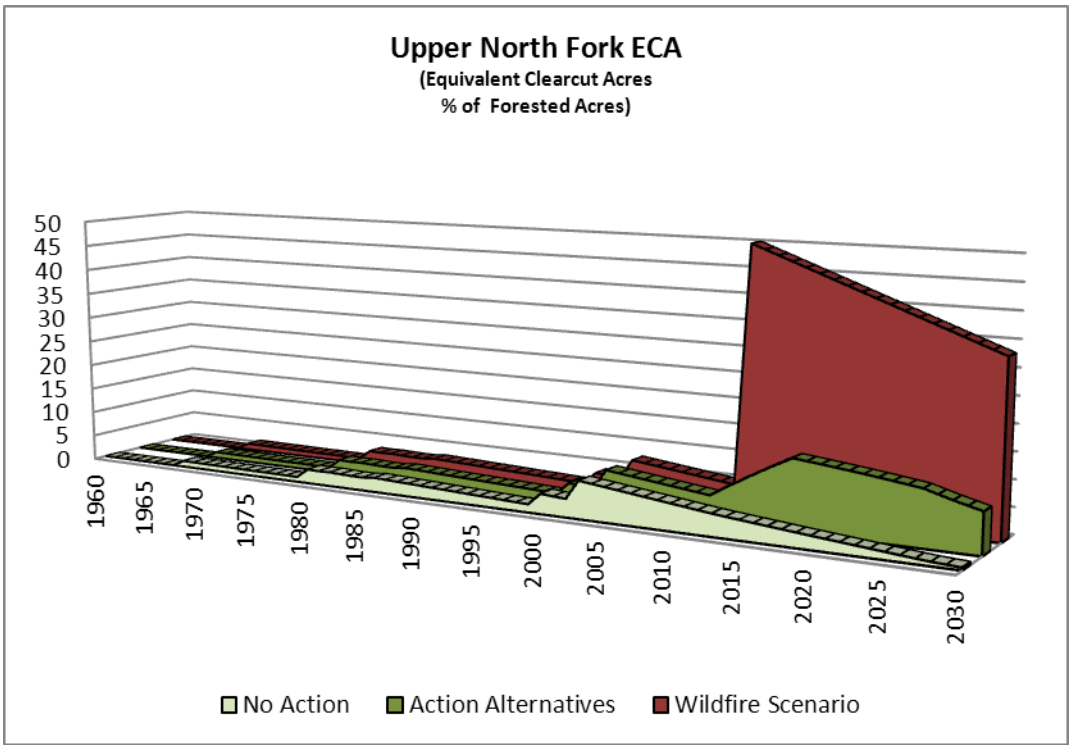


Figure 13. Percent of forested area in equivalent clearcut area in the Upper North Fork subwatershed over time

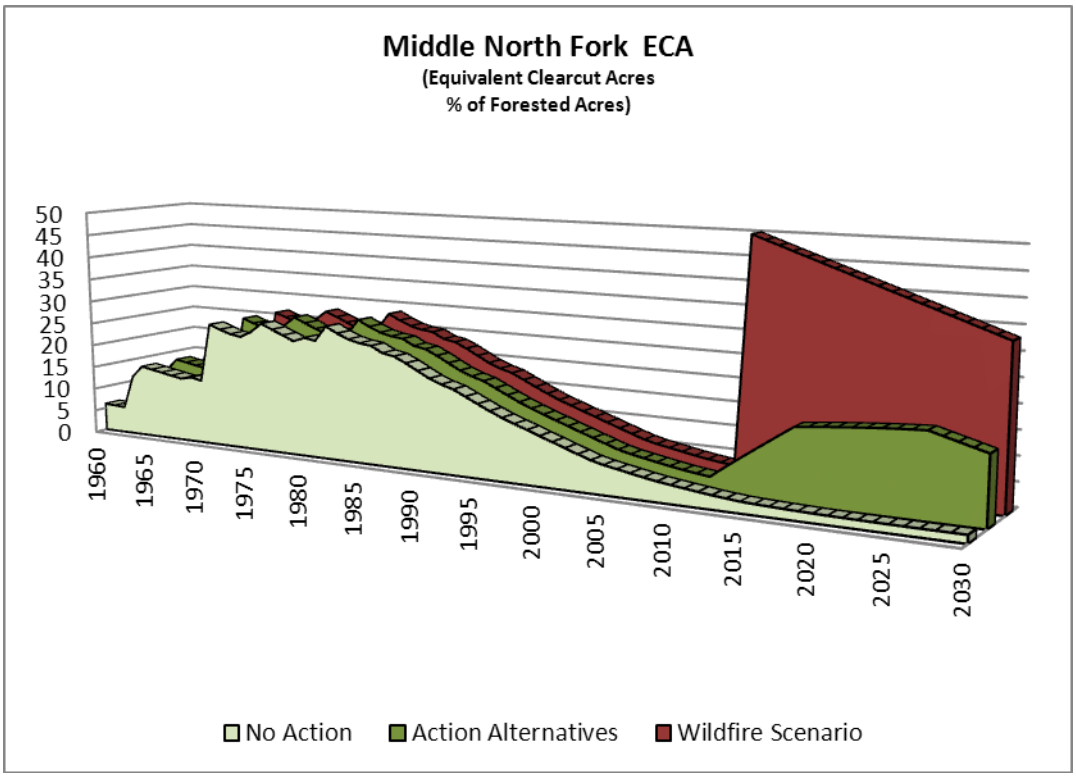


Figure 14. Percent of forested area in equivalent clearcut area in the Middle North Fork subwatershed over time

Analysis of Haul Routes

Roads can affect hydrologic functions and resultant water quality by altering groundwater interception, runoff distribution over time and space, and the potential for sediment production and delivery to streams. The risks of a road affecting water yield and quality are largely determined by location, maintenance level, dimensions, and surfacing. Road density, expressed as miles per square mile, provides an index of the overall potential for roads to affect watershed function. In general, watersheds or subwatersheds with less than 30 percent watershed relief (30 percent average drainage slope from upper end to lower end) and road density of three miles per square mile or less are considered to have low risk for the overall potential for roads to affect watershed function (USDA Forest Service 1993). The road density within the Upper North Fork project area is 1.4 mi/mi^2 in the Upper North Fork subwatershed and 5.0 mi/mi^2 in the Middle North Fork subwatershed.

Forest roads are needed to conduct the prescribed burning, thinning, and timber harvest operations proposed in this alternative. These compacted road surfaces typically have very low infiltration rates and, as a result generate large amounts of surface runoff. Road surfaces are subjected to rain splash, and the combination of rain splash with large amounts of surface runoff results in surface erosion rates that are several orders of magnitude higher than the adjacent undisturbed forest. Research has consistently shown that roads have the greatest effect on erosion of all practices associated with forest management.

Runoff can detach and transport the fine material available on native material road surfaces, without vehicle traffic, the sediment concentration in the road decreases over time. However, vehicle traffic, especially heavy trucks, can crush surface aggregate material and this generates more fine particles that are available for transport by runoff. In addition, the pressure of tires on saturated road aggregate can move fine particles up to the road surface. Higher use also is associated with more frequent maintenance operations, and grading increases the amount of available sediment and road erosion rates.

Haul routes and their proximity to streams are variable throughout the project area. Airborne delivery of fine sediment to streams would vary depending on many factors including the proximity to a stream, slope, vegetative cover, prevailing wind and season. Research by Randy Foltz, USDA Forest Service, Rocky Mountain Research Station, Forestry sciences Laboratory, Moscow, ID, and others has shown that if road blading is reduced, sediment that reaches streams is reduced.

Water or magnesium chloride could be used to minimize the loss of road surface through dust, reduce the number of bladings needed to maintain the road surface and eliminate the need for continuous water applications. Additionally the treated roads would require less maintenance and fewer bladings further reducing surface loss and sediment potentially available to streams.

Fines generated from increased road activity are generally airborne and fall out adjacent to the road and accumulate on the leaves of nearby vegetation. Typically dust settles quickly and is not transported far from the road. Dust and fine sediment are transported from the vegetation and incorporated into the forest floor during precipitation events. Typically airborne particles only reach streams if they settle directly on the water surface. Sediment generated from hauling and road maintenance are not expected to measurably increase turbidity or levels of fine sediment in the Upper North Fork Project area or negatively impact downstream beneficial uses.

On low-use forest roads, vegetation is allowed to grow on the running surface to reducing road-generated sediment. These “brushed-in” roads generally have sediment production rates that are a tenth of the rates for bare roads with traffic. Access for fuel management activities would likely require that these brushed-in roads be reopened by scraping the vegetation off the running surface and to some degree, the cut and fill slopes.

Like road construction, road obliteration typically causes a spike in sediment production that decreases rapidly after the activity ends.

For roads immediately adjacent to a stream, much of the road-generated sediment is delivered directly to streams. However, when a sufficient forest buffer is located between the road and the stream, much of the sediment may be deposited on the forest floor. In addition to road location, road-stream connectivity can be increased because the concentrated runoff from roads can increase the drainage density.

Actions recommended by the roads analysis and included in the proposed action that would improve watershed conditions would include decommissioning roads by recontouring road templates and stabilizing with native vegetation, and reducing traffic or maintenance on roads adjacent to streams. In addition to roads used for the proposed action unauthorized routes that are not needed for public access or administrative use would be decommissioned to improve watershed conditions. Surveys were conducted on these unauthorized routes to identify problem areas, develop closure prescriptions, and prioritize routes for closure. Generally speaking, decommissioning roads by recontouring to establish original drainage would be the preferential treatment. However, in most cases, the roads identified for decommissioning are well vegetated and closed to traffic. In these cases, a less disturbing method of decommissioning by treating only the entrance may be preferred.

Detrimental Soil Disturbance

Detrimental disturbance effects depend on a combination of factors such as existing ground cover, soil texture, timing of operations, equipment used, skill of the equipment operator, the amount of wood to be removed, and sale administration. Forest Plan disturbance guidelines are evaluated after the completion of all management activities including mitigation measures, such as, ripping skid trails and landings, redistributing berm and slash onto roads and skid trails, redistributing soil and slash on firelines, and installing waterbars. Harvest intensity also affects the amount of soil disturbance. Even though 15 percent of a stand may be impacted by skid trails and landings not all areas that are impacted are detrimentally disturbed. Thinning within proposed vegetation treatment units is designed to avoid detrimental soil impacts. This goal is achieved by implementing mitigation and design features as best management practices and soil and water conservation practices. The design features and management practices would minimize the extent of compaction, rutting, puddling, and displacement.

Tractor Harvest

Soil compaction and displacement at landing sites and on main skid trails are expected due to equipment operations. Soil displacement is expected to be small and localized and may occur where logs are lifted from the forest floor or at landings. Detrimental effects can be long-lasting. However, the impacts of compaction depend largely on site conditions affecting air and water balance in the rooting zone (Powers et al. 2004; Page-Dumroese et al. 2006). Compaction is not expected to be an issue in these units due to the high rock fragment content and sandy loam soil texture. In addition, areas that do become compacted or displaced would be rehabilitated by scarifying or ripping the soil to restore proper water infiltration, redistributing displaced topsoil, seeding with native species, and constructing waterbars. Plant root expansion, freeze and thaw cycles, and rodent activities would continue to rework the soil to improve soil structure.

Approximately 170 acres are at risk of increased soil disturbance. Small, localized areas may have reduced soil productivity in the first 10 years following harvest as vegetation becomes re-established and organic layers rebuild. Areas of reduced productivity include skid trails, landings, and firelines. However, rehabilitation is prescribed to limit the severity of soil damage and its aerial extent.

Loss of groundcover and organic matter at landing sites and on main skid trails is expected due to equipment operations. However, the Proposed Action is designed to leave a variety of organic matter on site. Vegetation and organic matter protects the soil surface from raindrop impact, dissipates energy of overland flow, binds soil particles together, and dampens soil temperature extremes and daily fluxes. Studies have found that 60 percent effective ground cover reduced sediment movement substantially and 30 percent ground cover reduced erosion by 50 percent compared to bare soil (Robichaud et al. 2000). Logging slash would add to effective ground cover until fine logging slash decomposes over several decades (Clayton 1981). Any increase in groundcover and fine logging slash through harvest may be offset by fuel treatments. Fuel treatments may reduce the amount of organic matter and groundcover in the short term (0 to 5 years after treatment) through the use of fire and slash pile burning. In the long term (greater than 5 years) regrowth of vegetation and needle drop would provide groundcover and leaf and litter material for conversion into soil organic matter.

Skyline Harvest

Soil compaction and displacement in skyline corridors and at landings is expected due to equipment operations and corridor convergence. Soil disturbance occurs when moving trees to and within the corridor. These corridors are narrower than skid trails caused by ground-based equipment with an average spacing of 200 feet. Skyline logging soil disturbance may be greatest at the landings where logs are no longer suspended and corridors converge. These effects can be minimized by ensuring good suspension of the log and avoiding wet soil conditions. Soil mitigation for skyline yarding include construction of waterbars and covering areas of bare soil within the corridors with slash where needed in order to minimize the risks of soil erosion.

Small, localized areas within the skyline corridor may have reduced soil productivity in the first 10 years following harvest as vegetation becomes re-established and organic layers rebuild. Areas of bare soil are expected to be short and discontinuous. Other areas of reduced soil productivity include landings and burn piles. However, rehabilitation is prescribed to limit the severity of soil damage and its aerial extent.

Precommercial Thinning

Precommercial thinning activities would not impact the soil resource. All work would be accomplished with hand tools so there would be no increases in soil compaction or other detrimental changes in soil physical properties.

Pile Burning

Pile burning would occur where hand or machine piles remain after treatment and biomass utilization. It is not anticipated to have large adverse effects to soil productivity. Burning of large slash piles may sterilize the underlying soil because heat is retained in the pile. This could cause small, localized areas of soil sterilization, reduced water infiltration, and lost groundcover.

Prescribed Burn Units

Approximately 40,273 acres will be burned to reduce hazardous fuel buildup. Impacts to the soil resource as a result of a high severity fire can result in significant changes in physical, chemical, and biological properties. These include breakdown in soil structure, reduced moisture retention and capacity, development of water repellency, changes in nutrient pools cycling rates, atmospheric losses of elements, offsite erosion losses, combustion of the forest floor, reduction or loss of soil organic matter, alterations or loss of microbial species and population dynamics, reduction or loss of invertebrates, and partial elimination (through decomposition) of plant roots (USDA Forest Service 2005).

The prescribed burns are designed to be low intensity, low to moderate severity fire based on parameters specified in the prescribed burn plans. Fire intensity and fire severity are not synonymous. Fire intensity

is concerned mainly with the rate of aboveground fuel consumption and energy release rate. Fire severity is a more qualitative term used to describe the effects of fire on soil and other ecosystem resources. Severely burned soils are identified by ratings of fire severity and the effects to the soil resource (Ice et al. 2004, USDA 2005).

The effects of the prescribed burn treatment would be similar to a low severity wildland fire that reduces fuels while not killing most of the live trees, shrubs, and other forest vegetation. Widespread heating that would adversely change soil physical, chemical and biological properties would not be expected during this project. Mixed severity fire could occur where pockets of dense trees exist. Localized soil charring under and immediately adjacent to large accumulations of downed woody debris would be expected. Burning in spring would reduce adverse effects caused by high soil heating such as hydrophobic conditions, loss of nutrients through volatilization, and loss of microorganisms necessary for nutrient cycling. Soil organisms necessary to recycle nutrients would remain available on the burned sites.

Bacteria, Nitrosomas bacteria, and fungi are relatively sensitive to the increased soil temperatures encountered with light to moderate intensity fire, whereas sulfur, soil structure, soil wettability, nitrogen, and organic matter are only moderately sensitive (DeBano et al. 1991). The risks to soil organisms drops when soil moisture content is less than 15 percent and the duration of the heat is less than 30 minutes. Burning prescriptions would be carefully written and implemented to take these as well as other resource limitations into consideration.

Total Soil Resource Commitment

With this alternative approximately 67.9 miles of “unauthorized” roads will be decommissioned. By decommissioning roads the total amount of total soil resource commitment will be reduced. By Decommissioning 68 miles of road approximately 150 acres of national forest system land will be returned to production. In the Upper North Fork subwatershed 7.2 miles of road would be decommissioned reducing the total resource commitment from 0.5 percent to 0.46 percent. The Middle North Fork subwatershed would see a reduction of 60.6 miles reducing the Total Soil Resource Commitment from 1.9 percent to 1.1 percent.

Cumulative Effects

Other on-going, past and proposed activities that could affect soil and water resources include, timber sales, insects and disease, special uses, mining, wildfires, firewood cutting, and noxious weed treatments. Figure 15 and figure 16 display major past disturbances (harvest, roads and wildfires) within the project area considered in this cumulative effects analysis. See appendix C for a comprehensive list of past, present and foreseeable activities and events considered in this analysis.

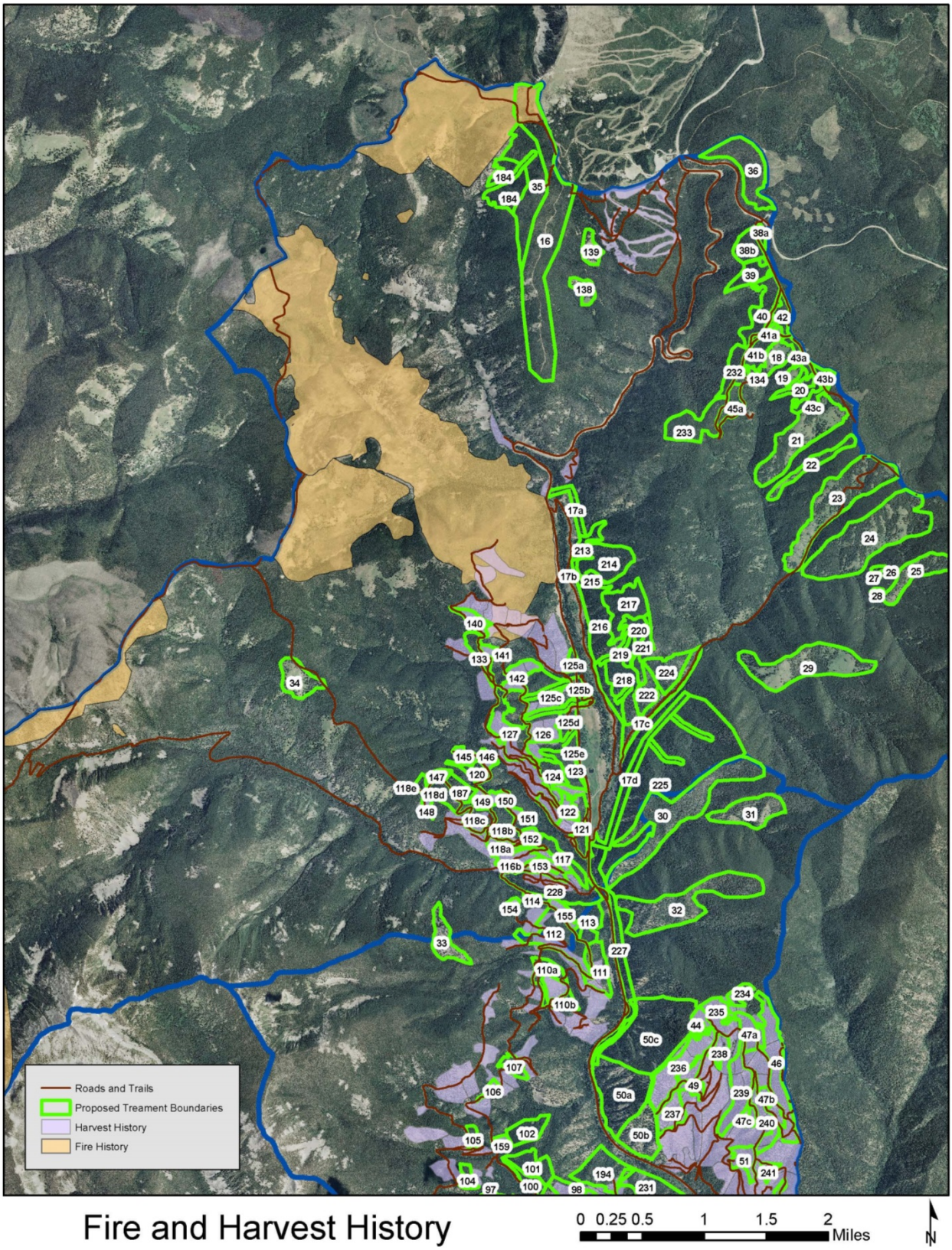


Figure 15. Past disturbances, north half of the project area

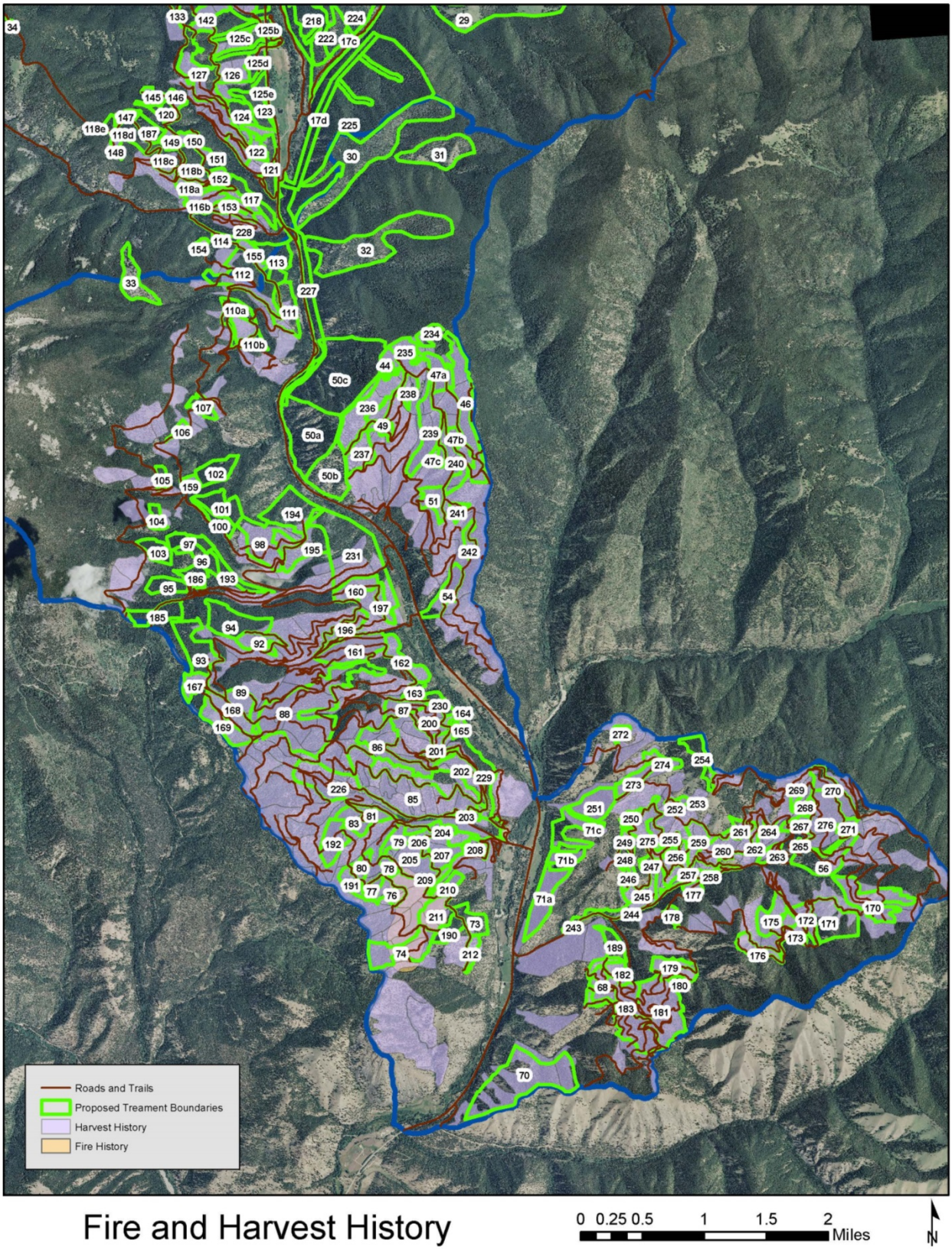


Figure 16. Past disturbances, south half of the project area

A watershed risk rating based on watershed relief, road density, channel stability, and equivalent clearcut area was used to calculate the current cumulative effects for hydrologic and aquatic resources in each project subwatershed (table 46). The Upper North Fork subwatershed would see an increase in equivalent clearcut area over a period of time. The increase would be from 5 percent to 10 percent at its peak and would be under the threshold that we would expect to see measurable change in flow. Road densities would be reduced from 1.4mi/mi^2 to 1.2mi/mi^2 improving watershed condition. The overall cumulative risk rating would be somewhat elevated from the existing condition however the resiliency of the watershed would be much improved by protecting it from wildfire and reestablishing a more natural fire regime. The Middle North Fork subwatershed would similarly see an increase in equivalent clearcut area from 5 to 15 percent at its peak which is the point where we expect of begin to show a detectible change in timing and magnitude of flows. Road density would be reduced from 5.0 mi/mi^2 to 2.9 mi/mi^2, a significant reduction that would certainly improve watershed function. The net result is a reduced watershed risk rating and an improved condition in the watershed.

When the effects of the Proposed Action are combined with the past and foreseeable future effects of insects and disease there is potential for an increased risk of hydrological effects of removing large stands of trees from a watershed. The loss of vegetation from insects and disease can reduce evapotranspiration and interception, which reduces detainment and storage of rainfall and changes snow distribution, accumulation, and melt rates. Changes in timing and melt rates could negatively affect riparian habitat by causing bank instability and mobilizing sediment until a new equilibrium is reached.

Roads can alter the drainage density, and the timing and synchrony of stormflow and snowmelt runoff, resulting in an increase in the number and/or magnitude of peakflow events. The Proposed Action would extensively reduce current road densities.

The present level of firewood cutting would have no effect on water resources. Public pioneering of roads to gather firewood could affect water resources depending on the extent and location of pioneered roads.

Noxious weed treatments have the potential to affect water quality by killing streamside vegetation and reducing the effectiveness of the filter strips. If procedures found in the *Programmatic Biological Assessment: Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest* (USDA Forest Service 2002) are followed, no increased adverse effects to water quality are expected under Alternative 1 - Proposed Action.

Alternative 2- No New Temporary Road Construction

Direct and Indirect Effects

Compliance with State Water Quality Standards and Maintenance of Beneficial Uses

The proposed activities have the potential to affect water quality and beneficial uses. The activities proposed in alternative 2 are similar to those proposed in alternative 1. Prescribed burn acres would be the same, seventy six acres of commercial thin units would be converted to non-commercial fuels treatments and fuel breaks, and 14.5 miles of new temporary road would not be constructed. Since the scale and range of activities would be essentially the same the effects would be expected to be the same as well. The descriptions of potential effects in the Proposed Action would hold true for alternative 2. One difference related to beneficial uses in alternative 2 is that alternative 2 proposes complete removal of the Hammerean culvert and closing a short section of road (60449) at the crossing. Similar to culvert replacement, removal would restore aquatic organism passage. However, removal would be a better long term solution for the hydrologic function of Hammerean creek and the riparian corridor. Allowing floodplain continuity would allow for a continuous band of riparian vegetation that would dissipate flood

flows and provide a corridor for wildlife movement. Closing the road at Hammerean creek would additionally elevate the annual maintenance problem at the Hammerean slide area and reduce the potential for the slide feature to be a continual sediment source.

Modeled Probability of Erosion and Sediment Delivery

The proposed activities have the potential to increase the probability of erosion and sediment delivery to streams. The probability of erosion and sediment delivery would be the same as described above in the proposed action alternative. One notable difference is the 14.5 miles of new temporary road construction would not occur under this alternative. With fewer miles of new temporary road construction and fewer acres of commercial harvest alternative 2 would have lower probability to contribute sediment to streams.

Potential for changes in timing and magnitude of water yield

The proposed action includes the removal of forest cover and has the potential to decrease interception and transpiration, and increase annual water yields. The potential for changes in timing and magnitude of water yield would be the same for alternative 2 as the Proposed Action. Figure 13 and figure 14 display the pre-project and post-project Equivalent Clearcut Area as a percentage of the Upper North Fork and Middle North Fork Creek subwatersheds. The Equivalent Clearcut Area in Middle North Fork could reach as high as 15 percent and the Upper North Fork as high as 10 percent depending on the timing of harvest and burning.

Analysis of Haul Routes

Roads can affect hydrologic functions and resultant water quality by altering groundwater interception, runoff distribution over time and space, and the potential for sediment production and delivery to streams. Alternative 2 proposes no new temporary road construction. This difference results in constructing 14.5 fewer miles of temporary road than the Proposed Action. The potential for erosion and sediment delivery from road surfaces would be less than the proposed action for the short period the temporary roads would have existed (1 to 2 years). Other aspects related to roads such as road densities and hauling would be the same as the proposed action.

Detrimental Soil Disturbance

Alternative 2 includes tractor harvest, skyline harvest, precommercial harvest, pile burning, and prescribed burning, activities that have the potential to detrimentally disturb soils. In alternative 2 there would be 76 fewer acres of commercial harvest than in the Proposed Action, reducing the potential for detrimental disturbance. This area amounts to a reduction of approximately 1.6 percent of the potential for detrimental disturbance associated with the Proposed Action. Apart from a 1.6 percent reduction in potential area the effects would be the same as the Proposed Action. With this alternative approximately 67.9 miles of “unauthorized” roads would be decommissioned. By decommissioning roads the total amount of total soil resource commitment would be reduced. By decommissioning 68 miles of road approximately 150 acres of National Forest System land would be returned to production.

Total Soil Resource Commitment

With this alternative approximately 67.9 miles of “unauthorized” roads will be decommissioned. By decommissioning roads the total amount of total soil resource commitment will be reduced. By Decommissioning 68 miles of road approximately 150 acres of national forest system land will be returned to production. In the Upper North Fork subwatershed 7.2 miles of road would be decommissioned reducing the Total resource commitment from 0.5 percent to 0.46 percent. The Middle North Fork subwatershed would see a reduction of 60.6 miles reducing the total soil resource commitment from 1.9 percent to 1.1 percent.

Cumulative Effects

Other on-going, past and proposed activities that could affect soil and water resources include, timber sales, insects and disease, special uses, mining, wildfires, firewood cutting, and noxious weed treatments. Figure 15 and figure 16 display major past disturbances (harvest, roads and wildfires) within the project area considered in this cumulative effects analysis. Cumulative impacts would be the same as the Proposed Action.

Compliance with the Forest Plan and Other Regulatory Direction

Alternative 1 - Proposed Action and Alternative 2 - No New Temporary Road Construction as described above are in compliance with the Forest Plan and other regulatory direction. Both would move the project area toward the Forest Plan desired future condition, and maintain watershed conditions and water quality so that downstream beneficial uses are protected and in compliance with State standards. The no action with wildfire scenario would not be consistent with Forest Plan direction in that it would not be moving towards the desired future condition and would not be maintaining watershed conditions and water quality such that downstream beneficial uses are protected and compliance with State standards is achieved.

Irreversible and Irretrievable Commitments of Resources

There would be no irreversible or irretrievable commitment of resources as a result of implementing either action alternative.

Aquatic Resources

This section discusses the fisheries species of concern of the Upper North Fork HFRA Ecosystem Restoration Project. It describes the fisheries resources in the project area, analyzes the potential effects that treatments under the proposed alternatives might have on fish species of concern, and specifies mitigation measures that minimize potential effects.

Regulatory Framework

Forest Plan Direction

Salmon National Forest Land and Resource Management Plan, 1988:

The general objective for trout is to increase the allowable harvest and meet demand at improved catch rates. Objectives for anadromous species are to rebuild run levels to 1960 level (Forest Plan page II-29).

The Forest management goals for fisheries, Forest Plan pages IV-1-2, include:

1. Provide habitat of sufficient quantity and quality to sustain populations of management indicator species. (USDA Forest Service 2004)
2. Manage classified threatened and endangered species habitat to maintain or enhance their current status.
3. Maintain aquatic habitat capability at a level sufficient to meet State water quality and species production goals for both resident and anadromous fisheries.

General Direction Statements specify the actions, measures or treatments (management practices) to be done when implementing the management activity or the condition expected to exist after the general direction is implemented (Forest Plan page IV-5).

Standards and Guidelines are quantifications of the acceptable limits within which the general direction is implemented. These Forest standards and guidelines adhere to the Regional Guide Standards and Guidelines unless otherwise determined through the planning process that changes are necessary and practical for the situation on the Salmon National Forest (Forest Plan page IV-5).

The following are this proposed project's applicable management activities, general direction statements and standard and guidelines to follow as written in the 1988 Forest Plan.

Management Activities – Wildlife and Fish Resource Management (Forest Plan page IV-18)

General Direction Statements

1. Provide National Forest portion of the habitat needed to meet regional wildlife and fish management objectives (Forest Plan page IV-19).

Standard and Guidelines to follow:

1. Contribute to the local and State economics by providing favorable habitat for socially and economically important fish and wildlife species (Forest Plan page IV-19).
2. Place emphasis on improving key ecosystems including by not limited to: riparian, aspen, aquatic, snag, and old growth (Forest Plan page IV-19).
3. Manage and provide habitat for recovery of endangered and threatened species as specified in the Species Management Plan for the Salmon National Forest (Forest Plan page IV-19).

Management Activities - Silvicultural Prescriptions (Forest Plan page IV-31)

General Direction Statements

1. Full suspension yarding will be required to convey logs across all perennial streams, except where skidding would not seriously and adversely affect water conditions or fish habitat (Forest Plan page IV-42).
2. Use directional felling away from perennial and intermittent stream channels, except in cases where serious and adverse influences are not anticipated (Forest Plan page IV-42).
3. When slash disposal is within riparian zones, it will be hand or grapple piled in areas above the high water mark (Forest Plan page IV-42).
4. Broadcast burning and mechanical site preparation will not be done within perennial riparian zones (Forest Plan page IV-42).

Standard and Guidelines to follow:

1. Ephemeral draws should have minimal disturbance from timber harvest equipment. Crossings and skid trails should be at right angles to draws (Forest Plan page IV-35).

The 1988 Salmon National Forest Land and Resource Management Plan does not identify management activities, general direction statements or standard and guidelines to follow for prescribed fire activities. It does however speak to fire planning and suppression (Forest Plan page IV-68) and escaped fire suppression (Forest Plan page IV-68).

Management Activities – Fire Planning and Suppression (Forest Plan page IV-68)

General Direction Statements

1. Provide a level of protection from wildfire that is cost efficient and that will meet management objectives for the area considering the following: (Forest Plan page IV-68)

    a. The values of the resources that are threatened by fire;

    b. The probability of fire occurrence;

    c. The fuelbed that fires will probably occur in;

    d. The weather conditions that will probably influence fires that occur;

    e. The social, economic, political, cultural, environmental, life and property concerns; and,

    f. Management objectives for the area.

Standard and Guidelines to follow:

No applicable standard and guidelines are identified under silvicultural prescriptions for this proposed project.

Management Activities – Escaped Fire Suppression (Forest Plan page IV-69)

General Direction Statements

1. Take suppression action on all escaped fires considering the following: (Forest Plan page IV-69)

    a. The values of the resources threatened by the fire (both positive and negative);

    b. Management objectives for the threatened area;

    c. The fuelbeds the fire may burn in;

    d. The current and projected weather conditions that will influence fire behavior;

    e. Natural barriers and fuel breaks;

    f. Social, economic, political, cultural, and environmental concerns;

    g. Public safety;

    h. Firefighter safety; and,

    i. Private property values.

2. Although tractor line construction is often prudent for cost, speed, and safety reasons, suppression actions can sometimes pose a greater threat to resource values than does the fire itself. The use of tractors for fireline construction may significantly affect watershed, fisheries, wildlife, visual, and recreational values (Forest Plan page IV-70).

3. The incident commander is responsible for consulting the resource advisor whenever tractor line construction is being considered and/or planned. The resource advisor will keep the Forest Supervisor and the incident commander informed of all tactical proposals which have the potential for significant resource impacts (Forest Plan page IV-70).

Standard and Guidelines to follow:

1. Control will be the suppression strategy during fire season on al fires that occur below 8000 feet outside the Frank Church-River of No Return Wilderness (Forest Plan page IV-69).

2. Containment or confinement strategies may be chosen for pre and post season fires and those above 7000 feet. The general fire season is May 10 through October 20 with the primary fire season from June 15 through September 30 (Forest Plan page IV-69).

3. Tractor line width must be commensurate with the situation at hand. Lines in excess of one blade wide are rarely needed and will not be permitted without prior approval of the Forest Supervisor, except in emergency situations. Safety zones up to 300 feet wide and vehicle turnouts may be constructed as necessary (Forest Plan page IV-70).

4. Every effort will be made to perform rehabilitation work concurrently with line construction. Wildlife openings, at intervals no greater than 200 feet, will be built into slash windrows during construction. Water bars will be constructed as soon as possible after construction, based on intended use of the line, equipment availability, and safety considerations (Forest Plan page IV-70).

Table 47. Fireline water bar spacing guidelines

Gradient (%)	Quartzites	Sediments & Volcanics	Granitics
0 – 10	200 feet	80 feet	75 feet
10 – 20	160	70	65
20 – 30	110	55	50
30 – 40	80	40	35
40 – 50	60	35	20
50 - 60	45	20	10

Pacific Anadromous Fish Strategy Requirements

The Pacific Anadromous Fish Strategy amended the Salmon National Forest Plan thus requiring projects to meet the goals, objectives, and standards/guidelines as described in the environmental assessment and subsequent Finding of No Significant Impact and DN/DR for the Interim Strategies for Managing Anadromous Fish Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho, and portions of California, Pacific Anadromous Fish Strategy (February 24, 1995) (USDA Forest Service 1995).

The Pacific Anadromous Fish Strategy identifies:

- Riparian goals (pages C3-C4)
- Riparian management objectives (pages C4-C6)
- Riparian habitat conservation areas (pages C6-C9)

- 300 feet on either side of a fish bearing stream,
- 150 feet on either side of a perennial non-fish bearing stream,
- 150 feet around the outer edges from riparian vegetation for ponds, lakes, reservoirs and wetlands greater than 1 acre,
- 100 feet on either side of an intermittent stream,
- 100 feet around landslides and landslide prone areas and around the outer edges from riparian vegetation for wetlands less than 1 acre

The definition for "stream" and "channel" will be used as defined in the *R1/R4 (Northern/Intermountain Regions) Fish and Fish Habitat Standard Inventory Procedures Handbook - General Technical Report INT-GTR-346 May 1997* (Overton, et.al, 1997 pp 65, 67). In short, to be considered a stream channel that has Pacific Anadromous Fish Strategy riparian habitat conservation area requirements there needs to be a definite streambed and stream banks that serve to confine the water.

- Standard and guidelines for projects within and adjacent to riparian habitat conservation areas (pages C9-C18).
    - Commercial and noncommercial thinning activities are designed to maximize the maintenance and enhancement of the Riparian Management Objectives. The project's proposed activities and objectives are consistent with the Pacific Anadromous Fish Strategy timber management standard/guideline TM-1 page C-10 and General Riparian Area Management standard/guidelines RA-1 thru RA-5 page C-17.
    - Road construction and maintenance activities are designed to maximize the maintenance and enhancement of the riparian management objectives. The project's proposed activities and objectives are consistent with the Pacific Anadromous Fish Strategy roads management standard/guidelines RF-1 thru RF-5 pages C-10 thru C-12 and Pacific Anadromous Fish Strategy general riparian management standard/guidelines RA-1 thru RA-5 page C-17.
    - Prescribed fire activities are designed to maximize the maintenance and enhancement of the riparian management objectives. The project's proposed activities and objectives are consistent with the Pacific Anadromous Fish Strategy timber management standard/guideline TM-1 page C-10, fire/fuels management standard/guidelines FM-1 thru FM-5 pages C-15-16 and general riparian area management standard/guidelines RA-1 thru RA-5 page C-17.

Fisheries Desired Condition

Habitats represented by management indicator species will improve in spatial distribution as well as structural and species' diversity. Habitat for anadromous and resident fish will be maintained or will slowly improve. The numbers of anadromous fish have the potential to increase over the planning period (USDA Forest Service 2004 Appendix A-21).

Aquatic habitats will be managed at a level sufficient to meet State water quality goals and maintain habitat capability to meet species production goals for both resident and anadromous species. Species production goals are linked with maintaining fry survival at 60 percent for resident trout and 68 percent for anadromous species. Several barriers to fish passage will be corrected and sediment levels allowed to decline on several streams in order to attain anadromous species objectives. Habitat enhancement will have to be conducted on an annual basis to compensate for natural and man caused habitat deficiencies.

Resident trout and anadromous species habitats will be improved in productive capacity over the plan period through reduction in sedimentation, better riparian management and habitat enhancement (USDA Forest Service 1988 pages IV-88-89).

USDA Forest Service Manual Direction

The Forest Service Manual 2670.12 - Secretary of Agriculture's Policy on Fish and Wildlife.

Department Regulation 9500-4 directs the Forest Service to:

1. Manage "habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species."
2. Conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species."

The Forest Service Manual 2670.21 - Threatened and Endangered Species.

1. Manage National Forest System habitats and activities for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the Endangered Species Act are no longer necessary.
2. Promote recovery efforts through research and state and private forestry programs.

The Forest Service Manual 2670.22 - Sensitive Species.

1. Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
2. Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.
3. Develop and implement management objectives for population and/or habitat of sensitive species.

The Forest Service Manual 2670.31 - Threatened and Endangered Species.

1. Place top priority on conservation and recovery of endangered, threatened, and proposed species and their habitats through relevant National Forest System, State and Private Forestry, and Research activities and programs.

Laws

Clean Water Act

The Clean Water Act of 1972, as amended in 2002 defines three parameters that make up the water environment: chemical, physical and biological. Water quality standards are legally established rules consisting of three parts: designated uses, criteria to protect those uses, and an anti-degradation policy. Designated uses are the beneficial uses identified by the State of Idaho Department of Environmental Quality which are supported by the water quality in a given stream or lake. Criteria are the conditions presumed to support or protect the designated uses.

Beneficial uses affecting fisheries resources identified by the State of Idaho include the following:

Cold water biota: waters which are suitable or intended to be made suitable for protection and maintenance of viable communities of aquatic organisms and populations of significant aquatic species which have optimal growing temperatures below 18 degrees C.

Salmonid spawning: waters which provide or could provide a habitat for active self-propagating populations of salmonid fisheries.

Secondary contact recreation: surface waters which are suitable of intended to be made suitable for recreation uses on or about the water which are not included in the primary contact category. These waters may be used for fishing, boating, wading, and other activities where ingestion of raw water is not probable.

Endangered Species Act

From the Endangered Species Act of 1973 as amended in 2002 and the Endangered Species Consultation Handbook US Fish and Wildlife Service and National Marine Fisheries Service March 1998 (US Fish and Wildlife Service 1998):

Section 7 of the ESA [16 U.S.C. 1531 *et seq.*] outlines the procedures for Federal interagency cooperation to conserve Federally listed species and designated critical habitats.

1. Section 7(a)(1) directs the Secretary of Interior and Secretary of Commerce to review other programs administered by them and utilize such programs to further the purposes of the Act. It also directs all other Federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation species listed pursuant to the Act.

2. Section 7(a)(2) states that each Federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. In fulfilling these requirements, each agency must use the best scientific and commercial data available. This section of the Act defines the consultation process, which is further developed in regulations promulgated at 50 CFR Section 402.

Biological Opinions

1. the conservation recommendations as described in the Endangered Species Act - Section 7 Consultation Biological Opinion for the Interim Strategies for Managing Anadromous Fish Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho, and portions of California, Pacific Anadromous Fish Strategy January 23, 1995 (USDC National Marine Fisheries Service 1995a)

2. the goals, objectives, and guidelines to avoid jeopardy on individual projects and long-term approaches for ecosystem management as described in the Endangered Species Act - Section 7 Consultation's Biological Opinion for the Land and Resource Management Plans for the: Boise, Challis, Nez Perce, Payette, Salmon, Sawtooth, Umatilla, and Wallowa-Whitman National Forests March 1, 1995 (USDC National Marine Fisheries Service 1995b)

3. the reasonable and prudent measures, terms and conditions, and conservation recommendations as described in the National Marine Fisheries Service Final Biological Opinions consultation on effects to steelhead from continued implementation of USDA Forest Service Land and Resource Management Plans and BLM Resource Management Plans, as

amended by the Pacific Anadromous Fish Strategy June 19, 1998 (USDC National Marine Fisheries Service 1998)

4. the reasonable and prudent measures, terms and conditions, and conservation recommendations as described in the US Fish and Wildlife Service Final Biological Opinions consultation on effects to bull trout from continued implementation of USDA Forest Service Land and Resource Management Plans and BLM Resource Management Plans, as amended by the Pacific Anadromous Fish Strategy August 14, 1998 (US Fish and Wildlife Service 1998)

National Forest Management Act

The National Forest Management Act of 1976 includes requirements for forest planning procedures that keep desired aquatic organisms well distributed throughout their range, protect diversity generally, and protect against blockages of water courses and other impacts to fish habitat.

Section 1604(g)(3)(B): (land management guidelines must) “provide for diversity of plant and animal communities.”

Methodology for Analysis

Project Assumptions

- Proposed vegetative treatments would reduce fuel loading, which would in turn reduce the risk of large high severity wildfire and crown fires, and reduce the potential for resource damage caused by large high severity wildfire and crown fires.
- There would be long-term ecosystem benefits of project implementation from the reduced risk and severity of the effects of large wildfires on: 1) fish populations, 2) fish viability, 3) fish habitat, 4) riparian vegetative communities, and 5) upland vegetative communities.
- The long-term ecosystem benefits would out-weigh any potential short-term impacts on fish or fish habitat.
- Project design features, best management practices, monitoring, and adaptive management would be effective in minimizing or eliminating any long-term or short-term impacts on fish or fish habitat.
- Implementation of management requirements in the 1988 Forest Plan as amended by the Inland Native Fish Strategy and the associated programmatic biological assessments and biological opinions, in addition to no treatments in the riparian habitat conservation areas, would ensure no adverse impacts to fish and fish habitat.
- The standard Inland Native Fish Strategy riparian habitat conservation areas and riparian management objectives would be adequate to protect fish and fish habitat and ensure the project’s activities would have no adverse effects including: 1) overland sediment delivery to streams, 2) increased stream temperatures, 3) reduced large woody debris recruitment, 4) reduced pool frequency, and 5) increased channel width to depth ratios.
- Prescribed fire burning out of prescription outside of the project area boundary or the Endangered Species Act action area would be considered a wildfire and shall require re-

initiation of consultation with National Marine Fisheries Service and the US Fish and Wildlife Service.

Measurement Indicators

Measurement indicators used to analyze project activity effects to fisheries resources are:

Fish presence/absence and population densities and trend:

Electrofishing presence/absence and population density trend monitoring used a methodology of two or three pass 50 percent depletion over a 100 meter reach. The Idaho Fish and Game 1986 Microfish 2.2 Interactive Program is used to calculate the fish/100 meter squared.

Stream habitat condition (large woody debris, pools and width to depth ratios):

Stream habitat conditions were surveyed using the "R1/R4 Northern/Intermountain Regions Fish and Fish Habitat Standard Inventory Procedures Handbook" (Overton 1997. INT-GTR-346) and were compared to similar unmanaged stream habitats as described in the "User's Guide to Fish Habitat: Descriptions that Represent Natural Conditions in the Salmon River Basin, Idaho" (Overton 1995. INTR-GTR-322).

Stream sediment (percent fines by depth):

The Salmon-Challis National Forest watershed program has a long-term sampling site addressing sediment trends over time. Depth of fines sampling data has been collected from 1993 to present using a McNeil core sampler and sieve analysis

Stream temperature:

Stream temperatures are monitored using continuous monitoring data loggers, Hobo temp (8k). These data loggers are programmed to take an instantaneous stream temperature reading every 2 hours.

Stream connectivity:

Stream connectivity surveys and analyses at road crossings have been completed using the 2005 National Inventory and Assessment Procedure For Identifying Barriers to Aquatic Organism Passage (USDA Forest Service 2005b).

Affected Environment

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

Conclusions regarding the following fish species and their habitat (including critical habitat) occurrence are based on habitat accessibility and suitability, professional judgment, Salmon-Challis National Forest District fish survey records, National Marine Fisheries Service and Idaho Department of Fish and Game public information.

Action Area

The Endangered Species Act Action Area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR§402.02). This is the area where the action and any interdependent and interrelated actions will result in direct, indirect or cumulative affects to listed species or designated critical habitat. This project's ESA Action Area is defined as two 6th-field subwatersheds: Upper North Fork Salmon River (HUC 170602030601) and Middle North Fork Salmon River (HUC 170602030602).

Affected Species

Threatened, endangered, proposed and candidate species were identified in the U.S. Fish and Wildlife Service's online site at http://www.fws.gov/idaho/ipac_splist.html and National Marine Fisheries Service online site at http://www.nmfs.noaa.gov/pr/species/esa/fish.htm. These lists identifies Snake River sockeye salmon as Endangered, Snake River spring/summer Chinook salmon as threatened, Snake River Basin steelhead as threatened and Columbia River bull trout as threatened. Region 4 Regional Forester's sensitive fish species were identified from the USDA Intermountain Region Sensitive Species list updated in February 2013, which includes westslope cutthroat trout. This document analyzes effects on the following fish evolutionarily significant units or distinct population segments and their habitats in the Endangered Species Act Action Area that have special status under the Endangered Species Act or are given special management consideration as Forest Service sensitive species:

Endangered:

- Snake River sockeye salmon (*Oncorhynchus nerka*) (70 FR 37160) and its designated critical habitat.

Threatened:

- Snake River spring/summer Chinook salmon (*Oncorhynchus tshawytscha*) (70 FR 37160) and its designated critical habitat
- Snake River Basin steelhead (*Oncorhynchus mykiss*) (71 FR 834) and its designated critical habitat.
- Columbia River bull trout (*Salvenus confluentus*) (63 FR 31647)and its designated critical habitat

Sensitive:

- Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)

Essential Fish Habitat:

- Snake River spring/summer Chinook salmon evolutionarily significant units.

The Salmon-Challis National Forest and Idaho Department of Fish and Game fish surveys indicate that all of these species except sockeye salmon occur within the Endangered Species Act Action Area. Sockeye salmon use the mainstem Salmon River as a migration corridor to and from spawning and juvenile rearing habitat within lakes of the Salmon River headwaters, but do not occupy or use waters within the North Fork Salmon River 5th field HUC (17060206), thus do not occur within the Endangered Species Act Action Area. National Marine Fisheries Service designated critical habitat for the Snake River sockeye salmon on December 28, 1993, effective January 27, 1994 in the Federal Register (58 FR 68543). Critical habitat is designated to include river reaches presently or historically accessible. This designation does not include any waters within the Endangered Species Act Action Area. Since Snake River sockeye salmon and its critical habitat do not occur within the Endangered Species Act Action area, this species will not be discussed further in this document.

Critical Habitat

Snake River Spring/Summer Chinook Salmon

The National Marine Fisheries Service designated critical habitat for the Snake River spring/summer Chinook salmon in the Federal Register on December 28, 1993, effective January 27, 1994 (58 FR 68543). This was revised on October 25, 1999 (64 FR 57399). Critical habitat is designated to include

river reaches presently or historically accessible. The Salmon-Challis National Forest considers and has mapped Chinook salmon critical habitat designations within Forest streams following the process as identified in appendix D of the project fisheries biological assessment. There are approximately 15.0 miles of Critical Habitat for Chinook salmon within the Endangered Species Act Action Area (as shown in table 48).

Snake River Basin Steelhead

The National Marine Fisheries Service designated critical habitat for Snake River Basin steelhead on September 2, 2005 (70 FR 52630). The Salmon-Challis National Forest considers the extent of critical habitat as it is shown on maps included in the Federal Register. Designated critical habitat includes the stream channel with a lateral extent as defined by the ordinary high-water line; the bankfull elevation is used in areas where the ordinary high-water line has not been defined. There are approximately 23.9 miles of critical habitat for steelhead within the Endangered Species Act Action Area (as shown in table 48).

Bull Trout

The US Fish and Wildlife Service published a final rule in the Federal Register (75 FR 63898) on October 18, 2010, which revised critical habitat for bull trout populations. The Salmon-Challis National Forest considers the extent of critical habitat as it is shown on maps included in the Federal Register. Both occupied and unoccupied habitat considered to be essential for bull trout recovery was included in this designation. There are approximately 34.0 miles of critical habitat for bull trout within the Endangered Species Act Action Area (as shown in table 48).

Table 48. Miles of critical habitat by stream within the Endangered Species Act action area

Stream Name	Chinook Salmon Critical Habitat (miles)	Steelhead Critical Habitat (miles)	Bull Trout Critical Habitat (miles)
Moose Creek		1.8	3.1
North Fork Salmon River	12.5	12.5	16.4
Pierce Creek		2.0	2.2 (U)
Twin Creek	2.5 (U)	7.6	7.6
Vine Creek			2.8 (U)
West Fork North Fork Salmon River			1.9
Totals	15.0	23.9	34.0

(U) = Currently unoccupied habitat.

Essential Fish Habitat

The National Marine Fisheries Service updated designated essential fish habitat in the Federal Register on January 17, 2002 (67 FR 2343). Essential fish habitat provisions of the Magnuson-Stevens Act require heightened consideration of habitat for commercial species in resource management decisions. essential fish habitat is defined in section 3 of the Magnuson-Stevens Act as “those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity.” The National Marine Fisheries Service interprets essential fish habitat to include aquatic areas and their associated physical, chemical and biological properties used by fish that are necessary to support a sustainable fishery and the contribution of the managed species to a healthy ecosystem.

The Magnuson-Stevens Act and its implementing regulations at 50 CFR 600.92(j) require that before a federal agency may authorize, fund or carry out any action that may adversely affect essential fish habitat, it must consult with National Marine Fisheries Service. The purpose of the consultation is to develop conservation recommendations that address reasonably foreseeable adverse effects to essential fish habitat. Freshwater essential fish habitat for Pacific salmonids includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically, accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers, and long-standing impassable natural barriers. In the Endangered Species Act Action Area, essential fish habitat for Chinook salmon (the only commercial species in the action area) occurs in the North Fork Salmon River and Twin Creek.

Management Indicator Species

The Salmon-Challis National Forest completed a Forest Plan Amendment for Management Indicator Species in 2004 in which bull trout was designated as a management indicator fish species. Since bull trout is also listed as an Endangered Species Act threatened species, potential effects of project actions on bull trout habitat are incorporated into this document and in the project fisheries biological assessment and the project fisheries specialist report, located in the project record.

Existing Condition

Fish Species and Streams

The Endangered Species Act analysis area supports populations of resident coldwater and anadromous fish species. All fish streams within this watershed are to some degree influenced by existing roads, private land development, and other urban interface related activity. Roads have, in the past, been constructed in the valley bottoms and adjacent to streams in drainages which were already confined by geologic form. This has altered the streams ability to naturally meander and has reduced fish habitat complexity and quality. Fish-impassable road crossings and stream diversions for irrigation purposes have also influenced stream connectivity and reduced essential migration corridors from historic levels.

There are approximately 61 miles of streams within the Endangered Species Act Action Area. The North Fork Salmon River provides about 15.5 miles of perennial fish habitat while tributary streams to the North Fork Salmon provide about 20.8 miles of perennial fish habitat. Table 49 displays the length of perennial streams and amounts of existing suitable fish habitat by species in the Endangered Species Act Action Area.

Table 49. Stream lengths and suitable fish habitat in the Endangered Species Act action area

Stream Name	Length of Stream (miles)	Chinook (miles)	Steelhead (miles)	Bull Trout (miles)	Cutthroat Trout (miles)
Deep Creek	3.2				1.2
East Fork Pierce Creek	2.5				1.1
Elk Creek	1.4				
Hammerean Creek	3.7				2.5
Lick Creek	4.0				
Little Deep Creek	0.8				
Little Moose Creek	1.0				
Moose Creek	3.4		1.7	1.9	2.6
North Fork Salmon River	16.4	12.5	14.5	14.5	15.5
Pierce Creek	4.0		2.1		3.1

Stream Name	Length of Stream (miles)	Chinook (miles)	Steelhead (miles)	Bull Trout (miles)	Cutthroat Trout (miles)
Quartz Creek	2.0				
State Creek	1.7				
Twin Creek	7.6	2.4	6.2	6.2	6.4
Vine Creek	3.4				2.1
Votler Creek	2.4				
West Fork North Fork Salmon River	3.3			1.4	1.8
Totals	**60.8**	**14.9**	**24.5**	**24.0**	**36.3**

Snake River Spring/Summer Chinook

Chinook salmon in the North Fork Salmon River belong to the Upper Salmon River Major Population Group. This major population group's abundance and productivity estimates for most populations remain at very low levels relative to viability objectives. The Upper Salmon mainstem has the highest relative abundance and productivity combination of populations within the major population group with a very high population size and complexity.

Spatial structure and diversity risk ratings vary considerably across the major population group. The North Fork population of Snake River Spring summer chinook salmon has a low or moderate risk spatial structure/diversity rating and as such could achieve viable status with improvements in average abundance and productivity.

Population-level status ratings remain at high risk and all populations remain below minimum natural-origin abundance thresholds. Relatively low natural production rates and spawning levels below minimum abundance thresholds remain a major concern across the evolutionarily significant unit. None of the major population groups in the evolutionarily significant unit meet population viability criteria. The evolutionarily significant unit is not currently considered viable. (USDC National Marine Fisheries Service 2011a; USDC National Marine Fisheries Service 2011b)

Table 50. Idaho Fish and Game's North Fork Salmon River Chinook salmon redd counts

Year	Redd Count	Year	Redd Count	Year	Redd Count	Year	Redd Count
2012	42	2001	102	1978	29	1967	66
2011	58	2000	11	1977	31	1966	70
2010	70	1999	2	1976	6	1965	5
2009	40	1998	3	1975	14	1964	86
2008	22	1997	10	1974	18	1963	71
2007	21	1996	5	1973	55	1962	84
2006	21	1995	1	1972	31	1961	144
2005	20	1994	3	1971	53	1960	91
2004	42	1993	17	1970	95	1959	121
2003	36	1992	12	1969	155	1958	322
2002	36	1991	8	1968	145	1957	2533

Idaho Department of Fish and Game tracks and compiles records of Chinook salmon spawning in the North Fork Salmon River. Table 50 displays the results of redd surveys from 1957 to 2012. Spawning Chinook salmon are on a steep decline when pre 1990 surveys counts are included, however, from 1990 to the present, redd counts have been on an increasing trend.

Snake River Basin Steelhead

Steelhead in the North Fork Salmon River belong to the Salmon River major population group. According to the National Marine Fisheries Service (2011) there are insufficient data to estimate the abundance and productivity of this major population group. Steelhead in the North Fork Salmon River are at a moderate risk for spatial structure and diversity and have a “maintained” overall viability rating. Juvenile steelhead density estimates done by Idaho Department of Fish and Game showed the highest median densities in the Salmon River major population group including the North Fork Salmon River. (USDC National Marine Fisheries Service 2011; Ford 2011)

Although the distinct population segment is well distributed throughout its range, due to high risk population ratings, the uncertainty of viability status and lack of population data, none of the major population groups are considered viable, thus the distinct population segment is not considered viable (USDC National Marine Fisheries Service 2011).

Bull Trout

Bull trout in the Endangered Species Act Action Area are included in the Middle Salmon River – Panther Core Area for bull trout populations. Bull trout are well distributed throughout the mainstem Salmon River and its tributary streams including the North Fork Salmon River. There is good connectivity between core areas. Limiting factors include grazing, water withdrawals, roads (Hwy 93 impacting the flood plain), mining, isolation and habitat fragmentation. This core area is considered at an intermediate risk (US Fish and Wildlife Service 2002).

The most recent forest wide status report completed for bull trout is dated November 9, 2004. In that report it states the present bull trout distribution and status provides a meta-population perspective of on-forest distribution and status throughout the upper Salmon River sub-basin. With the change in Idaho bull trout fishing regulations in the mid-1990s, basin-wide populations of bull trout appear to be gradually recovering as older, larger, more fecund fluvial individuals within the meta-population begin rebuilding and reestablishing spawning runs to tributary streams within the sub-basin. The increase of spawning activity from these mature fluvial adults, in association with increased spawning activity of protected smaller resident individuals (now reaching maturity at five to seven years of age) have set the stage for a potential broad scale, upward trend of bull trout populations throughout the basin.

Review of available baseline data for the Salmon-Challis National Forest’s thirty-six selected bull trout management indicator species streams indicates that while this trend may generally be underway at basin scales, at subwatershed scales a large degree of variation still exists both between streams, as well as between year classes of bull trout within each subwatershed. Redd count data illustrate a large degree of recruitment activity both between years, as well as between different reaches within the same stream, by year. However, fish density data, whether by snorkeling or electro-fishing, illustrate the variability of both year/size classes and total numbers of fish within individual streams, between years.

Comparisons of selected Forest management indicator species streams indicate that while some streams exhibit possibly low but stable numbers of fish between years, others indicate fewer numbers of fish now than in the past, some indicate a slight increasing trend, while several streams have incomplete data from which to draw a definitive conclusion at this point in time. In general, considering all of the above factors and their variability between streams, it is concluded that forest-wide, bull trout population trends are

generally stable to slightly increasing. However, individual subwatersheds may have specific management or habitat issues that result in sub-populations, which can be either better or below the forest-wide average condition.

Table 51. Threatened, endangered and sensitive fish species known or suspected habitat use patterns within the Endangered Species Act action area

Species	Stream	Presence / Absence	Spawning	Adult Overwinter	Juvenile Rearing	Migration
Snake River Spring/Summer Chinook Salmon	North Fork Salmon (EFH)	Yes	Yes	No	Yes	Yes
	Twin Creek (EFH)	No	No	No	No	No
Snake River Basin Steelhead	North Fork Salmon	Yes	Yes	No	Yes	Yes
	Moose Creek	Yes	Yes	No	Yes	Yes
	Pierce Creek	Yes	Yes	No	Yes	Yes
	Twin Creek	Yes	Yes	No	Yes	Yes
Columbia River Bull Trout	North Fork Salmon	Yes	Yes	Yes	Yes	Yes
	West Fork North Fork Salmon	Yes	Yes	Yes	Yes	Yes
	Pierce Creek	No	No	No	No	No
	Moose Creek	Yes	Yes	Yes	Yes	Yes
	Twin Creek	Yes	Yes	Yes	Yes	Yes
	Vine Creek	No	No	No	No	No
Westslope Cutthroat Trout	North Fork Salmon	Yes	Yes	Yes	Yes	Yes
	West Fork North Fork Salmon	Yes	Yes	Yes	Yes	Yes
	Moose Creek	Yes	Yes	Yes	Yes	Yes
	Pierce Creek	Yes	Yes	Yes	Yes	Yes
	East Fork Pierce Creek	Yes	Yes	Yes	Yes	Yes
	Vine Creek	Yes	Yes	Yes	Yes	Yes
	Twin Creek	Yes	Yes	Yes	Yes	Yes
	Deep Creek	Yes	Yes	Yes	Yes	Yes
	Hammerean Creek	Yes	Yes	Yes	Yes	Yes
	Johnson Gulch	Yes	Yes	Yes	Yes	Yes

Bull trout populations within the Endangered Species Act Action Area are depressed from historic numbers in part because of private land migration barriers associated with irrigation practices. Fluvial forms are known to use the North Fork Salmon River and suspected to use Moose, Pierce and Twin Creeks within the Endangered Species Act Action Area. Fluvial bull trout begin to move into tributaries as the high water spring runoff flows begin to decrease, but the stream flows are still above base flows. Migratory corridors are largely intact in project streams.

Table 51 shows the known or suspected habitat use patterns of fish-bearing streams in the Endangered Species Act Action Area. Some streams have designated critical habitat (as shown in table 50 previously) but have not had confirmed presence of a particular species. These streams are included in table 51 and show “no” for presence/absence. For example, Snake River spring/summer Chinook salmon have designated critical habitat in Twin Creek, but they are not known to currently occupy that habitat for any life stage. Similarly, Columbia River bull trout have designated critical habitat in Pierce Creek and Vine Creek but are not known to currently occupy those streams for any life stage.

Habitat Conditions

More detailed descriptions of existing overall watershed conditions and existing aquatic habitat conditions, including but not limited to potential sediment yields, background erosion rates and water quality can be found in the soils and hydrology section of this document and in the project fisheries biological assessment.

Stream Temperatures

The Salmon-Challis National Forest north zone district's fisheries program has collected water temperature data on several streams within the Endangered Species Act Action Area. The data collected from these streams, some since 1993, indicates water temperature is not a limiting factor for fish populations. Table 52 displays stream temperatures for select tributaries to the North Fork Salmon River for the years 2010 to 2012. Displayed stream temperatures are the maximum 7-day moving mean of daily maximum temperatures for the period of record (July1- September 30).

Table 52. Tributary stream temperatures

Stream Name	Temperature °C		
	2010	2011	2012
Deep Creek	9.6	9.5	9.9
Hammerean Creek	11.2	10.9	11.7
Johnson Creek	11.5	12.0	13.0
Moose Creek	11.2	11.0	12.4
Pierce Creek	14.7	14.3	12.5
Twin Creek	9.6	12.4	17.9
Vine Creek	12.4	11.4	13.9

On the Salmon-Challis National Forest, instream core sampling using a McNeil core sampler is used to monitor sediment trends and to determine the percentage of fine sediment in a stream. Streams that support or have the potential to support anadromous fish are cored to a depth of 6 inches (the amount of substrate material an anadromous fish could move when preparing a redd) while resident fish streams are cored to a depth of 4 inches. The percent fines at depth are used in determining the stream's biotic potential (Stowell et al. 1983). Biotic potential is the condition of spawning substrate quality which maximizes survival and emergence of fish embryos.

Percent fine sediment in the substrate for selected streams, collected by the McNeil core sampling method, is displayed in table 53. Overall, the North Fork Salmon River is on a decreasing trend, although the North Fork 1A is slightly increasing. Moose Creek and Twin Creek both have slightly increasing trends and Pierce Creek fines are on a decreasing trend.

Table 53. Percent depth fines measurements of major tributaries in the project area

	Forest Wide Sediment Survey Data Percent Depth Fines in Select Project Area Streams					
Year	**North Fork 1A**	**North Fork 2A**	**North Fork 3A**	**Moose**	**Pierce**	**Twin**
1993	16.2	21.3	24.6		31.2	10.4
1994	20.5	22.7	19.5		29.0	7.9
1995	17.6	26.0	22.5	19		
1996	22.0	48.6	28.4	25.1		20.3
1997	10.2	17.5	17.2	17.7		10.6
1998	13.8	19.7	16.5	13.2		13.6
1999		7.3	12.5	20.2		10.9
2000	19.4	23.8	22.3	26.2		18.0
2001	21.8	27.3	19.8	15.0		
2002	16.7	22.9	23.2	26.8		15.3
2003	17.3	17.1	18.4			
2004		19.5				10.9
2005	23.4	16.6	24.3			6.6
2006						7.8
2007	10.4					
2008		21.7				13.9
2009	23.9			26.2	16.8	20
2010		20.1	21.9		27.4	11.7
2011	21.2				26.4	
Mean Fines	18.2	22.1	20.9	21.0	26.2	12.7

Bank stability was also measured in streams in the Project using a 100 pace step transect along each bank. Streambank condition can influence the overall stability and resilience of stream channels. Reduced streambank stability can result in reduced structural stability of the stream channel resulting in negative impacts on fish productivity (Platts 1991). Bank stability in all the sampled reaches have slightly increasing trends with the exception of Moose Creek, which has a slightly decreasing trend. However, the majority of all the samples are above 80 percent. Most streams in the analysis area have some amount of bank erosion. Table 54 displays bank stability ratings for selected streams in the Endangered Species Act Action Area from 1993 to present.

Table 54. Bank stability of major tributaries in the project area

	Forest Wide Sediment Survey Data Percent Bank Stability in Select Project Area Streams					
Year	**North Fork 1A**	**North Fork 2A**	**North Fork 3A**	**Moose**	**Pierce**	**Twin**
1993						
1994	96	84.5	88.5	99.5	80	73.5
1995	100	100	96.5	89		
1996	93	89	94	98		96.5
1997	82	71	85	99.5		70
1998	94	95.5	86.5	94.5		97.5
1999		78	65.5	100		94.5
2000	97.5	84	67.5	84.5		83.5
2001	95	95.5	76.5			
2002	91.5	93	66.5			78
2003	93.5	86.5	46.5			
2004		98				96
2005	93	96	83			89.5
2006						94
2007	93					92.5
2008		77.5				91
2009	100			95	90	85.5
2010		97.5	95.5		96.5	87.5
2011	96.5				99	
Mean	94.2	89.0	79.3	95.0	91.4	87.9

Summary of Baseline Conditions for Habitat Indicators in the Watershed

Existing baseline conditions for the Upper North Fork 5th-field watershed have been summarized based on an analysis of watershed indicators (see table 55). Additional discussion of baseline conditions by habitat indicator can be found in the project fisheries biological assessment.

Monitoring

There is no management required fisheries monitoring associated with this proposed project. Independent of this project the Salmon-Challis National Forest north zone Ranger District's aquatic monitoring program will continue with management indicator species bull trout population and trend monitoring, electrofishing fish population and trend monitoring, stream temperature, Forest Service Region 1 and Region 4 stream habitat inventory and the Forest's watershed department's stream sediment core sampling percent fines by depth.

Table 55. Summary of baseline habitat indicator conditions in the Upper North Fork Salmon River 5th-field watershed

Ranking	Functioning Appropriately	At Risk	Functioning at Unacceptable Risk
Baseline Indicator	Growth and Survival (BT) Life History Diversity and Isolation (BT) Persisitence and Genetic Integrity (BT) Temperature Sediment (Twin Creek) Chemical/Nutrients Large Wood Pool Frequency & Quality Off Channel Habitat Refugia Width/Depth Ratio Stream Bank Condition Floodplain Connectivity Drainage Network Increase Disturbance History Riparian Conservation Areas Disturbance Regime (BT) Habitat Quality and Connectivity (BT)	Sub-Population Size (BT) Sediment (North Fork Salmon River and Moose Creek) Physical Barriers Change in Peak/Base Flows	Sediment (Pierce Creek) Road Density and Location

Environmental Consequences

The analysis of environmental effects to fish habitats takes into account those factors that have the greatest potential to impact water quality, water quantity and instream habitat features. Relative to the analysis of effects to streams, riparian habitat conservation areas have been identified within the project area and are also taken into consideration in the assessment. Other considerations used in evaluating project effects include proximity of actions to habitat, the extent of the geographic area where disturbance may occur, the nature of the effect on habitat, the duration of effect and disturbance intensity and severity. Sources of information are referenced and represent consideration of the best available science.

Proposed activities for action alternative 1 (as described in the Proposed Action section of this document) analyzed in this document that could potentially affect fisheries resources include:

- Commercial thinning (felling, yarding, skidding, slash disposal);
- Pre-commercial and non-commercial thinning (felling, piling, slash disposal);
- Prescribed burning including firelines;
- Log haul;
- Transportation system management: road maintenance and reconstruction, temporary road construction, road decommissioning. (Culvert replacement actions would be implemented under the existing Stream Crossings on National Forests and Bureau of Land Management Public Lands in Idaho 10-year Programmatic Consultation (Endangered Species Act 2012, U.S. Fish and Wildlife Service 2012)).
- Instream fish habitat enhancements (structure placement).

As designed and planned the Project has used the following to address, minimize and eliminate potential impacts from proposed activities, to fish and fish habitat;

- Salmon-Challis National Forest Soil / Water / standards and guidelines
- Pacific Anadromous Fish Strategy Riparian habitat conservation areas, riparian management objectives, standards and guidelines)
- Best Management Practices (BMPs)

Design criteria and mitigation measures stated in the Programmatic Biological Assessment for Fire Suppression and Prescribed Natural Fire Activities in the Upper Salmon River Sub-Basin (USDA Forest Service 2002a) and associated National Marine Fisheries Service (USDC National Marine Fisheries Service 2002) and U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 2002) concurrence letters .

Design criteria and mitigation measures stated in the May 24, 2002 Programmatic Biological Assessment For Road Maintenance On Public Lands Administered by: Salmon-Challis National Forest and Bureau of Land Management Salmon, Challis and Idaho Falls Field Offices In the Upper Salmon River Basin and Lost River Subbasin (USDA Forest Service, 2002b) its associated May 29, 2003 Supplement (USDA Forest Service 2003) and the National Marine Fisheries Service (USDC National Marine Fisheries Service 2003) and U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 2003) concurrence letters.

Design criteria and mitigation measures identified in the December 1, 2011 Programmatic Biological Assessment for Restoration Activities at Stream Crossings Affecting the Habitat of Endangered Species Act -listed Fish Species on National Forests and Bureau of Land Management Public Lands in Idaho (USDA Forest Service 2011) and would meet associated requirements as stated in U.S. Fish and Wildlife Service June 15, 2012 (US Fish and Wildlife Service 2012) and the National Marine Fisheries Service June 4, 2012 (USDC National Marine Fisheries Service 2012) biological opinions.

Indices of measurement to analyze the action alternatives along with the relative risk of cumulative fisheries effects are: 1) fish presence/absence and population densities and trend, 2) stream habitat condition (large woody debris, pools and width to depth ratios), 3) stream sediment (percent fines by depth), 4) stream temperature and 5) stream connectivity. Determinations of the effects of the Project's activities on fisheries resources also consider effects on the measurement indices from the Matrix of Diagnostic Pathways and Indicators. Indices 2 through 5 above are included in the matrix indicators.

Additionally, there are habitat elements that are essential features of the federally designated critical habitat for Snake River spring/summer Chinook salmon. These 10 habitat elements are also needed by other adult spawning and juvenile rearing cold water salmonids and cover the primary constituent elements of critical habitat for Snake River Basin steelhead and Columbia bull trout. These 10 habitat elements include: spawning gravel, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and access/migration conditions. These habitat elements are also included in the matrix indicators.

There are 6 habitat features identified in the Pacific Anadromous Fish Strategy (USDA Forest Service 1995 Appendix C p C-6). The habitat features include: bank stability, lower bank angle, temperature, width-to-depth ratios, large woody debris, and pool frequency. These habitat features provide riparian management objectives for stream channel conditions. These riparian management objectives provide the "criteria" against which attainment or progress toward attainment of the riparian goals is measured. These habitat features are good indicators of ecosystem health, are quantifiable and are subject to accurate,

repeatable measurements (USDA Forest Service 1995). The goal is to achieve a high level of habitat diversity and complexity which would meet the life history requirements of the anadromous fish community within a watershed (USDA Forest Service 1995 appendix C p C-5). Four of these habitat features are included in the fisheries measurement indices and Matrix Indicators for this analysis. Two habitat features are not included as fisheries measurement indices because they are associated with non-forested systems. These are bank stability and lower bank angle.

The analysis of direct effects includes areas actually proposed for treatment within the project area boundary (project area), for the duration of the proposed work. The analysis area for indirect effects and cumulative effects includes the treatment area plus areas that might be influenced by the project in terms of downstream factors; this has been defined as the Endangered Species Act Action Area.

Taking No Action

With no hazardous fuels reduction, no forest health restoration treatments, no prescribed burning activities, no roads actions and not aquatic habitat improvements, there would be no direct effects to fish species or aquatic habitat. Watershed and aquatic habitat conditions would continue to respond to climatic and other environmental changes and would continue to recover from past flood and fire events until reset by future natural disturbance events. Any disturbances caused by past forest management activities would also continue to recover to pre-disturbance conditions through natural processes. Taking no action would not directly affect fish habitat components including stream shade, water temperature, sedimentation rates or large woody debris.

Taking no action may cause indirect effects to fish and their habitat because the project area would be at a higher risk of high severity wildfire. If a high severity wildfire occurred, it could have adverse impacts to watersheds and streams. Adverse effects of a wildfire would include creation of hydrophobic soils, post-fire increased soil erosion, increased water runoff, decreased lag time, and increased peak flows. These conditions result in disrupted channel maintenance processes, increased sediment delivery to stream channels and degraded aquatic habitat through pool filling, loss of spawning habitat and poor water quality. Post-fire sedimentation would likely be chronic until vegetation and soil recovery occurred. Widespread removal of riparian reserve vegetation from a high severity fire would reduce future large wood recruitment, reduce stream shade and increase stream water temperatures until riparian vegetation was re-established. In summary, taking no action with a high severity wildlfire has potential to result in significant adverse effects to fish species of concern and their habitats.

Alternative 1 – Proposed Action and Alternative 2 – No New Temporary Road Construction

Alternative 2 proposes slightly more acres of shaded fuel break, slightly less commercial thinning, 14.5 miles less temporary road construction and a little over 1 mile less road decommissioning. Although alternative 2 would have slightly less negative impacts because of fewer thinning acres and fewer road miles, the potential effects from implementing alternative 2 would be very similar to the potential effects from implementing alternative 1, thus both action alternatives are discussed together.

Direct Effects

Temporary Road Construction and Road Decommissioning

Proposed new temporary roads do not cross fish-bearing stream reaches, thus new temporary road construction would have no direct effects on fish species analyzed in this document.

Ten roads proposed for decommissioning include portions of their surface in riparian habitat conservation areas along fish-bearing streams. Table 56 displays the road numbers and miles of decommission segments in designated Pacific Anadromous Fish Strategy riparian habitat conservation area buffers along

fish bearing streams (300 feet buffers). Out of these ten, only three road segments cross fish-bearing streams or encroach close to fish-bearing streams, the rest have small segments that enter the outside edges of the 300 foot fish-bearing stream Pacific Anadromous Fish Strategy riparian habitat conservation area buffer. Road number 60082 follows Pierce Creek, which provides habitat for steelhead and westslope cutthroat trout. Roads U262116D and U262116E follow Hammerean Creek, which provides habitat for westslope cutthroat trout.

Table 56. Road decommissioning in riparian habitat conservation areas along fish-bearing streams

Road Number	Miles of Decommissioning in Riparian Habitat Conservation Areas
60082	1.7
60090	0.4
U262103D	0.1
U262103E	0.1
U262110A	0.1
U262116D	0.1
U262116E	0.5
U272121A	0.1
U272122A	0.3
U272134F	0.1
Total	3.6

Decommissioning these roads is for the purpose of reducing road density, reducing vehicle disturbance in riparian habitat conservation areas, and reducing sediment input to streams. As stated in the project design criteria decommissioning activities will be closely coordinated by appropriate interdisciplinary team members and agreed to by a Forest Service hydrologist in order to avoid direct impacts to fish species and their habitats. It is unlikely any instream work would be required at these three locations. However, if any instream decommissioning work is needed on road 60082, the work window would be July 7 through August 15 to avoid direct impacts to spawning and incubating steelhead. If any instream decommissioning work is needed on roads U262116D or U262116E, the work window would be during low water after July 31st to avoid impacts to spawning and incubating westslope cutthroat trout.

Road decommissioning activities will have no direct effects on any of the five fisheries indices of measurement (as listed on page 133 of this document). They will not directly increase or decrease Endangered Species Act listed fish population densities and trends. As designed and planned, the project's activities will meet Forest Plan standard and guidelines, and Pacific Anadromous Fish Strategy riparian habitat conservation areas, riparian management objectives and standard and guidelines, thus ensuring there will be no direct effects to stream habitat conditions, stream sediment and stream temperatures. There will be no road decommissioning activities that will restore or degrade stream connectivity.

Instream Habitat Enhancement

Instream aquatic habitat enhancement activities are proposed to help restore spawning and rearing habitat for Chinook salmon, steelhead/rainbow trout, bull trout and westslope cutthroat trout. The enhancements would occur within a 150 meter reach of the North Fork Salmon River at the confluence with Twin Creek. All instream work would take place between July 7th and August 15th to avoid spawning and incubation

of Endangered Species Act listed fish as well as spawning and most of the incubation period for westslope cutthroat trout in the North Fork Salmon River.

Structure placement activities would have no direct effects on any of the five fisheries measurement indices. They would not directly increase or decrease Endangered Species Act listed fish population densities and trends. As designed and planned, the project's activities would meet Forest Plan standard and guidelines, and Pacific Anadromous Fish StrategyRiparian habitat conservation areas, riparian management objectives and standards and guidelines, thus ensuring there would be no direct effects to stream habitat conditions, stream sediment and stream temperatures. There would be no activities that would restore or degrade stream connectivity.

Since structure placement actions may overlap with the incubation period for westslope cutthroat trout, there is potential for individual cutthroat trout juveniles to be crushed or harmed by the equipment or other activities required to place the boulders. There would be no direct effects of structure placement on Snake River spring/summer Chinook salmon, Snake River Basin steelhead, Columbia bull trout, or their designated critical habitat. There would be no direct effects to essential fish habitat.

Indirect Effects

Indirect effects are defined as those effects that are caused by or would result from the proposed action and are later in time, but are still reasonably certain to occur. Indices of measurement, indices from the Matrix of Diagnostic Pathways and Indicators, essential features and primary constituent elements of critical habitat, and habitat features identified in the Pacific Anadromous Fish Strategy are all grouped and analyzed by listed indicators.

Fish Presence / Absence and Population Densities and Trend:

Because of the design features associated with the project's activities, implementation of alternative 1 is not expected to affect fish distribution and densities within the Endangered Species Act Action Area. The fish presence/absence and population densities and trends are expected to be maintained and remain near current conditions. Current resident fish populations within the Endangered Species Act Action Area are considered stable, whereas anadromous fish populations would continue to fluctuate and be depressed because of factors outside of the control of the Salmon-Challis National Forest's and the Idaho Fish and Game's management activities. The project's activities would not degrade this measurement index in the short term (5 to 10 years) and would protect, help maintain and potentially improve this measurement index in the long term (greater than 10 years) by reducing the risk of a large severe wildfire within the Endangered Species Act Action Area.

Bull Trout Subpopulation Characteristics

Subpopulation Size, Growth and Survival, Life History Diversity and Isolation, Persistence and Genetic Integrity.

The effects of proposed actions would not play a role in decreasing or increasing the bull trout population in the North Fork Salmon River, West Fork of the North Fork Salmon River, Pierce Creek, Moose Creek, Twin Creek or Vine Creek. The project's design criteria, standards and guidelines and best management practices are expected to minimize to a negligible level or eliminate project-generated effects to hydrologic resources, water quality and fish habitat in the Endangered Species Act Action Area. Further, project treatments would reduce the severity of effects of a future wildfire and reduce future cumulative effects from fires. There are no expected measurable changes to physical channel or habitat conditions from proposed activities. The long-term trend would be a slight improvement in overall riparian and aquatic conditions in the project area because of the reduced threat of high severity wildfire in the subwatersheds. Project area streams would continue to provide the same quantity and distribution of bull

trout habitats post project. Thus, the project is not likely to result in any meaningful change to population trends, habitat availability or habitat use for bull trout.

Water Quality

Temperature

Proposed actions do not include silvicultural practices that remove riparian forest cover or that are detrimental to healthy stands in riparian areas. Commercial thinning is not proposed within Pacific Anadromous Fish Strategy riparian habitat conservation areas or modified riparian habitat conservation areas thus commercial thinning would have no effect to stream temperatures.

Precommercial thinning, noncommercial thinning and shaded fuel break treatments are proposed on approximately 262.6 acres of Riparian Habitat Conservation Areas adjacent to perennial streams. Silvicultural prescriptions for precommercial and noncommercial thinning treatments within riparian habitat conservation areas are designed to maintain or restore natural vegetative processes, which includes a healthy overstory canopy. Treatments are intended to remove understory trees less than 7 inch dbh and maintain both the overstory canopy and effective vegetative shade over stream channels.

The purpose of shaded fuel break treatments is to reduce the potential for a crown fire to develop and carry through the upper canopy. Where fuel breaks intersect with perennial stream riparian habitat conservation areas, silvicultural prescriptions include only ladder fuel reduction treatments. Ladder fuel reduction includes the removal of trees in suppressed or intermediate canopy positions and some hand pruning of lower tree limbs for trees with dominant and codominant canopy positions.

Neither thinning treatments nor shaded fuel breaks would remove measureable amounts of effective shade over perennial stream channels. Furthermore, these treatments would not prevent attainment of National Marine Fisheries Service riparian management objectives. Since stream shading would be maintained, measurable increases in stream temperatures as a result of thinning actions and shaded fuel break actions are not expected. All the treatments in riparian habitat conservation areas are expected to facilitate development of canopy structure that is resilient to fire events. Over time, a more robust riparian stand structure should develop which would help maintain the functioning condition of existing stream temperatures in the long term.

Prescribed fire prescriptions call for low severity backing fire in riparian habitat conservation areas, fire ignition would not be conducted within riparian areas. Prescribed burning activities, as designed and planned would maintain adequate canopy cover such that measureable effects to stream temperatures would not occur. The effects of prescribed fire on streams and riparian zones were studied by Beche et.al. (2005) by actively lighting fire within riparian zones. Low to moderate severity fire did not measurably change riparian canopy cover and the patchy behavior of prescribed fire along with moisture levels in the riparian zone served as an effective barrier from fire reaching the stream. Implementation of burn prescriptions, project design features and following required standards and guidelines would maintain riparian functions and stream shade levels would not be affected by the project, thus water temperature would not be affected.

Log haul, road maintenance, road reconstruction, temporary road construction, road decommissioning and instream fish habitat enhancement activities would not remove trees that provide shade to streams, thus would not affect stream temperature.

Currently stream temperatures are not a limiting factor for fish in the Endangered Species Act action area. Increased stream temperature resulting from reduced shade is a concern if high-severity, stand replacing wildfire occurs within riparian habitat conservation areas. This project is designed to reduce the risk of

wildfire damage to both aquatic and terrestrial resources across the landscape. There may be long-term benefit to stream temperature by the proposed project reducing the risk of widespread, high severity wildfire.

Sediment and Spawning Habitat

Commercial Thinning

Soil compaction and displacement at landing sites, on main skid trails and in skyline corridors are expected due to equipment operations and corridor convergence. Soil displacement is expected to be small and localized and may occur where logs are lifted from the forest floor, at landings or where skyline corridors converge. Loss of groundcover and organic matter and areas of reduced productivity at landing sites and on main skid trails is expected due to equipment operations. There would also be loss of ground cover from fireline construction around thinning units. Approximately 170 acres are at risk from increased soil disturbance. Small, localized areas may have reduced soil productivity in the first 10 years following harvest as vegetation becomes re-established and organic layers rebuild. However, rehabilitation is prescribed to limit the severity of soil damage or its aerial extent.

The degree of impacts from compaction depends largely on site conditions affecting air and water balance in the rooting zone (Powers et al. 2004; Page-Dumroese et al. 2006). Detrimental effects from compaction are not expected in thinning units due to the high rock fragment content and sandy loam soil texture. Proposed activities designed to leave a variety of organic matter on site to protect the soil surface from raindrop impact and dissipate energy of overland flow. Studies have found that 60 percent effective ground cover reduced sediment movement substantially and 30 percent ground cover reduced erosion by ½ compared to bare soil (Robichaud et al. 2000). Logging slash would add to effective ground cover. Subsequent fuel treatments may reduce the amount of organic matter and groundcover left onsite in the short term (0 to 5 years after treatment). In the long term (greater than 5 years) regrowth of vegetation and needle drop would provide groundcover and leaf and litter material for conversion into soil organic matter. In addition, areas that do become compacted or displaced would be rehabilitated by scarifying or ripping the soil to restore proper water infiltration, redistributing displaced topsoil, seeding with native species, covering areas of bare soil with slash and constructing waterbars. Plant root expansion, freeze/thaw cycles, and rodent activities would also continue to rework the soil to improve soil structure.

Most of the commercial thin units were designed so standard Pacific Anadromous Fish Strategy riparian habitat conservation area buffers were excluded from the treatment units. There are 11 units where modified riparian habitat conservation area buffer widths are proposed. These units have a road within the riparian habitat conservation area boundary between the unit boundary and the stream channel. Proposed actions modify the riparain habitat conservation area buffer to the edge of the road prism. Unit numbers, treatment types and unit acres for modified riparian habitat conservation area boundary commercial treatments are shown in table 57. There are approximately 75 acres of designated Pacific Anadromous Fish Strategy riparian habitat conservation area that are proposed to be removed from riparian habitat conservation area designation where commercial thinning treatments are proposed upslope of the road.

Table 57. Units with proposed modified riparian habitat conservation areas (RHCA)

Unit Number	Treatment	Total Unit Acres	Sum Of Affected RHCA Acres	Percent of unit in Original RHCA Boundary
16	shaded fuel break	344.9	1.3	0.4%
17b	shaded fuel break	5.4	1	18.5%
85	skyline	148.3	0.1	0.1%
87	skyline	23.6	0.2	0.8%
112	tractor	76.7	2.3	3.0%
121	tractor	26.9	2.5	9.3%
122	skyline	27.0	4.3	15.9%
185	tractor	32.5	1.7	5.2%
196	skyline	23.8	1.9	8.0%
203	skyline	8.7	0.5	5.7%
227	shaded fuel break	80.1	58.9	73.5%
Totals		797.9	74.7	9.3%

The Salmon-Challis National Forest developed buffer strips for streams to minimize the probability that forest treatments would deliver sediment to stream channels. Best management practices reviews of past projects have shown Forest Plan filterstrips provided effective buffers to capture sediment before it reached a stream in the event that there was erosion and sediment transport from treatment units. In one set of surveys, 66 sites including timber harvest units and road segments were examined. Three had evidence of soil movement with soil movement distances ranging from two to five feet. The Salmon-Challis National Forest buffer strips adjacent to these three sites ranged from 90 to 150 feet and were entirely effective in preventing sediment delivery to stream channels (USDA Forest Service 1994). However, the Pacific Anadromous Fish Strategy (USDI and USDA 2005) was amended to the Forest Plan, and riparian habitat conservation area buffers in the Pacific Anadromous Fish Strategy are often wider than the Forest Plan filterstrips. The riparian habitat conservation area buffers were designed to provide sediment filtering as well as other ecological functions (e.g. large woody debris recruitment, riparian habitat, floodplain function).

Water Erosion Prediction Project (WEPP) modeling was used to estimate erosion and sediment delivery from treatment units in the project. The WEPP model uses the buffer, soil type, average slope, percent ground cover, and climate data to predict the probabilities of erosion and sediment yield occurring within the first year following treatment when the thinning units would be most vulnerable to the effects of high intensity storms. Mean annual averages, probabilities of occurrence in the first year following disturbance, and buffer effectiveness were estimated for representative hillslope profiles for each treatment unit. WEPP modeling of a typical hillslope profile (figure 17) shows that the majority of sediment transported from a treated slope and road prism cutslope would be deposited on the road surface. The modeling also shows that forested filter strips are effective in capturing any additional sediment leaving the road prism. Thus the proposed modified riparian habitat conservation area buffer widths are not expected to allow any additional sediment delivery to streams in the project area. There would be no change in sediment risk from modifying riparian habitat conservation area buffers in the listed 11 units.

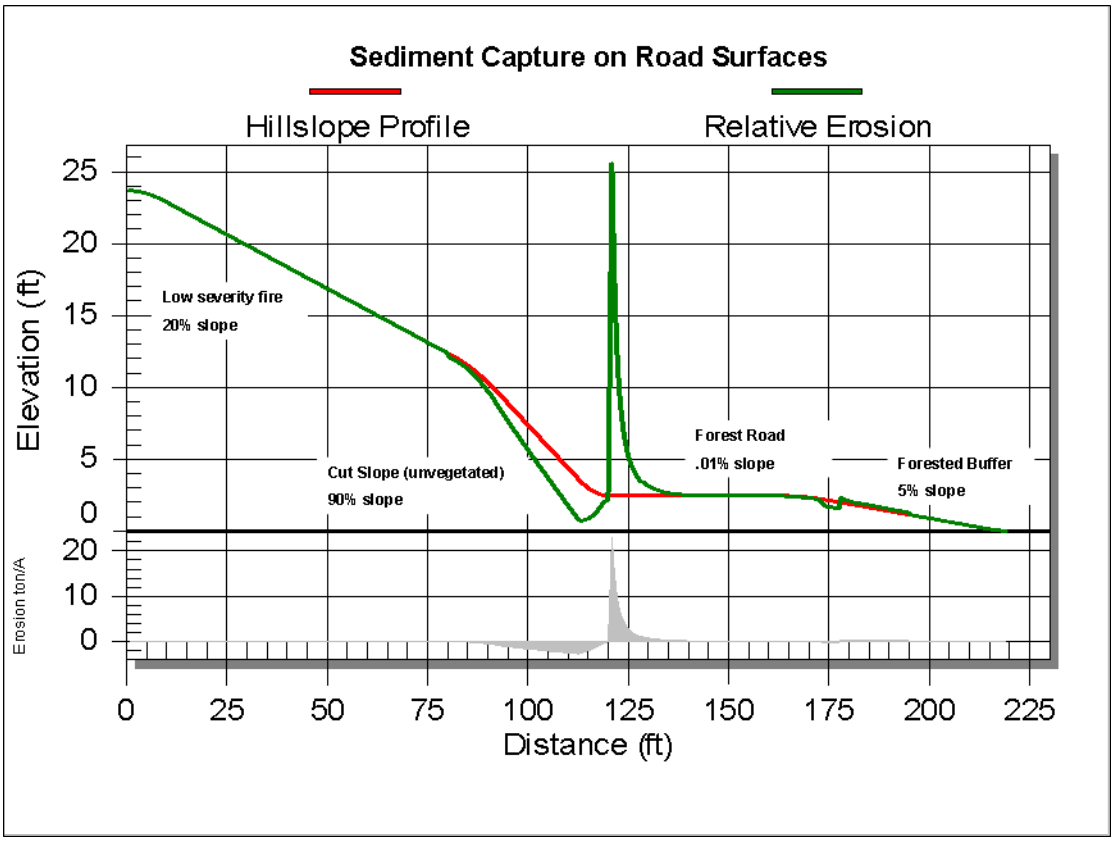


Figure 17. Typical slope profile displaying deposition on road surface and effectiveness of forested buffer

WEPP modeling results of all commercial thinning units in the analysis predict the average probability of sediment reaching a stream channel the first year following a disturbance would be less than 1 percent. (Values ranged from 0 to 4 percent probability.) Buffer effectiveness was shown to be highly effective with an average of 93 percent effectiveness.

Given the unit layout and design criteria of the proposed activities there is a high probability of success for minimizing erosion and retaining or capturing any sediment before it can enter streams within the project area. Thinning treatments were designed to maintain riparian function in the short term and through protecting riparian habitat conservation areas from high severity fire, improve riparian function over the long term.

There are no ground disturbing activities associated with commercial thinning activities within a Pacific Anadromous Fish Strategy riparian habitat conservation area or modified riparian habitat conservation area that would increase the risk of overland sediment transport to a stream channel. The project's activities would meet the Pacific Anadromous Fish Strategy standards and guidelines and riparian habitat conservation area widths or modified riparian habitat conservation area widths (USDA Forest Service 1995). Riparian habitat conservation area and modified riparian habitat conservation area widths would meet Forest Plan filter strip widths and would be adequate to protect streams from non-channelized sediment inputs. Commercial thinning activities would maintain Pacific Anadromous Fish Strategy riparian management objectives which were designed to protect aquatic habitat and channel morphology, and promote desired channel, riparian, and floodplain characteristics.

Pre-Commercial Thinning and Non-Commercial Thinning

Precommercial and noncommercial thinning activities are not expected to impact soil resources. All work would be accomplished with chain saws and hand tools so there would be no increases in soil compaction or other detrimental changes in soil physical properties.

Prescribed Burning

The greatest hydrologic influence that prescribed fire has on watershed processes affects infiltration (the amount of water that can move through the soil surface) and overland flow potential (Baker 1990). If more water is supplied than can infiltrate soils the excess runs off as overland flow, which can increase the level of suspended sediment transported in streams. Executed properly, prescribed fire does not significantly alter infiltration rates or overland flow due to the patchiness and lower intensity of vegetation burning and resultant soil effects (Baker 1990).

Precipitation is a major factor influencing post-fire erosion responses, and generally post-fire erosion would be more pronounced in wet years as compared to normal rainfall years (Wohlgemuth 2001). Natural stream sedimentation processes also largely depend upon the intensity of storm events and the proximity of sensitive areas to streams.

Approximately 40,273 acres are proposed to be burned to reduce hazardous fuel buildup. Small amounts of sediment are expected to reach streams within the project area as a result of prescribed fire treatments. Low severity prescribed fire allows for retention of soil cover which reduces erosion potential. Fine sediment exposed by prescribed fire is expected to be washed downslope during the first few post-burn precipitation events large enough to cause runoff from hillslopes. Most fines would settle out in vegetation and duff and in riparian buffer strips but some may be delivered to stream channels during storm events. Growth of herbaceous vegetation during the first growing season after prescribed fire treatments would also further reduce the risk of sediment delivery to stream channels. Low severity fire would be allowed to enter riparian habitat conservation area designations, which is not expected to negatively affect riparian reserve function.

Because fire is a natural watershed disturbance in this area, native species are adapted to persist under the natural fire regimes and associated watershed conditions. Although fish species may be exposed to slight increases in turbidity and fine sediment during storms post-project, there is low probability that the amount generated from project actions would adversely affect patterns of migration, spawning, or rearing. The activities associated with the prescribed burn units would have minimal risk to impact fish and fish habitat within the Endangered Species Act action area.

Prescribed burn activities would follow the design criteria / guidelines for fire suppression within drainages supporting listed fish and critical habitat identified in the 2002 Programmatic Biological Assessment for Fire Suppression and Prescribed Natural Fire Activities in the Upper Salmon River Sub-Basin (USDA Forest Service 2002a pp 5-7) and the National Marine Fisheries Service (USDC National Marine Fisheries Service 2002) and U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 2002) concurrence letters.

Log Haul

Forest roads are needed to conduct the prescribed burning, thinning, and timber harvest operations proposed in this project. Fines generated from increased road activity are generally airborne and fall out adjacent to the road and accumulate on the leaves of nearby vegetation. Airborne delivery of fine sediment to streams would vary depending on many factors including the proximity to a stream, slope, vegetative cover, prevailing wind and season. Typically dust settles quickly and is not transported far from the road. Dust and fine sediment are transported from the vegetation and incorporated into the forest

floor during precipitation events. Typically airborne particles would only reach streams if they settle directly on the water surface (USDA Forest Service 2013).

Water or magnesium chloride would be used to minimize the loss of road surface through dust, reduce the number of bladings needed to maintain the road surface and eliminate the need for continuous water applications. Additionally treated roads would require less maintenance and fewer bladings further reducing surface loss and sediment potentially available to streams.

Compacted road surfaces typically have very low infiltration rates and, as a result generate large amounts of surface runoff. Runoff can detach and transport fine material available on native material road surfaces. Road surface-derived sediment from runoff is generally delivered either directly or via ditches during storm events or snow melt. Vehicle traffic, especially heavy trucks, can crush surface aggregate material and this generates more fine particles that are available for transport by runoff. In addition, the pressure of vehicular tires on saturated road aggregate can force fine particles from below the surface to move to the surface. Fine sediment created by hauling and other project traffic on unpaved roads is expected to be washed from road surfaces in the first few precipitation events large enough to cause runoff from the road surface. Sediment delivery from roads generally occurs where roads are either close to or cross streams, or at cross drains that are gullied down to the stream network. Haul routes and their proximity to streams are variable throughout the project area. Most fine sediment washed from road surfaces by runoff would settle out in vegetation and duff. Fine sediments reaching stream channels would likely remain in suspension and move rapidly through the system to settle in low gradient reaches.

Project design criteria (such as dust abatement) would effectively minimize risk of road damage and road wear. Sedimentation due to log haul is considered short-term in duration, expected to last one rainy season following harvest and hauling activities. The amount of fine sediment generated by log haul that is washed off roads and entrained into the stream system is expected to be minor and dispersed and undetectable from background road use. Sediment generated from hauling is not expected to measurably increase turbidity or levels of fine sediment in the Upper North Fork Project area or negatively impact downstream beneficial uses.

Road Maintenance and Road Reconstruction:

Road maintenance and reconstruction consists of removal of earth barriers, slough and debris removal, brushing, minor repairs to drainage features and culvert replacement. Slough and debris removal by blading are expected to result in short-term sediment delivery to streams throughout the project area during the first few storms after reconstruction. Project design criteria and best management practices (USDA Forest Service 1988) would minimize erosion and reduce the associated risk of stream sedimentation during and following the activities. Fine sediment created by road maintenance and reconstruction is expected to be washed from road surfaces in the first few precipitation events large enough to cause runoff from the road surface. Most would settle out in vegetation and duff but some may be delivered by ditches during storm events.

Culvert replacement on 3 streams would also result in short-term sediment delivery after the first few storms when water begins to flow in the channels. Replacing culverts and eliminating passage barriers would have long-term beneficial effects by improving the ability of drainage structures to function properly and reduce the risk of road crossing failure. New passage structures would also be properly sized to withstand peak flow flood events.

The effects of planned road activities would be short-term in nature, include minimal surface erosion, and would be expected to last one rainy season following the activities. The amount of fine sediment generated by road maintenance and reconstruction that is washed off roads and entrained into the stream

system is expected to be minor and dispersed and undetectable from background road use. Fine sediment generated from culvert replacement is also expected to be short-term and minor and culvert replacement would result in a long term positive effect on sediment production. Road reconstruction activities combined would result in short-term negative effects to turbidity and instream fines, however, the effects are expected to be insignificant.

Road maintenance activities would follow the mitigation measures identified in the 2002 Programmatic Biological Assessment For Road Maintenance On Public Lands Administered by: Salmon-Challis National Forest and Bureau of Land Management Salmon, Challis and Idaho Falls Field Offices In the Upper Salmon River Basin and Lost River Subbasin (USDA Forest Service 2002b pp 14-18) its associated May 29, 2003 Supplement (USDA Forest Service 2003) and the National Marine Fisheries Service (USDC National Marine Fisheries Service 2003) and U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service2003) concurrence letters.

Temporary Road Construction and Road Decommissioning:

Approximately 13.9 miles of temporary road construction is proposed with approximately 0.5 mile in riparian habitat conservation areas. One short segment enters the outside edge of the riparian habitat conservation area around the North Fork Salmon River for about 0.05 miles. The remaining 0.45 miles are where two temporary roads cross intermittent stream channels.

Newly constructed temporary roads are being proposed only where the existing road prisms do not meet project needs. It is anticipated that most temporary roads would be opened and reclosed in the same season but some could be used for more than one season depending on the scheduling of treatments. Temporary roads would be decommissioned at the completion of project activities supported by the route. Decommissioning is intended to eliminate the use of the route and facilitate a rapid return to vegetative production within the disturbed area. Construction of new roads is expected to cause a short-term increase in potential sediment production. Because the new construction is very limited in riparian habitat conservation areas occurring on the outside edge of a fish-bearing stream and occurring where the roads cross seasonally flowing streams, measurable amounts of fine sediment from new road construction are not expected to reach perennial fish-bearing waters.

Road decommissioning is proposed on approximately 66.3 miles of road in the project area (including the13.9 miles of temporary road construction). In addition to roads used for the proposed action unauthorized routes that are not needed for public access or administrative use would be decommissioned to improve watershed conditions. Surveys were conducted on unauthorized routes to identify problem areas, develop closure prescriptions, and prioritize routes for closure. Generally speaking, decommissioning roads by re-contouring to establish original drainage and stabilizing with native vegetation is the preferential treatment, however, in most cases, the roads identified for decommissioning are well vegetated and closed to traffic. In these cases, a less disturbing method of decommissioning by treating only the entrance may be preferred.

Road decommissioning is expected to cause a short-term increase in potential sediment production until ground cover and vegetation are re-established on the former road surface. Implementation of best management practices and project design criteria would minimize the increased erosion. Temporary road construction and road decommissioning actions have short –term negative effects to turbidity and instream fine sediment. The effect of the temporary deposition of fine sediments from the new surface disturbances would have an insignificant effect on turbidity and instream fines. Any fine sediment flushed downstream at the beginning of the rainy season would become indistinguishable from background. Road decommissioning negative effects are expected to last about 2 growing seasons as native vegetation becomes established on the disturbed roadbed. Road decommissioning would have long-term positive

effects on instream sediment indicators and spawning areas for fish species because fewer road prisms on the landscape reduce the risk of sediment being transported to streams.

Culvert replacement activities would follow the design and mitigation measures identified in the December 1, 2011 Programmatic Biological Assessment for Restoration Activities at Stream Crossings Affecting the Habitat of ESA-listed Fish Species on National Forests and Bureau of Land Management Public Lands in Idaho (USDA Forest Service 2011) and would meet associated requirements as stated in U.S. Fish and Wildlife Service June 15, 2012 (US Fish and Wildlife Service 2012) and the National Marine Fisheries Service June 4, 2012 (USDC National Marine Fisheries Service 2012) biological opinions.

Chemical Contaminants/Nutrients

There are no known sources of chemical or nutrient pollution in project area subwatersheds. There are no 303d listed streams within the Endangered Species Act action area. There are no known chemical contaminations in streams within the Endangered Species Act action area The project design and required design criteria associated with Forest Plan and programmatic biological assessments would ensure the project's activities would not input chemical contaminants into streams Commercial logging camps, helicopter log landings, refueling sites and staging areas would only be allowed outside of Pacific Anadromous Fish Strategy riparian habitat conservation areas and would have a developed site plan to ensure all resources are protected on lands within the project area. Fueling operations and storage would be governed by USDA Forest Service Timber Sale Special Contract Provision CT6.344 Prevention of Oil Spills. Therefore the effects of alternative 1 would have no effect on chemical contamination/nutrients.

Habitat Access

The fisheries analysis area identified two fish barrier culverts on two fish streams within the Endangered Species Act action area. The identified non-fish passable road crossings that create migration barriers have negatively influenced stream connectivity and reduced essential migration corridors within the fisheries analysis area. Completed road crossing surveys and analyses for identifying barriers to aquatic organism passage indicated the following: Deep Creek has one, at least partial, fish migration barrier culvert located on NFSR #60449; Hammerean Creek has one, at least partial, fish migration barrier culvert also located on NFSR #60090. In addition to these two culverts a third on Johnson Gulch NFSR #60090 is proposed for replacement.

Project actions would restore habitat access benefiting fish species by removing identified fish migration barriers and restoring natural channel and sediment transport processes with the Endangered Species Act action area. Culvert removal would have a positive effect on physical barriers and migration.

Habitat Elements

Large Woody Debris

Commercial thinning is not proposed within riparian habitat conservation area or modified riparian habitat conservation area boundaries, thus commercial thinning would not affect large woody debris. Non-commercial thinning and pre-commercial thinning actions propose to hand thin small diameter, understory trees less than 7 inch dbh and leave the trees onsite within riparian habitat conservation areas. Shaded fuelbreak treatments propose a ladder fuel reduction, removing selected trees in suppressed or intermediate canopy positions. These types of treatments would retain all larger sized overstory vegetation and would not modify the amount of existing large woody debris or large trees in riparian habitat conservation areas. Alternative 1 and 2 thinning and shaded fuelbreak treatments were designed to improve the structure and diversity of stands within riparian habitat conservation areas and reduce the potential for a crown fire to develop and carry through the upper canopy. In the long term thinning

treatments may have a positive effect on large wood recruitment by protecting riparian habitat conservation areas from burning under high fire severity conditions in the future. The project's activities would meet the Pacific Anadromous Fish Strategystandard and guides and riparian habitat conservation area widths or modified riparian habitat conservation area widths (USDA, Forest Service 1995).

Thinning treatments proposed in alternatives 1 and 2 would have neutral effects to large woody debris.

Prescribed burn prescriptions are designed to retain large woody debris both standing and downed, in riparian habitat conservation areas. Low severity fire in riparian habitat conservation areas would not burn hot enough or long enough to consume existing large woody debris and would not reduce future large woody debris recruitment. Prescribed burning in riparian habitat conservation areas is expected to have discountable effects to large woody debris. Treating riparian habitat conservation areas with prescribed fire may have slightly positive long term effects to large woody debris levels by protecting these areas from burning under high fire severity conditions in the future. High severity wildfire in riparian habitat conservation areas would have the potential to consume large woody debris and decrease large woody debris recruitment.

Log haul, transportation management and instream fish habitat enhancements activities would not remove large wood from project riparian habitat conservation areas, thus would have no effect to large woody debris. The action alternatives would maintain current levels of large woody debris.

Pool Frequency, Pool Quality, Off-Channel Habitat and Rearing

Within the Endangered Species Act action area, pool frequency, pool quality and off-channel habitat, are largely dependent upon the existence of flow deflectors (such as large woody debris or boulders) serving as pool scouring and channel maintenance agents, and the sediment regime. Proposed actions would have no negative effects to large woody debris (as discussed under the large wood indicator). Prescribed burning, log haul, and transportation system management all have potential to increase sediment (as discussed under the sediment indicator).

Prescribed burning would result in slight increases of soil disturbance and surface erosion at the site scale during storm events following proposed activities. The extent of soil cover loss is expected to be minimized by resource protection measures and best management practices incorporated into the project design. The small amounts of fine sediment that may enter stream channels would likely stay suspended and be transported immediately downstream. The amount of fine sediment generated by prescribed burning and entrained into the stream system is expected to be minor and dispersed and undetectable from existing levels of instream fines. Any changes in the sediment regime due to prescribed burning activities are not expected to result in meaningful or detectable effects to pool habitats, off-channel habitat or rearing habitat. Should a wildfire occur in the future, the proposed underburning may have a long term beneficial effect on watershed processes (including hydrological processes and sediment regimes) and fish habitat as it would reduce the severity of effects of a future wildfire.

Log haul and transportation system management (road maintenance and reconstruction, culvert replacement, temporary road construction and road decommissioning) is expected to result in short-term sediment delivery to streams throughout the action area during the first few storms after activity. Project design features, following required standards and guidelines, and meeting Pacific Anadromous Fish Strategy riparian habitat conservation areas and modified riparian habitat conservation areas would minimize erosion and reduce the associated risk of sediment delivery during and following the activities.

The amount of fine sediment generated by transportation system management and entrained into the stream system is expected to be minor and dispersed and undetectable from background levels. The small magnitude of these impacts would not affect pool frequency, pool quality, off-channel habitat or rearing

habitat. Effects are expected to be insignificant. Culvert replacement and road decommissioning would result in long term positive effects on sediment production. There would be an overall net loss of road surface in the subwatersheds, thus a long-term positive effect to road-related erosion.

Instream fish habitat enhancements would be place to create pool or deeper water habitat in a shallow section of the North Fork Salmon River. Structures would break up a low gradient riffle reach by providing habitat complexity and to allow deposition of suitable spawning gravels. Structure placement would slightly improve pool frequency and pool quality at a localized site.

Collectively, proposed actions are expected to have a neutral effect on pool frequency, pool quality, and rearing habitat. This determination is a result of project design including best management practices. Riparian habitat conservation area and modified riparian habitat conservation area buffers along all stream courses protect stream banks from the potentially negative consequences of erosion, sloughing, and compaction. Large tree retention in riparian habitat conservation areas would maintain pool forming and off channel habitat forming features in the long term. Effects are expected to be insignificant at both the site and watershed scales.

Refugia

Refugia are areas where species or a community of species would be able to survive after extinction in surrounding areas. Overall, project activities would not measurably restore nor degrade stream habitat elements or riparian areas that create and maintain refugia. The North Fork population of Snake River spring/summer chinook salmon has a low or moderate risk spatial structure/diversity rating thus have the potential to achieve viable status. Snake River Basin steelhead in the North Fork Salmon River watershed are rated with a maintained viability with the Salmon River major population group exhibiting relatively high population densities. Bull trout are well distributed throughout the mainstem Salmon River and its tributary streams including the North Fork Salmon River. Proposed actions would not change existing habitat conditions for fish species to a measurable degree, thus would not change refugia conditions in the watershed. There are no activities associated with this action that would reduce the viability of fish populations. The project would meet the Pacific Anadromous Fish Strategy standard and guidelines and riparian habitat conservation area widths or modified riparian habitat conservation area widths (USDA Forest Service 1995). Therefore, the effects of alternatives 1 and 2 would have a neutral effect on refugia.

Channel Condition and Dynamics

Width/Depth Ratio and Streambank Condition

These two indicators are analyzed together because width to depth ratios are typically a function of stream bank stability where decreased channel stability leads to increased width to depth ratios.

Channel width to depth may respond to interrelated minor adjustments of stream bank stability and/or external input of sediment from road stream crossing construction (culvert replacement). However, the duration and magnitude of channel instability is expected to be minor and limited. Channel conditions would be maintained on all other project area streams reducing the risk of management induced compounded effects. Proposed actions would not change the functional condition of stream channels thus there is a discountable probability of modifying width to depth ratios or stream bank condition.

The project would have a neutral effect to width to depth ratio and stream bank condition indicators. Riparian habitat conservation areas and modified riparian habitat conservation areas would retain stream bank integrity and would protect stream channels from erosion, sloughing, and compaction. Width to depth ratio and stream bank conditions would be retained through project design which is intended to

retain channel stability, prevent sediment delivery and protect riparian habitat conservation areas from potential high severity fire.

Floodplain Connectivity-

Transportation system management activities have the greatest likelihood to affect floodplain connectivity. Typically, a channel may be prone to lose floodplain connectivity as a result of road-stream crossings, excessive channel scour, or stream channel downcutting. The principal influences on connectivity include stream channel stability, erosive energy, and reduced channel roughness through loss of large woody debris or large size class substrate (cobble or larger). Floodplains are not a significant component in Rosgen type A and B stream channels whose general characteristics include high-gradient reaches with boulder–cobble substrates. The extent of response reaches, which are low-gradient reaches that typically store sediment is in the valley bottoms where transportation system management actions are absent.

The project would maintain principle influences on floodplain connectivity. Project actions are expected to maintain consistent water yield and timing which should maintain baseline erosive energy. Channel roughness factors would be sustained through maintenance of large woody debris or large size class substrate (cobble or larger) and would not be impacted by project actions. Stream morphology is expected to remain consistent with the baseline condition. No measurable change in channel transport capabilities are expected to result due to road reconstruction or temporary road construction. Riparian habitat conservation areas and modified riparian habitat conservation areas would provide sufficient streamside buffers to retain the quantity and timing of stream flows, retain channel stability, and prevent sediment delivery. There is a discountable probability of project actions modifying flood plain connectivity.

Flow Hydrology

Change in Peak/Base Flows-

Proposed actions that remove forest cover have the potential to decrease interception and transpiration, and increase annual water yields. Increases in annual water yield following forest harvest are usually assumed to be proportional to the amount of forest cover removed, but at least 10 to 20 percent of the trees must be removed to produce a statistically detectable effect. Since evapotranspiration rapidly recovers with vegetative regrowth in partially thinned areas, any increase in runoff due to thinning treatments is likely to persist for about 5 to 10 years. The project proposes to treat between 10 to 15 percent of the forested area in the Upper North Fork subwatershed and 15 to 20 percent of forested area in the Middle North Fork subwatershed. There would be no detectable change in the Upper North Fork subwatershed as a result of the proposed activities. The Middle North Fork subwatershed has the potential to show a statistically detectable change in flow as a result of the proposed commercial thinning activities. Flow modeling using Equivalent Clearcut Area was based on a worst-case scenario (clear-cutting) and proposed treatments do not reach modelled levels of vegetation removal. Although the model suggests changes in flow may be detectable in this subwatershed, remaining existing vegetation is expected to uptake any excess water run-off as a result of thinning. Increases in base or peak flows are expected to be minor and of short duration, and are not expected to alter channel morphology.

Overall, thinning treatments would not have detectable effects to water yields either on-site or at the subwatershed scale. Most prescriptions do not remove 20 percent of the basal area to generate a detectable change in flow. There may be some units where there would be a detectable hydrologic response to proposed thinning treatments. These cases would be limited spatially and temporally and would only show measureable effects at the site scale. Minor changes in flow timing are expected from both the beetle epidemic and proposed commercial thinning activities, however effects would be minimal based on the silviculture prescription and design of this project. In addition, project design features and

following required standards and guidelines are expected to be effective in minimizing hydrologic connectivity of commercial thin units with the stream network.

Research (Stednick 2010) suggests that light to moderate prescribed fire has little effect on streamflow because only a small percentage of the vegetation is affected. Thus, net changes in infiltration characteristics are minimal. Since major components of the water balance are not substantially altered through prescribed fire treatments there is no meaningful effect on streamflow.

Excessive surface runoff is not expected from proposed actions, and there would be adequate residual trees and vegetation to provide root strength and to use excess groundwater so that soil stability is largely maintained. In addition, project design features and following required standards and guidelines are expected to be effective in minimizing effects to the hydrologic function of project area subwatersheds.

Increase in Drainage Network-

There would be 13.9 miles of temporary road construction which would be obliterated when project activities utilizing those road segments are completed. If the temporary road is not decommissioned prior to the wet season, it would be weatherproofed by construction of waterbars, crossdrains and grade breaks. This would ensure that surface waters do not concentrate on the road surface and contribute directly to increases in drainage network density. Temporary road construction would have discountable effects to this indicator. Because temporary roads would be obliterated; there is no probability of temporary road construction increasing road density.

There are 66.3 miles of road proposed for decommissioning. Decommissioning roads would decrease the drainage network within the Endangered Species Act action area and improve the environmental baseline for this indicator. There would be no net gain of road density due to project proposed actions.

Watershed Conditions

Road Density and Location-

Proposed road decommission actions would reduce the road density in the Upper North Fork subwatershed from 1.4 miles/square mile to 1.2 miles/square mile and reduce the road density in the Middle North Fork subwatershed from 5.0 miles/square mile to 2.9 miles/square mile. Therefore, the effects of the project would improve this environmental baseline condition.

Disturbance History

The equivalent clearcut area in the Middle North Fork subwatershed peaked in 1982 with about 28 percent in a hydrologically immature condition. With less opportunity for harvest, the equivalent clearcut area in the Upper North Fork peaked in 2003 with about 7 percent of the subwatershed in a hydrologically immature condition. Recovery has outpaced harvest allowing trees in both subwatershed to mature. Currently more than 95 percent of the Endangered Species Act action area is in a mature condition. Current equivalent clearcut areas are less than 5 percent for both subwatersheds. Baseline equivalent clearcut areas for a natural pre-fire exclusion condition were modeled at about 18 percent. Depending on the timing of commercial thinning and prescribed burning, proposed actions could increase the equivalent clearcut area in Middle North Fork as high as 17 percent and could increase the Upper North Fork as high as 13 percent. However, these modeled percentages would represent an unlikely worst-case scenario.

Project actions are expected to have short term, insignificant negative impacts on this this indicator and long term positive effects by improving forested stand health and improving watershed resiliency to large disturbance events such as wildland fire. Both subwatersheds would likely be at or below the 15 percent equivalent clearcut area for a watershed to be considered functioning appropriately (USDC National

Marine Fisheries Service 1996 p 12 & US Fish and Wildlife Service 1998 p 23). Both subwatersheds would be below the 18 percent equivalent clearcut area modeled for natural pre-fire exclusion conditions.

Riparian Habitat Conservation Areas

Proposed treatments are designed to reduce fuel loading and move the vegetation in treated areas closer to stand characteristics that occurred historically in terms of stand density, large tree density and species diversity. Vegetation treatments in riparian habitat conservation areas including pre-commercial and non-commercial thinning, shaded fuel breaks and low severity prescribed fire would remove accumulated ground and dead fuels, and dense low-growing understory vegetation with the intent of eliminating ladder fuels and reducing the threat of a crown fire. Large overstory vegetation would remain intact and would continue to provide thermal regulation. In the long-term, treatments in riparian habitat conservation areas are expected to promote the growth of larger species already present, resulting in a more diverse forest structure and a source of large woody debris. Project activities move treated riparian habitat conservation areas towards being more resilient to wildfire and maintain riparian processes and function.

Due to the low intensity of fire allowed to burn in riparian areas there would be no effect to thermal regulation, nutrient filtering, surface erosion, bank erosion, and channel migration, or large woody debris as the integrity of riparian buffer strips would be maintained and prescribed fire treatments would not alter riparian functions. Prescribed fire treatments in riparian habitat conservation areas are expected to minimize the risk of future extreme fire behavior in riparian habitats. Due to project design and meeting Pacific Anadromous Fish Strategy standards and guides and riparian habitat conservation area widths or modified riparian habitat conservation area widths, the integrity of both riparian areas and stream channels would be protected from adverse direct and indirect effects of proposed actions. There is a discountable probability that the project would lead to measureable negative impacts riparian habitat conservation areas and high probability that the project would reduce potential future impacts to riparian habitat conservation areas from wildfires. Therefore, the environmental baseline condition would be maintained in the short term and slightly improved in the long term.

Disturbance Regime-

Due to land developments and fire suppression, wildfires in this area have become much less frequent, more intense and extensive, and pose increased risks to the loss of life, property, and natural resource values. Climate modeling also predicts weather conditions that would likely increase the likelihood of large fire occurrence. The project would reduce fuels and break up the continuity of fuels across landscape. Prescribed fire treatments would begin the restoration of fire to the ecosystem in a controlled manner and promote return to the historic fire regime; thereby the project is likely to decrease the intensity and extent of future wildfires and the associated watershed impacts of wildfire and wildfire suppression efforts. The project would have a slightly positive effect to the disturbance regime indicator because proposed actions would begin to bring the disturbance regime back to desired conditions. As a result, there would be a gradual reduction in accumulated fuel levels across the landscape and a trend toward historic fuel conditions and a reduced risk of adverse effects to watershed resources. Thinning and prescribed fire treatments would trend project area subwatersheds to reduced overall disturbance levels where adverse watershed effects are not expected to occur.

Habitat Quality and Connectivity-

Alternatives 1 and 2 would not negatively impact stream habitat quality and would improve stream connectivity. Project actions would meet the Pacific Anadromous Fish Strategy standards and guidelines and riparian habitat conservation area widths or modified riparian habitat conservation area widths (USDA Forest Service 1995).

Cumulative Effects

Cumulative watershed effects were examined for the project and considered the disturbance history as well as ongoing and reasonably foreseeable future actions of both private and public lands in the action area. The cumulative effects analysis area is the same as the Endangered Species Act action area and consists of two 6th-field subwatersheds: Upper North Fork Salmon River (HUC 170602030601) and Middle North Fork Salmon River (HUC 170602030602). As described in the project hydrology report (USDA Forest Service 2013), a watershed risk rating based on watershed relief, road density, channel stability and equivalent clearcut area was used to evaluate overall watershed condition and the potential impacts of land management on project area subwatersheds.

Reasonably foreseeable future and ongoing federal actions considered for the cumulative effects analysis for the project include the following: recent and on-going vegetation treatment activities including noxious weed treatments, timber harvest and hazard tree removal on National Forest System lands. See appendix C for a comprehensive list of past, present and foreseeable activities and events considered in this analysis. Additionally there are fuels reduction projects either completed or underway on non-National Forest System lands in and around communities in the action area. There is also mining activities and recreation use within the action area including hiking, fishing, OHV use, camping, and hunting. Non-recreation uses include private property inholdings, private development, transmission lines and communication sites.

As shown in the watershed risk rating used to determine current cumulative effects for hydrologic and aquatic resources (page 111and table 46), the proposed activities increase equivalent clearcut acre values but lower road densities. Overall, risk ratings would be elevated from existing conditions in the short term (3 to 5 years post project) but in the long term (longer than 5 years post project) the resiliency of the subwatersheds would be improved because they would be exhibiting a more natural fire regime. Long term, the net result would be a reduced watershed risk and improved watershed conditions. Additionally, design features that reduce potential disturbance and risk would be used during project implementation. The treatments would take place over ten years, further reducing the disturbance in any given year.

There is a discountable probability that instream aquatic habitat indicators would be measurably affected by the project. Project actions are not likely to contribute to changes in runoff response in action area subwatersheds and are not expected to contribute to increases in peak/base flows by a detectable level. The project is likely to result in minor, short-term sediment effects that are within the natural range of watershed conditions in the action area. The potential for the project to contribute to cumulative effects is considered low, as the duration of potential effects, in particular sedimentation, to instream and riparian habitat is expected to be short-term and discountable. Further, proposed actions would reduce the severity of effects to aquatic habitats from a future wildfire, should it occur, and would result in reduced future cumulative effects from potential high severity fires.

Summary Determinations

Commercial thinning treatments would have an insignificantly negative effect on peak/base flows and on disturbance regimes. Precommercial and noncommercial thinning would have neutral effects to all habitat indicators. Prescribed burning would have short term insignificantly negative effects and long term positive effects on sediment. Log haul would have insignificantly negative effects on sediment. Transportation system management would have short term insignificantly negative effects and long term positive effects on sediment, positive effects on physical barriers, drainage network and road density, and insignificantly negative effects to disturbance regime. Instream fish habitat enhancements would have neutral effects for all habitat indicators.

An Effects Determination Key was completed for the Upper North Fork HFRA Ecosystem Restoration Project for federally listed fish species and their critical habitat and sensitive fish species as shown below in Table 58.

Table 58. Effects determination summary of the Upper North Fork HFRA Ecosystem Restoration Project

Effects Determination Variables	Conclusion (Yes/No)
Do any of the indicator summaries have a positive (+) or negative (-) conclusion?	Yes
Are the indicator summary results only positive?	No
If any of the indicator summary results are negative, are the effects insignificant or discountable?	Yes

Consequently the Upper North Fork HFRA Ecosystem Restoration Project "**may affect, but is not likely to adversely affect**" Snake River spring/summer Chinook salmon, Snake River Basin steelhead or Columbia River bull trout.

The Upper North Fork HFRA Ecosystem Restoration Project **may affect but is not likely to adversely affect** designated critical habitat for the Snake River spring/summer Chinook salmon, Snake River Basin steelhead or Columbia River bull trout.

The Upper North Fork HFRA Ecosystem Restoration Project **may affect but is not likely to adversely affect** essential fish habitat for the Snake River spring/summer Chinook salmon.

The Upper North Fork HFRA Ecosystem Restoration Project **may impact** the westslope cutthroat trout R4 sensitive fish species or its habitat in the short term with long-term beneficial effects. The proposed Upper North Fork HFRA Ecosystem Restoration Project shall not contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Project design criteria and analysis that contribute to the **may affect, but is not likely to adversely affect** effect determination are summarized below:

- Wildfire is a natural watershed disturbance in the project area. Consideration of the natural fire regime indicates that wildfire is likely in the near future. Wildfire in the project area in its current condition is likely to threaten watershed resources. Vegetation thinning and prescribed fire treatments are expected to help protect aquatic ecosystems from potentially severe effects of future wildfire.
- Snake River spring/summer Chinook salmon, Snake River Basin steelhead and Columbia River bull trout have evolved in the context of natural fire regimes and associated watershed conditions.
- There would be no direct impacts to Snake River spring/summer Chinook salmon, Snake River Basin steelhead or Columbia River bull trout.
- Only low severity prescribed fire would enter Riparian Habitat Conservation Areas. Riparian habitat conservation areas would remain functional, and stream shade and large woody debris would not be reduced due to the project.
- Integrated design features incorporated into the project design and required standards and guidelines would minimize sediment delivery into streams.

- The proposed commercial thinning activities do not take place within riparian habitat conservation areas or modified riparian habitat conservation areas.
- The proposed transportation system management activities decommission about 66.3 miles of road. Temporary roads would be obliterated and treated to control erosion following project activities. Reconstruction of system roads would improve and stabilize their condition thereby reducing amounts of road-generated sediments.

Management Indicator Analysis Summary

Both action alternatives (alternative 1 and alternative 2) would maintain existing bull trout viability, maintain the bull trout population trend and maintain bull trout habitat on the Salmon-Challis National Forest. The rationale for this assessment is based in part on the project fisheries biological assessment determination for bull trout as May Effect- Not Likely to Adversely Affect determination.

Irreversible and Irretrievable Commitments of Resources

There would be no irreversible or irretrievable commitment of resources as a result of implementing either action alternative

Compliance with the Forest Plan and Other Regulatory Direction

Alternative 1 (proposed action) and alternative 2 (no new temporary road construction) as described above and in relation to aquatic resources are in compliance with the Forest Plan (USDA Forest Service 1988) and other regulatory direction such as the Clean Water Act of 1972 as amended 2002, the Endangered Species Act of 1973 as amended 2002 and the National Forest Management Act 1976. Both action alternatives manage threatened and endangered species habitat to maintain or enhance their current status and maintains aquatic habitat capability at sufficient levels to meet State goals for both resident and anadromous fisheries.

Terrestrial Biota

Introduction

This section discloses the impacts of the Upper North Fork HFRA[6] Ecosystem Restoration Project (project) on US Forest Service Region 4 Regional Forester's Sensitive species, Salmon-Challis National Forest Management Indicator Species, migratory birds, and species of interest, namely big game.

Current Management Direction

The following management direction applies for wildlife. Forest plan direction may range from broad to site-specific. Further direction may come from Regional authority or other regulation, or other regulating agencies, like the US Fish and Wildlife Service.

USDI Fish and Wildlife Service

The following direction applies to Federally-listed threatened and endangered species.

Canada lynx were federally listed as threatened by the US Fish and Wildlife Service in 2000 (US Fish and Wildlife Service 2000). A distinct population segment was finalized for the population found in the contiguous US (US Fish and Wildlife Service 2003), which includes the project area. Critical habitat was designated in the contiguous US in the northern Rocky Mountains, Maine, and Minnesota (US Fish and

[6] Healthy Forests Restoration Act of 2003

Wildlife Service 2009); however, the Salmon-Challis National Forest does not contain any designated Critical Habitat for Canada lynx.

On February 4, 2013 the status of North American wolverine within the lower 48 states changed from being a candidate species to being proposed. The US Fish and Wildlife Service, in the Federal Register (Vol. 78, No. 23), published the Proposed rule to list the distinct population segment of the North American wolverine occurring in the contiguous United States as threatened. Two extensions to the comment period have since been issued (October 2013 and February 2014).

USDA Forest Service application of the Northern Rocky Mountains Lynx Management Direction

The Salmon National Forest Land and Resource Management Plan, as amended, (Forest Plan) (USDA Forest Service 1988) provides direction as it relates to the project area. Some of the direction is superseded by more specific direction included within the Northern Rockies Lynx Management Direction (USDA Forest Service 2007). The Northern Rockies Lynx Management Direction amended all Forest Plans within its jurisdiction and provides standards and guidelines for activities occurring on National Forests within the management area (the Northern Rockies), including the Salmon-Challis National Forest and adjacent National Forests. Most of the direction included in the Northern Rockies Lynx Management Direction is related to vegetation management in lynx denning habitat and snowshoe hare habitat as the hare is the primary prey animal. Thus, timber harvest, insect and disease management, fuels management, and grazing management are important aspects of managing a landscape for lynx. Human recreation management (primarily within the snowy periods) is addressed as well, because human activity may influence lynx behavior and habitat. Because the Salmon-Challis National Forest is unoccupied secondary lynx habitat according to the Northern Rockies Lynx Management Direction, the Forest is encouraged to consider, but not bound to use, the management direction provided.

Salmon-Challis National Forest Application of the Northern Rockies Lynx Management Direction Record of Decision

The Northern Rockies Lynx Management Direction Record of Decision amended 18 Forests Plans in Regions 1 and 4. The direction of that decision applies to “mapped lynx habitat on National Forest System lands presently occupied by Canada lynx, as defined by the Amended Lynx Conservation Agreement between the Forest Service and the US Fish and Wildlife Service. When National Forests are designing management actions in unoccupied mapped lynx habitat they should consider the lynx direction, especially the direction regarding linkage habitat.” (USDA Forest Service 2007 Northern Rockies Lynx Management Direction Record of Decision, p. 1). The Northern Rockies Lynx Management Direction, Record of Decision selected Alternative F, Scenario 2, which states: management direction would be incorporated into all forest plans, but would only apply to occupied habitat. Under Scenario 2, the direction should be “considered” for unoccupied units, but would not have to be followed until such time as lynx occupy the unit. The Salmon-Challis National Forest was considered to be unoccupied based on the best scientific information available at that time of the Northern Rockies Lynx Management Direction Forest Plan Amendment.

According to the definition of “occupied” in the Northern Rockies Lynx Management Direction, the Salmon-Challis National Forest remains unoccupied. That is, there have not been two verified sightings since 1999 (USDA Forest Service 2007 Northern Rockies Lynx Management Direction Record of Decision 29; USDA Forest Service 2007 Northern Rockies Lynx Management Direction Ch. 1 pg. 3; Ch. 2 pg. 99-100; Ch. 3 pg. 142-143; USDA Forest Service and US Fish and Wildlife Service 2006 pg. 4). The most recent verified sighting was an individual lynx incidentally caught in a leghold trap on the Salmon/Cobalt Ranger District in late 2011 and successfully released by the Idaho Department of Fish and Game.

Salmon National Forest Plan

Forest plan wildlife-related direction is included in appendix E of the wildlife specialist's report, located in the project record.

Consultation to Date

Interagency cooperation between the Forest Service (or other federal agency) and the US Fish and Wildlife Service, regarding proposed, threatened, or endangered species, is described in Section 7 of the Endangered Species Act. Definitions relating to "consultation" and "conference" are given in FSM Supplement 2600-90-6.

The US Fish and Wildlife Service, Idaho Field Office, publishes a general reference use list of threatened, endangered, candidate, and proposed species by county on their website (US Fish and Wildlife Service 2014). This US Fish and Wildlife Service species list for Lemhi County was obtained on February 19, 2014; it indicates the Canada lynx (T), North American wolverine (P), yellow-billed cuckoo (P), and greater sage-grouse (C) are found in Lemhi County. Furthermore, an approximate project area boundary was digitized to create the official species list using the US Fish and Wildlife Service's Information, Planning, and Conservation (IPaC) web tool. This list includes only the wolverine. The Canada lynx is added for the previously mentioned reasons. This BA strictly addresses the expected effects of the project on Canada lynx and North American wolverine. (See appendix A of the wildlife specialist's report, located in the project record, for the official species list.)

Correspondence and communication with the US Fish and Wildlife Service has occurred during meetings and telephone and email communications. Specifically, the project was discussed on the following dates:

20140129 – Level One consultation meeting for the Upper North Fork Restoration Project

20140214 – Phone conversation between L. Berglund of the US Fish and Wildlife Service and S. Hill of the USDA Forest Service

Evaluated Species Information, Effects, and Determinations

Analysis Process

National Forest Management Act (NFMA) regulations, adopted in 1982, require that habitat be managed to support viable populations of native and desired non-native vertebrates within the planning area (36 CFR 219.19). USDA regulation 9500-004, adopted in 1983, re-enforces the NFMA viability regulation by requiring that habitats on national forests be managed to support viable populations of native and desired non-native plants, fish, and wildlife. The following 4-step process is used in this analysis to assess changes in species or their habitat:

Step 1: Pre-field Assessment

The analysis process related to wildlife species started prior to identification of proposed activities. For example, unique habitats such as critical habitat, or uncommon habitats, were identified. As these areas are of public interest and are important to maintaining species viability and biodiversity, they were avoided for inclusion within proposed activities. Once the proposed actions were identified, information was collected and reviewed to identify species' present conditions or affected environment. This information included species literature searches; Salmon-Challis National Forest project files and GIS data; aerial photos; past activities; relevant survey data (biological species surveys within and near the project area); and monitoring and observation databases for locations of known wildlife species and habitats within the project area.

The Salmon-Challis National Forest has conducted track surveys for lynx in suitable habitats, including the project area in recent years and has not yet detected any sign of lynx (tracks, scat, hair samples) (Haggas 2014, personal communication). The Forest plans to continue surveys as feasible. Other wildlife survey and observation information was considered and used as appropriate to determine wildlife use of the project area.

Step 2: Field Assessment

The author reviewed existing project record data to better understand the purpose and need of the proposed activities; observations and incidental sign of wildlife use documented; and habitat conditions identified in the pre-field assessment validated. I spent a week in autumn 2012 hiking through project units, with a concentrated effort in the mapped lynx habitat where silvicultural and fuels reduction activities were proposed. In autumn 2013 I spent a day in the same area, concentrating my efforts in the vicinity of Chief Joseph and Lost Trail Passes where there is suitable lynx habitat and a linkage zone.

Step 3: Wildlife Screening

The wildlife analysis was done using a multi-scale assessment that included the following basic strategies; 1) a coarse filter approach (described below) which is used to identify wildlife communities across a wide area. This approach assumes that if the species, genetics, functions, and processes are protected at the community level, then the bulk of the biotic species, both known and unknown, will also be protected, 2) the second strategy is to assess habitat and effects to those species considered most at risk and/or those species with potential viability concerns. In this instance, this includes federally threatened, endangered, and proposed species with habitat within or immediately adjacent to the project area.

See appendix A of the terrestrial wildlife specialist's report, located in the project record, for the list of Threatened, Endangered, Sensitive, and management indicator species considered in this analysis. If a species has no habitat in the project area, and would not be expected to be found in the project area, or would not be affected by the project, then it was eliminated from further analysis and indicated with a "no effect" determination. Those species with suitable habitat and likely or known to occur are considered, as indicated with some other determination summary.

Using information from steps one through three, anticipated changes in habitat and the associated communities were predicted under the activities considered and associated effects to wildlife and wildlife habitat evaluated. Information from steps one and two were used to complete the coarse filter analysis, identify and evaluate spatial relationships between habitat(s), assess changes in landscape diversity, and predict changes and effects to species in general context. Site-specific data was used to assess specific project level changes in habitat and ensure that unique vegetative and physical habitat conditions were maintained and/or protected.

Step 4A – Environmental Baseline

The "environmental baseline" as defined under the Endangered Species Act (ESA) includes past and present impacts of all federal, state or private actions and other human activities in the action area, and anticipated effects of all proposed federal projects in the action area that have undergone consultation, and state or private actions that are contemporaneous with the consultation. This discussion should describe the current baseline conditions, with emphasis on the important risk factors and habitat relationships that were described in the previous section. This analysis includes other influences on the landscape, as well, such as wildfires. Within the NEPA analysis, this can also be referred to as "existing condition."

Step 4B – Scales of Analysis

The appropriate methodology and level of analysis needed to determine effects are influenced by a number of variables including the presence of species or habitat, the scope and nature of activities associated with the proposed actions and the potential risks that could ultimately result in adverse effects. Wildlife distribution and use of an area is largely determined by the availability of suitable habitat and can be influenced by site specific needs such as the vegetative structure or physical features on a site, as well as by landscape considerations such as the proximity to other habitat or the need for isolation or seclusion. As a result, a multi-scale analysis that looks at site-specific conditions in areas proposed for treatment (fine filter), as well as landscape considerations such as the proximity and availability to other habitat (coarse filter) will be considered. The multi-scale of analysis used in this assessment includes the following.

Step 4C – Project Level Assessment

Wildlife use of an area is often influenced by specific conditions that can only be identified at the stand or site scale. This assessment is also used to identify habitat features that may need to be protected or enhanced and is used to identify site-specific mitigation measures for project design criteria (see appendix A).

Direct and indirect effects to wildlife are assessed by evaluating potential effects to individuals and changes in habitat or conditions on National Forest System lands within the project area boundary. The area of analysis was selected for analysis of direct and indirect effects on wildlife species because it includes all areas proposed for activities and contains an adequate diversity of habitat conditions (vegetative and topographic) to assess wildlife distribution and use.

The existing condition of vegetation and the changes that would likely occur as a result of the proposed action, as it relates to wildlife habitat suitability, are quantified to the extent practicable in this document; if quantification not suitable, then a qualitative discussion may be sufficient. Changes in conditions are correlated to changes in habitat suitability. This correlation provides a useful tool to estimate the direction and magnitude of changes in wildlife habitat suitability caused by changes in condition.

Professional judgment is the principal method used to forecast effects. This judgment is backed by applying the most applicable scientific information related to wildlife on the Salmon-Challis National Forest, through experience assessing impacts from proposed activities to wildlife and wildlife habitat from similar proposed actions, and through formal and informal consultation with US Fish and Wildlife Service.

Step 4D – Cumulative Effects Assessment

Cumulative effects as defined under Endangered Species Act are those effects of future State or private activities, not involving Federal activities, which are reasonably certain to occur within the action area of the Federal action subject to consultation. This discussion should describe the current baseline conditions, with emphasis on the important risk factors and habitat relationships that were described in the previous section.

Under the NEPA, the cumulative effects discussion also includes the effects from past, present, and reasonably foreseeable federal activities. Again, the past activities are in general considered to form a part of the existing, or baseline, conditions.

Rationale for selection of these areas and terms include:

The environmental baseline (existing conditions) takes into account all activities and naturally occurring events, such as wildfires, that have occurred prior to the present, and which have led to the existing condition of habitat. If there are notable circumstances expected as a result of project implementation, such as the introduction of non-native plant species or habitat conversion, they will be brought forward in the effects discussion on a species-by-species basis. Within the project area, the Gibbonsville fuel reduction project addressed and reduced hazardous fuels in the vicinity of Gibbonsville, and the Upper North Fork project would increase the area treated near this community and the larger landscape.

Aerial imagery was used to assess the effects of past fires in and near the project area. The project area includes portions of large wildfires since 2000. These fires include the Sula and Twin fires in 2000 and the Frog Pond fire in 2003 which burned in the north and northwest of the project area boundary. The Twin fire burned with mixed to low severity and is well revegetated. The Sula and Frog Pond fires burned with varying intensity including severe to low, and the overstory kill is still clearly visible.

In 2012, the Mustang complex burned a small portion of the western project area, and was very large at over 377,000 acres. The Mustang complex burned with varying severity. Nearest the Upper North Fork project boundary it burned with mixed severity. The densest timber in high elevations burned with the greatest severity overall, although there are patches of unburned, dense forest remaining. In general, areas where there were previous forest thinning activities or where stands were naturally less dense, the burn severity was moderate to low. Riparian areas and springs are clearly visible now and are recovering quickly, as one might expect.

Wildfire management is expected to continue to be a suppression activity.

See appendix C for a comprehensive list of past, present and foreseeable activities and events.

Spatiotemporal scales for analyzing any effects can vary for each species. Generally, for species with limited mobility or small home ranges or territories, a smaller cumulative effects analysis area is required. Conversely, for wide-ranging species, a larger analysis area may be necessary. The scale will be discussed in each species' assessment.

There are no other activities on the current schedule of proposed actions for the Salmon-Challis National Forest in the project area. Adjacent to the project area, the Bitterroot National Forest has no scheduled projects. The Beaverhead-Deerlodge National Forest has two categorical exclusions under analysis: Chief Joseph Ski Trail Maintenance and Construction and Chief Joseph Cross Country Ski Trail Hazard Tree Removal. Use of a determined categorical exclusion means there are no extraordinary circumstances related to threatened, endangered, proposed, or sensitive species.

Affected Environment and Environmental Consequences by Species

Canada Lynx

Life History, Habitat, and Distribution

Lynx are medium-sized cats. Their large, heavily-furred feet easily hold their weight on snow. Long, dark ear tufts and a black tipped tail are distinctive. Adults weigh between 8.5 and 10 kilograms on average and are around 80 centimeters from nose to tail, females being the smaller of the sexes (US Fish and Wildlife Service 2012).

Adult lynx are largely solitary animals; they come together for mating in the late winter and early spring (Ruediger et al. 2000; US Fish and Wildlife Service 2012). Kittens are born in May and June in Yukon (Ruediger et al. 2000), and likely a similar time throughout the rest of the distribution. In the Lower 48,

females select den sites in mature spruce and subalpine fir forests with significant quantities of downed logs, rootwads, and wind thrown trees.

Snowshoe hares and squirrels are the primary prey, although a variety of other wildlife is consumed (US Fish and Wildlife Service 2003; US Fish and Wildlife Service 2007). Red squirrels are an important alternate food source for lynx (Ruediger et al. 2000; US Fish and Wildlife Service 2003), and they may be particularly important prey when hare numbers are low (Ruediger et al. 2000).

Lynx home ranges are large, from roughly 20 to 215 square kilometers (US Fish and Wildlife Service 2007). Actual home range size and use depends on an individual's gender, age, season, prey abundance, and local lynx population (ibid). Lynx may increase home range size if prey populations decline (ibid). Home ranges on the southern periphery of lynx distribution seem to be larger than in the core of the range (central Canada) (ibid).

Lynx seem to tolerate human activity or presence (Mowat 1999, in Ruggiero et al. 1999; Ruediger et al. 2000; US Fish and Wildlife Service 2007). Forest roads do not seem to adversely affect lynx movement, although roads and highways with high traffic volumes may influence how lynx move across the landscape between suitable habitat patches (US Fish and Wildlife Service 2003; US Fish and Wildlife Service 2007). Forest roads are not considered to have high-volume traffic. Forest roads are narrow and do not contribute to large areas of non-habitat within lynx analysis units, and road edges can provide early seral stage vegetation that is preferred by lynx prey. Road density does not appear to have an effect on how lynx select habitat (Ruediger et al. 2000; US Fish and Wildlife Service 2007). Dispersed recreation is not suspected to have an adverse effect on lynx because human activity in such areas is generally predictable in location and time, and lynx are rare and unlikely to be encountered (US Fish and Wildlife Service 2007). Disturbance near den sites is believed to be a greater threat, yet such occurrences are believed to be extremely unlikely because lynx and den sites are rare (US Fish and Wildlife Service 2007). The greatest threat to individual lynx may be collisions with motor vehicles on forest roads, although there are no records of such fatalities (ibid). Furthermore, vehicle collisions are unlikely given the slow vehicle speeds on forest roads (ibid). Traffic associated with project implementation can be categorized as slow-moving and of a low-volume.

Denning and foraging habitat are critical components of lynx populations. Lynx denning habitat has downed logs and rootwads that provide protection from predators and thermal cover for kittens (US Fish and Wildlife Service 2003). The amount of downed logs and other woody debris appears to be more important than the type of forest structure (ibid). The quantity of down wood may be greater in older forests than in young stands, however, regenerating stands can contain large quantities of downed material, (for example, natural conifer regeneration after wind throw events).

Foraging habitat very closely matches snowshoe hare distribution because the lynx is largely dependent on the hare for its food. In the western US, hares use habitats that provide food and cover from weather and predators (US Fish and Wildlife Service 2003). During the summer, the hare has wide variety of vegetation available; during the winter, however, the availability of forage is controlled by snow depth (Ruediger et al. 2000; US Fish and Wildlife Service 2003). During the winter, snowshoe hare forage, and subsequent lynx habitat use, is related to above-the-snow stems and twigs and cover (Ruediger et al. 2000). This food and cover combination is found in dense young conifer stands that protrude above the winter snowpack and in mature, dense stands that have layered crowns that are low enough to be reached during the winter. These stands most often contain a mix of tree species and have a hardwood shrub understory component.

A Salmon-Challis National Forest lynx habitat database identifies suitable vegetation types that are included as lynx habitat. Steep south- and west-facing slopes are typically unsuitable, because habitat

types are dry and snow cover is not maintained throughout the winter months except at high elevations. North- and east-facing slopes tend to be more suitable because the vegetation type is preferable, because the canopy and understory are dense, and the snow tends to remain deeper in the winter. Suitable vegetation types in the project area National Forest include subalpine fir (*Abies lasiocarpa*), riparian shrubs, and aspen (*Populus* spp.)/conifer mix.

In addition to the vegetation type, the vegetation structure plays an important role in determining habitat suitability for Canada lynx, in particular for its prey, snowshoe hares. Suitable structural classes include stand initiation, understory re-initiation, and old forest multi-story stands (USDA Forest Service 2007).

The stand initiation structural stage is suitable winter snowshoe hare habitat for roughly 10 to 30 years after a stand regenerating event, provided tree density is suitable and the trees protrude above the winter snow level, thereby providing year-round food and cover for hares.

The stand re-initiation process creates regenerating pockets of trees in an otherwise older stand with no understory as the older trees die and create canopy openings. These pockets of regeneration may not be as extensive as in large stands under the stand initiation structural stage, but the distribution of regeneration within an older forest can provide the conditions for a multi-structured stand in the future. The suitability of the vegetation for snowshoe hares again depends upon the vegetation protruding above the snow level.

The old forest multi-story structural stage includes old or mature forest stands interspersed with pockets of young trees, and often will include stands of varying ages. Not only will the branches of the young trees protrude above the snow, but the lower branches of the mature trees can intersect the snow level, providing snowshoe hare forage and cover.

The core of lynx distribution is across subarctic North America in boreal forests, and extends into southern Canada and the northern contiguous US along forested, high elevation mountain ranges as far south as Colorado (Ruediger, et al. 2000; US Fish and Wildlife Service 2003). Small populations also exist in northern Minnesota and Maine (ibid). The distribution of lynx is related to the distribution of its primary prey, the snowshoe hare (US Fish and Wildlife Service 2003).

Lynx in the contiguous US are at the southern edge of their range, and occur in regions where snow levels are deep and they have an advantage over their prey because of their large feet (US Fish and Wildlife Service 2003). Adequate snow depth, denning habitat, and prey habitat are limited to the boreal forests of the Rocky Mountains and Cascades of Washington in the west, and suitable forest types are in a patchy distribution, both in space and time (ibid).

There is but one recent and verified Canada lynx observation, and no evidence of lynx residency and reproduction, on the Salmon-Challis National Forest (USDA Forest Service 2007; Forest wildlife records database 2014). As such, the Salmon-Challis National Forest is considered unoccupied, secondary lynx habitat according to the Northern Rockies Lynx Management Direction. The Bitterroot National Forest to the north and the Beaverhead-Deerlodge National Forest to the east are also considered secondary, unoccupied habitat (USDA Forest Service 2007). A review of Forest Service observations databases revealed no recent, verified sightings on either adjacent Forest. This is not unexpected because the three Forests are at the southwestern edge of suitable mountainous habitat and bordered by very unsuitable sagebrush and otherwise high desert, Great Basin habitat. There are numerous unverified observations on and near the Forest by people with reported experience in identifying lynx (trappers, for example).

Canada Lynx Baseline Information

Figure 18 and figure 19 below display the baseline information discussed in the following two sections.

Lynx Analysis Units

A lynx analysis unit is the analysis area by which lynx habitat is assessed at the project scale. In general, a lynx analysis unit represents approximately the area used by an individual lynx and ranges from about 25 to 50 square miles (USDA Forest Service 2007).

As indicated above, the Salmon-Challis National Forest has classified its lynx habitat based on suitable vegetation types, namely subalpine fir-dominated stands in the project area. This forest type occurs at the higher elevations of the project area, while Douglas-fir and ponderosa pine types occur at lower elevations. Lodgepole pine occurs mixed with subalpine fir as well. This type classification is used as the habitat model for lynx habitat on the Forest.

As the Forest is on the periphery of the lynx's Lower 48 range, lynx analysis units are not necessarily contiguous; the lynx analysis units in this area of the Salmon-Challis National Forest are discontinuous. The project area intersects a portion of the North Fork Headwaters lynx analysis unit, about 34,195 acres (about 53 square miles). In this lynx analysis unit there are about 21,900 acres of modeled lynx habitat (about 64 percent of the lynx analysis unit).

Adjacent lynx analysis units on the Bitterroot and Beaverhead-Deerlodge National Forests have been modeled with more detail than the Salmon-Challis National Forest lynx habitat, and indicate foraging (that is, snowshoe hare) habitat and a category identified as "general" habitat. They also indicate denning habitat. Broadly, suitable lynx habitat is found along the divides between the Forests, and there is little in the way of identified foraging habitat. Metadata for the Beaverhead-Deerlodge National Forest data indicates more detailed categorization was not completed as the Forest continues to be unoccupied.

The adjacent lynx analysis units on the Bitterroot National Forest are named Camp Creek, Hughes Creek, and Overwhich Creek. On the Beaverhead-Deerlodge National Forest they are numbered 236 and 246.

Lynx Linkage Areas

A linkage area provides connectivity between larger blocks of lynx habitat (USDA Forest Service 2007).

The project area is bordered on the north by Lost Trail and Chief Joseph Passes. The Bitterroot Range lies to the northwest and the Beaverhead Range to the south-southeast. The junction of high forested country with major mountain ranges provides for potential movement corridors. Thus, the project area sits on the edge of a mapped linkage area, and at greater distances includes more linkage zones east in Montana's Pioneer Mountains and west in Idaho's Salmon River Mountains.

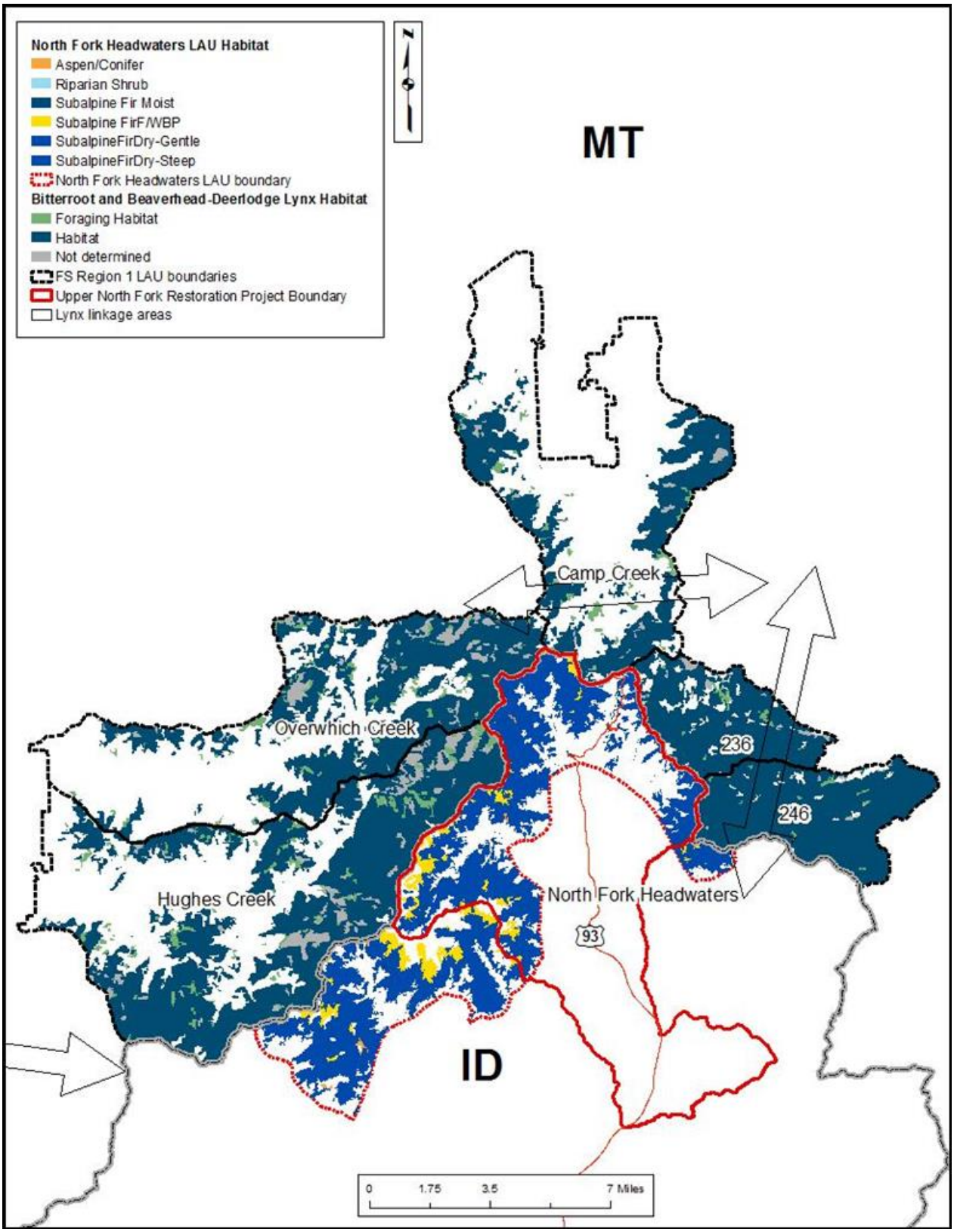


Figure 18. Canada lynx baseline habitat in the project area, including adjacent lynx analysis units

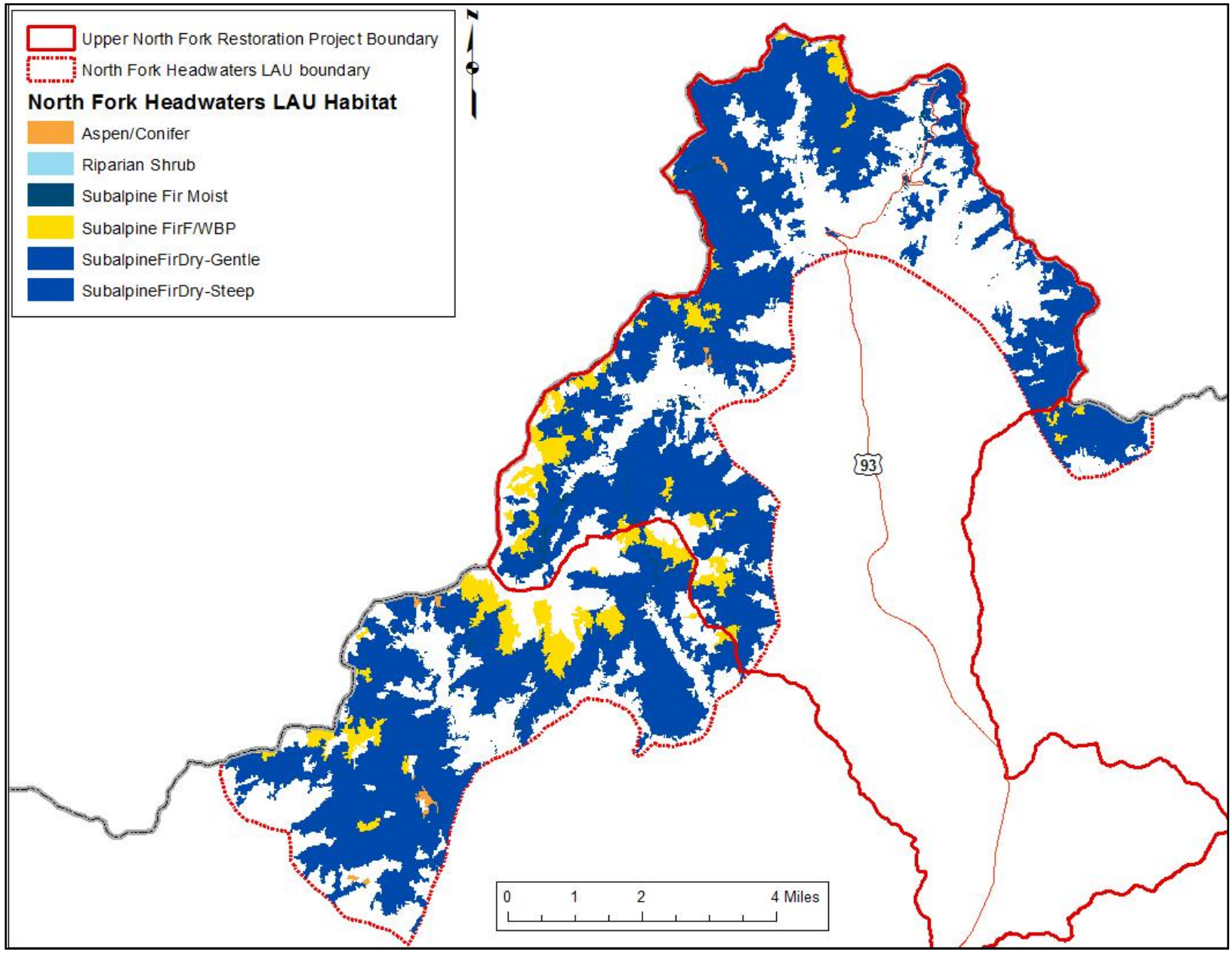


Figure 19. Lynx habitat in the North Fork Headwaters lynx analysis unit

Canada Lynx Environmental Consequences

The environmental consequences analyzed in this document include potential direct, indirect, and cumulative effects to individual lynx and to lynx habitat. Effects to individuals can include the risk of injury and disturbance, decreased reproductive success, or other effects to daily existence. These are discussed in a qualitative manner. Effects to habitat include changes to the amount and/or condition of available habitat in the sort and long term. These are discussed qualitatively but can be quantified by the acres proposed to be treated in the project.

No Action Alternative

The existing biotic processes and management would continue and would influence lynx habitat in the project area. A discussion of vegetative changes and the influence of insects, disease, and wildfire over time provide a framework to compare the proposed action from the results of not taking any action, given that the existing conditions vary from the desired conditions.

Effects to lynx habitat are drawn in part from the existing conditions for short term effects to projected vegetation changes, and fire, insect, and disease threats, as presented in the silviculture specialist report (USDA Forest Service 2012).

Direct and Indirect Effects

The silviculture report indicates there would be predictable and significant vegetation consequences should existing forest processes continue without intervention (USDA Forest Service 2012). In summary, there would be a continued over-representation of:

- Mid- and late-seral species abundance and distribution;
- Understory re-initiation and older, multi-story forest structure types; and
- High-density forests.

There would be a continued under-representation of:

- Early-seral species;
- Stem-exclusion and stand initiation structural types; and
- Low- and moderate-density forests.

There would be an increase in susceptibility to high-severity, stand replacement wildfire across the landscape, including those vegetation types adapted to more frequent, but low-intensity wildfire (USDA Forest Service 2012). Increased forest density and existing vegetation types that contribute to the fire risk also contribute in part to the insect and disease threats (ibid).

Specifically, based on recent trends in fire activity, the current fire condition class (moderate and high departure from historic regimes), and insect activity, forest stands that are lynx habitat are at a high risk of high severity fire and regeneration from insect mortality (USDA Forest Service 2012). This is complicated also by adjacent forest stands in the landscape being similarly at risk; should said adjacent stands at lower elevations experience severe fire activity, it would threaten the existing lynx habitat at higher elevations.

Post-fire revegetation is dependent on several factors, notably fire severity, existing vegetation type, and burned area size (USDA Forest Service 2012). Lodgepole pine readily regenerates from stand replacement fires, but regenerated stands are killed by frequent low-intensity ground fire (ibid). North- and east-facing slopes are wetter, and are thus better lynx habitat because the vegetation is denser and

typically more diverse, producing better hare forage. These slopes also can burn more severely because of this and fuel loads are usually higher, which can reduce cover and forage for an indeterminate, but long time. Given the existing conditions and potential for a severe wildfire event, the post fire condition would be large homogenous openings on lower slopes, and primarily lodgepole pine on the upper slopes. The result would less diversification in vegetation types and structure than currently exists or that would exist from the proposed action.

Action Alternatives

Direct and Indirect Effects

Lynx are not believed to occupy the project area, as per the discussion above. Should an individual enter the project area during implementation, the primary potential effect of the project would be disturbance associated with project activities, including noise from harvesting, hauling, and road maintenance equipment, vehicular traffic, and fire and smoke from fuels treatments. Low speed and low volume forest road traffic is not thought to present a high risk to lynx. As lynx are very mobile, they should be able to easily avoid human activity in prescribed fire units. As there is no known population on the Forest and therefore no reproduction, it is unlikely that there would be denning lynx and kittens that would be affected. The low likelihood of occupation, lynx mobility, and negligible effects of forest road use are expected to make project disturbance effects be inconsequential.

Proposed treatments that could affect lynx habitat include meadow thinning and burning, shaded fuel break, skyline harvesting, and tractor harvesting. The meadow units are contiguous with existing open meadows and meadows that have grown in as a result of fire suppression. These meadows are on south-facing slopes and historically would have grass and sagebrush cover. Where trees encroached the meadows, they are primarily Douglas-fir and lodgepole pine. These are dry meadows with little snowshoe hare forage suitability, and therefore are of little forage value for Canada lynx. Treatments for the meadow units are lop and scatter, which means trees would be felled, bucked up, and followed by burning which should reduce the large fuels volume on the ground. Cutting would occur on the edges of the meadows and would not affect any forest interior lynx habitat. All told, 177 acres of currently suitable lynx habitat would be treated under this prescription, centered on 12 meadow units that intersect lynx habitat.

Adjacent to the Lost Trail Pass ski area is a treatment designed to break up forest continuity, and thereby potential crown fire continuity and severity. Three harvest types or treatments would occur in lynx habitat: a shaded fuelbreak, skyline, and tractor. These units are numbered 16, 35, and 184. To the north of this group of units is the regenerating forest resulting from the Sula District wildfire in 2000. The units fall on the ridge to the west of the ski area and three miles of US Highway 93 on the south side of Lost Trail Pass. The shaded fuelbreak treatment would occur on the relatively level ridge top; the tractor harvest on moderately level slopes to the west of the ridge; and the skyline harvest would occur on steeper ground to the west and unsuitable for tractor access. Table 59 below summarizes the treatments.

Table 59. Treatments in lynx habitat in the vicinity of the Lost Trail Pass ski area

Unit	Treatment	Acres	Acres of lynx habitat treated
16	Shaded fuel break	303.1	293.6
35	Tractor	107.5	107.5
184	Skyline	56.8	56.7
Total		**467.4**	**457.8**

The treatment in the shaded fuelbreak unit is to retain the largest trees possible to achieve ten foot crown spacing. Fuels would be piled and burned. Post-treatment lynx habitat will be reduced in quality immediately following treatment because dominant canopy cover will be reduced and subdominant trees and shrubs will be reduced in cover to varying degrees. About ten years after treatment it is expected that there will be some shrub and sapling return, and winter habitat quality for lynx will increase through approximately 30 years when natural thinning causes sapling branches become out of reach for foraging snowshoe hares. In the longer term, the younger, vigorous tree growth will occur amidst the retained older trees and may produce multi-story mature habitat. The units adjacent to the fuel break would also be thinned to ten foot crown spacing, and only the tractor unit, the middle one, would be broadcast burned. The resulting lynx habitat value would be like that in the fuel break unit.

The remaining tractor units in lynx habitat would also reduce overstory canopy (see table 60 below). Some of these units would be broadcast burned, some would not. By refraining from broadcast burning, the understory shrubs, coarse woody debris, and structural diversification would be only moderately reduced as compared to units where a broadcast burn is included. As above, the commercial thinning prescription would retain trees at a ten-foot crown spacing. By ten years post-harvest the understory vegetation, especially shrubs, are likely to be well-represented as a result of minor reductions in canopy and more access to light and water under both burn and no burn scenarios. In the long term, snowshoe hare habitat may improve as a result of the increased food and structural diversity that provides cover. There would continue to be pockets of dead and down trees that would provide potential denning habitat, especially near riparian areas.

Table 60. Treatments in lynx habitat at and south of Chief Joseph Pass

Unit	Treatment	Acres	Acres of lynx habitat treated
36	Tractor	78.1	77.9
38a	Tractor	6.6	6.6
38b	Tractor	29.3	21.0
39	Tractor	27.3	25.6
40	Tractor	47.0	23.5
41a	Tractor	5.9	4.4
41b	Tractor	28.7	12.3
42	Tractor	17.3	17.2
43a	Tractor	17.7	12.0
43b	Tractor	10.6	10.5
43c	Tractor	15.2	10.8
45a	Tractor	23.9	0.0
232	Tractor	25.1	11.3
233	Tractor	59.0	26.2
Total		**391.6**	**259.2**

Reduced canopy continuity and fuel loads on the forest floor would reduce the risk of a stand replacement fire burning up the treated units and adjacent lynx habitat.

While habitat quality would be affected (reduced) in the short term, in the long term it would benefit through diversification of forest structure and movement towards a distribution that is more in line with the fire regime and potential vegetation for the site. As such, the vegetative conditions would be more resilient to stand replacement events such as wildfire and insect and disease outbreaks. This in turn would benefit lynx prey, and lynx.

Within the North Fork Headwaters lynx analysis unit, this project would alter the condition of, but not necessarily eliminate, 717 acres of lynx habitat (about two percent of the lynx analysis unit and about 3.2 percent of the suitable or modeled habitat in the lynx analysis unit). While the Forest does not have to comply with the Northern Rockies Lynx Management Direction, the small amount of lynx habitat affected is within the guidelines set forth in the direction.

The cover retention or spacing guidelines for the treatment units would retains sufficient canopy cover to permit lynx use of the habitat in the linkage zone.

Cumulative Effects

There are no known State, private, or Tribal actions ongoing or considered in lynx habitat in the project area. Private ownership is at lower elevations in the project area, outside lynx habitat and the North Fork Headwaters lynx analysis unit. Therefore, according to the Endangered Species Act, there are no cumulative effects.

Under the NEPA, cumulative effects would also include Forest Service activities. There are no other Forest Service projects planned in the project area. On the Beaverhead-Deerlodge National Forest, Wisdom Ranger District, analysis is being done now for ski trail maintenance, route reconstruction, and hazard tree removal under two projects. Both are categorical exclusions and therefore by definition should have no effects to lynx or their habitat.

Canada lynx determination

It is my determination that the implementation of the no action alternative may affect, but is not likely to adversely affect the Canada lynx. This is based on the following rationale:

- Forest conditions in the whole of the project area are out of the normal range of variability in regards to fire regime and forest density, and in lynx habitat this departure is less pronounced. Nonetheless, lynx habitat would continue to be threatened by the potential for severe wildfire if no action is taken.
- Habitat connectivity would remain unchanged in the short term, barring a large, intense wildfire. If there were a very large and intense wildfire, however, there could be a substantial loss of lynx habitat in the project area.
- Forest structure is such that in the long term there would be a continued underrepresentation of vegetation stages that are suitable for lynx prey.

It is my determination that the implementation of the proposed action may affect, but is not likely to adversely affect the Canada lynx. This is based on the following rationale:

- Canada lynx are not known to occupy the project area according to recent survey efforts and historical observation records. Any individual lynx is unlikely to be affected.
- If a lynx were to be present, the potential for disturbance and injury is extremely remote.
- Very little area of lynx habitat within the corresponding lynx analysis unit would be affected. Most of the project treatments are addressing forest fuel and health issues at lower elevations outside lynx habitat.

- About three percent or less of modeled or suitable lynx habitat and lynx analysis unit area, respectively, would be affected by forest vegetation and fuels management. There would be a moderate long term increase in prey forage as a result of some treatment in lynx habitat as a result of silvicultural treatments, and more so from the patchy burn characteristics of prescribed fire.
- There would be no loss in suitability of the linkage zone in the Lost Trail and Chief Joseph Passes area.
- Lynx in the Northern Rocky Mountains (lower 48 distinct population segment) are adapted to a fire-prone ecosystem.

It is my determination that the implementation of either the no action or proposed action will have no effect on Canada lynx critical habitat. This is based on the following rationale:

- There is no designated critical habitat in or near the project area.

North American Wolverine

Life History, Habitat, and Distribution

The wolverine has a Holarctic distribution; the North American subspecies, *Gulo gulo luscus*, is found from Alaska, to far northern Canada, and south in the Lower 48 United States along mountain ranges, including Idaho and Montana (USDA Forest Service 2013). It is the largest member of the family *Mustelidae* (ibid).

Adult wolverines are generally solitary except during mating. Females often become pregnant by age two or three, and can become pregnant every year (US Fish and Wildlife Service 2013). One to two kits are born (ibid). However, kits are not born every year as the female may spontaneously abort the fetus(es), even relatively late in the term, if resource conditions (namely food), are not suitable to rearing young (ibid). Also as a result, reproductive rates are low. Kits are born in mid-February through March (ibid).

Wolverines are not associated with specific vegetation types or geological features; rather it has been shown they select habitat that is cold and gets enough snow such that there is deep persistent snow cover late into the spring (US Fish and Wildlife Service 2013). Thus, the further south in the wolverine's distribution or the closer to warmer climatic influences, habitat would be located at higher elevations (ibid).

Wolverines are opportunistic scavengers, and prey on small mammals, and consume fruits, berries, and insects (US Fish and Wildlife Service 2013). Large game, deer and elk, are moderately abundant in the vicinity of the project area. In a Montana study, elk and deer made up 12 and 27 percent, respectively, of the winter diet (Pasitschniak-Arts and Lariviere 1995). Hares, marmots, and other small rodents are widely reported as food sources (ibid). It is believed they are largely active in the night, although it is variable (ibid).

Home ranges vary between sexes and age, and male home ranges may be dependent on female presence and reproductive status (US Fish and Wildlife Service 2013). Food availability and distribution also affect home range size (ibid). Male home ranges in Idaho were about 588 square miles; females, 148 square miles (ibid). It is thought that the large home range for their size reflects their life history, namely as scavengers that require a large area in which to search for food.

Population densities are low, and in Idaho are estimated at one per 76 square miles (Copeland 1996).

Wolverines are believed to be relatively intolerant of human disturbance, yet the converse has been observed, as well (US Fish and Wildlife Service 2013). Initially, research indicated that wolverine

presence was negatively related to human activity, but that may be a result of their habitat preference and that humans avoid the same geographical space (remote areas) (ibid). Across its range, there is little human activity in habitats where the wolverine is found (ibid). Recreational use may be the most frequent use of potential wolverine habitat in the project area (recreational use and the ski area), and wolverines appear to be somewhat tolerant of these activities (ibid).

Recent research has highlighted the importance of persistent spring snow cover as a primary requirement of wolverine habitat and a predictor of suitable habitat. Deep snow cover is required for denning females as it provides security and thermal over for young (US Fish and Wildlife Service 2013). Females often have alternate den sites and use them as they find a need to move, be it disturbance, snowmelt, or other reasons (ibid).

The Forest Service Northern Region (Region 1) used a model of suitable wolverine habitat that is based on persistent spring snow cover during a seven year period (Copeland et al. 2010). This model extends into adjacent Regions, including the area of the Salmon-Challis National Forest by 150 miles, and as such includes the project area. This model depicts the number of years recorded where there was mid-May snow cover from 2000 to 2006. The project area has suitable late spring snow cover along the Continental Divide and along the Bitterroot Divide. During the measurement period along the divides, there was mid-May snow cover for at least one year along most of the boundary, and in each year for some locations (Allan Mountain vicinity). This does not necessarily mean there was a snow depth suitable for denning, just that snow cover, as detected by satellite, was present, thus indicating broad habitat suitability.

Wolverine habitat is displayed in figure 20 below. The darkest blocks (black) indicate only one year of seven had snow cover in mid-May. The stippled blocks indicate all seven of the measured years had snow on that date.

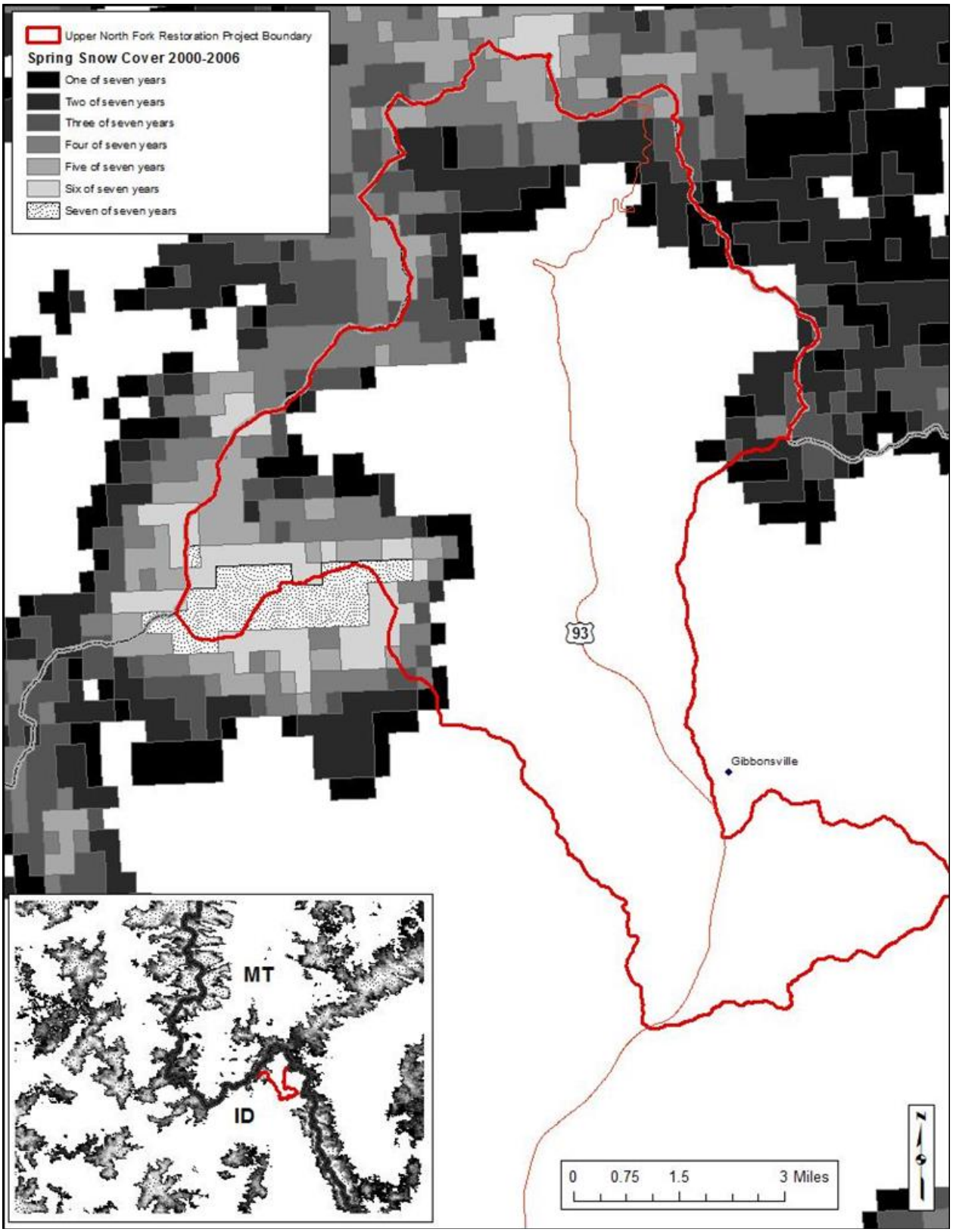


Figure 20. Wolverine habitat in the project area, and in the region (inset)

In Idaho, wolverines are at the southern periphery of their range. On the Salmon-Challis National Forest, wolverine habitat and observations are found at high elevation locations. There are numerous observations, with variable certainty, in and near the Forest. Some observations are recent, since 2000, and most of these are by experienced people. Because there is suitable snow cover and large game animals in the project area vicinity, it is expected that wolverines may be occasionally present nearby. There are Forest records of wolverines elsewhere on the Salmon-Challis National Forest by Forest staff.

Wolverines are wide-ranging and the population density is low. In the lower 48 US, the wolverine Distinct Population Segment is treated as a metapopulation (US Fish and Wildlife Service 2013). It consists of geographically separated (by unsuitable habitat) semi-isolated subpopulations that occasionally "exchange" individuals through some form of migration, immigration, and dispersal of individuals (ibid).

In July 2014 the Idaho Department of Fish and Game released a Management Plan for the Conservation of Wolverines (Idaho Fish and Game 2014a). In this management plan, the Department has modeled habitat within the National Forests in Idaho, including over four million acres on the Salmon-Challis National Forest, 21.5 percent of that available in the state (ibid). The project area is in a generally north-south modeled dispersal corridor along the Beaverhead Mountains to the Bitterroot Mountains (ibid). There is much suitable habitat on the Salmon-Challis NF as a result of the large area included in the Frank Church – River of No Return Wilderness, and on adjacent National Forests in central Idaho (ibid).

The Idaho Department of Fish and Game also developed Priority Conservation Areas using information on potential wolverine use (three models) and potential threats (five models) (Idaho Fish and Game 2014a). Scores are compiled and a priority was assigned based on that score; low scores were ranked in Tier III and high scores in Tier I. The scores for the Game Management Units in which the project area occurs (21 and 21A) are in the middle category, Tier II, and reflect good potential for wolverine use, but there is unprotected habitat and climate vulnerability (ibid).

The management plan also reports that wolverines occupy most of their historical range in Idaho (Idaho Fish and Game 2014a). Idaho Fish and Game modeled habitat in the state using a composite of the late spring snow cover model (above), and a habitat quality model based on resource selection and other habitat variables; this model correlated well with their verified observation records (ibid). Population models report an estimated 127 wolverines in Idaho (ibid). The population estimates for the mountain ranges near the project area are zero to one for Allen Mountain (west) and two to four for the Beaverhead Mountains (east) (ibid).

The Idaho statewide management direction for wolverine conservation is outlined in the Management Plan, as well (Idaho Fish and Game 2014a). In it, state objectives and strategies are laid out with timelines in which to achieve them. The Forest Service may aid in some of the following, especially those that are related to habitat and activities occurring on National Forest System lands:

> Objective 1: Collaborate across multiple jurisdictions and spatial scales to achieve wolverine conservation.Objective 2: Facilitate connectivity among wolverine subpopulations to enhance genetic exchange and population demographics.
>
> Objective 3: Conserve habitat to support viable wolverine populations.
>
> Objective 4: Support the development and use of inventory and monitoring systems to assess wolverine vulnerability to climate change.
>
> Objective 5: Further understand potential impacts to wolverine population viability as a result of disturbance from dispersed snow sports recreation.

Objective 7: Generate support and partnerships for wolverine conservation by promoting education, awareness, and stewardship of wolverines and alpine and subalpine forest ecosystems.

Wolverine Environmental Consequences

The environmental consequences analyzed here include potential direct, indirect, and cumulative effects to individual wolverines and to wolverine habitat. Effects to individuals include the risk of injury and disturbance, decreased reproductive success, or other effects to daily existence. These are discussed in a qualitative manner. Effects to habitat include changes to the amount and/or condition of available habitat in the sort and long term. These are discussed qualitatively but can be quantified by the acres proposed to be treated in the project.

No Action Alternative

The proposed action would not occur under the No action alternative. However, the existing biotic processes and management would continue.

The no action alternative would not affect the wolverine or its habitat. Under the existing conditions, there is sufficient food and snow cover for wolverines. Human use of suitable habitat has not prevented wolverines from using the area. This is evidenced by the presence of wolverines on the Forest in general and in the greater vicinity, as well.

There would be no effect to individual wolverines or their habitat from the no action alternative. In the context of the Healthy Forest Restoration Act, there would be no effect from a large-scale wildfire. Wolverines are not dependent on forested habitat, will readily cross openings, and spend much of their time in high elevation zones with little to no cover.

Action Alternatives

Direct and Indirect Effects

Project activities are not expected to greatly increase the human presence beyond a tolerable level for wolverines. Most of the project work would occur during the snow free season. They are very mobile, and if present, they would not be in any single place for very long, thereby reducing disturbance time. Due to the extremely low-density of wolverine populations, it is unlikely any wolverines would be encountered. Therefore, direct effects to wolverines are discountable.

The project would alter vegetation in suitable wolverine habitat. While vegetation itself may not determine wolverine use of an area, vegetative conditions can affect a wolverine’s prey. In the short term, prey species may leave the area during implementation or shift their activity patterns around noise and activity, in turn causing any present wolverines to do likewise. It is unlikely, however, that this would negatively affect a wolverine as they already move widely in time and space to attain food resources.

In the longer term, after treatments and when vegetative diversity increases and is not so departed from historical conditions, there may be more prey forage and cover, which could lead to an increase in prey abundance, and therefore more live food and potential carrion. This is an incidental benefit of the purpose and need of the project in that it reduces forest fuel continuity. This may be beneficial, but again, given the large home range of individual wolverines, the effect is somewhat diluted.

Cumulative Effects

There are no known State, private, or Tribal actions ongoing or considered in wolverine habitat in the project area. Private ownership is at lower elevations in the project area, outside wolverine habitat.

Under the NEPA, cumulative effects would also include Forest Service activities. There are no other Forest Service projects planned in the project area. On the Beaverhead-Deerlodge National Forest, Wisdom Ranger District, analysis is being done now for ski trail maintenance, route reconstruction, and hazard tree removal under two projects. Both are categorical exclusions and therefore by definition should have no effects to wolverines or their habitat.

North American wolverine determination

It is my determination that the implementation of the no action alternative is not likely to jeopardize the continued existence of the wolverine or adversely modify proposed critical habitat. This determination is based on the following rationale:

- Wolverines are not dependent on specific vegetation types. They utilize frequently use unforested habitat.
- Snow cover conditions, a predictor of wolverine habitat, would not change if there was a severe fire in the watershed.

It is my determination that the implementation of the proposed action is not likely to jeopardize the continued existence of the wolverine or adversely modify proposed critical habitat. This determination is based on the following rationale:

- Wolverine habitat and distribution is related to persistent spring snow cover, not forest structure and composition.
- The availability of food resources within any wolverine's home range are unlikely to be measurably affected by the project.
- Project activities are unlikely to disturb individual wolverines. Given their wide-ranging nature, there is a low probability that a wolverine would be present in the project area during implementation, and if one were, it would be of very short duration.
- There is not yet at this time any proposed critical habitat in the project area.

Gray Wolf

Life History, Habitat, and Distribution

Wolves use a variety of habitats and are known to occur in the project area. Gray wolves occupy diverse habitats, from open meadows to heavily forested stands. Wolves occupy broad territories (50 to 200 square miles) and travel extensively in search of prey, generally medium to large ungulates, especially elk in Idaho (US Fish and Wildlife Service 1987). They are adaptable to human and land management activity in general, but sensitive to disturbance at denning and rendezvous sites (ibid). Because any habitat types are suitable so long as primary prey is present, the whole project area may be considered suitable habitat.

Wolves were reintroduced into north central Idaho beginning in 1995. Wolf populations have since multiplied substantially throughout the state and were removed from the list of threatened species in Idaho in May of 2011 (US Fish and Wildlife Service 2011a).

The project area sits between a pack associated with Hughes Creek and the Battlefield pack that ranges east into Montana (Idaho Department of Fish and Game 2008). Also nearby is the Sula pack in Montana, but further north (ibid).

Gray Wolf Environmental Consequences

No Action Alternative

The no action alternative would have no impacts on gray wolves or their habitat.

In the context of a large, stand-replacement fire across the upper watershed, there may be effects to wolf prey habitat albeit speculative. As it stands right now, a large fire is possible, and would likely burn with mixed severity. There would likely be a loss in prey cover and forage habitat immediately. In the short term, prey forage habitat would rapidly improve; however, cover would take longer to return. It is assumed that deer and elk would not occupy habitat that has forage but no cover as they would where cover is present. As such, wolf use of the area would likely be less until cover increases and prey return to the area.

Action Alternatives

Direct and Indirect Impacts

Either action alternative is unlikely to substantially directly or indirectly impact wolves. Because wolves range through a wide variety of habitats, vegetation changes on the order proposed under either action alternative would not cause the affected areas to become unsuitable. Wolves are unlikely to be active or near project activities while machinery is operating or people are in the field, and therefore are unlikely to be disturbed. There are no known rendezvous sites that would be affected by the action alternatives.

It is reasonable to believe that wolf prey habitat would be affected by the proposed activities. Deer and elk habitat would be altered in treated units. In the high elevation meadow treatments, there would be an increase in suitable grassland habitat as a result of removing the encroaching conifers; adjacent cover habitat would essentially remain intact, however. At lower elevations, in particular in the Douglas-fir and ponderosa pine stands, there would be a decrease in cover immediately as a result of thinning and fuels reduction. In the short term, however, the forage cover would return in treated stands as a result of there being more light and precipitation available for understory shrubs. Opening the canopy would allow tree limbs to fill in the holes in the canopy, and along the edges of thinning units, thereby increasing the hiding cover over time. This would in effect increase the habitat value for deer and elk, and thus for wolves, in the long term.

The decreased threat of a stand replacement wildfire benefits wolf prey populations, and thus benefits wolves.

Road accessibility in the project area would not increase, and as such, there would be no increased threat to wolves being harmed or killed as a result of this project.

Cumulative Impacts

There are no known State, private, or Tribal, or federal actions ongoing or considered in wolf habitat in the project area. On the Beaverhead-Deerlodge National Forest, Wisdom Ranger District, analysis is being done now for ski trail maintenance, route reconstruction, and hazard tree removal under two projects. Both are categorical exclusions and therefore by definition should have no effects to wolves or their habitat.

Gray Wolf determination

It is my determination that the no action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the gray wolf in the planning area. This determination is based on the following rationale:

- Wolves are wide ranging and move through forested and unforested country frequently.
- Within a few years after a potential wildfire, there is likely to be ample vegetative regeneration over most of the area to provide forage and cover for wolf prey.

It is my determination that the either of the action alternatives may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the gray wolf in the planning area. This determination is based on the following rationale:

- Wolves are wide ranging and move through forested and unforested country frequently.
- There would be a decreased threat of habitat loss for wolf prey under the action alternatives
- There would not be an increase in road access, so security would remain the same.

Townsend's Western Big-eared Bat

Life History, Habitat, and Distribution

The Townsend's big-eared bat occurs throughout western North America, from southern British Columbia to central Mexico and east into the Great Plains, with isolated populations occurring in the south and southeastern United States (Pierson et al 1999; Piaggio 2005; NatureServe 2013).

Townsend's big-eared bats use roosts to hide, rest, and save energy (Woodruff and Ferguson 2005). Day roosts are used for resting and hiding during the active season; night roosts are for short-term use to rest, digest food, and seek shelter or safety (ibid.). Maternity, or nursery roosts, are day roosts used by females to care for young during the active season (ibid.), and these roosts have warmer temperatures compared to day roosts (Zeiner et al. 1990). Lastly, winter roosts, or hibernacula, are locations where bats overwinter and are safe from predators, are cold (yet above freezing), and are unlikely to be disturbed (Woodruff and Ferguson 2005).

Mating typically occurs from November to February after bats have entered their hibernaculum for the winter, although some females will be inseminated prior to hibernation (Barbour and Davis 1969; Burt and Grossenheider 1980; Kunz and Martin 1982).

They hibernate singly or in small clusters, usually several dozen or fewer, from October to April. Winter hibernating colonies are composed of mixed-sexed groups and may range from a single individual to several hundred animals (Piaggio 2005). *P. townsendii* hibernates throughout its range in caves and mines where temperatures are 12-13 degrees Celsius or less, and generally above freezing. Individuals may move during winter in response to temperature change (Barbour and Davis 1969). Townsend's big-eared bats utilize well-ventilated, cold caves and mine tunnels as hibernacula, in particular locations from which they can hang from the ceiling (Gruver and Keinath, 2006; Pierson et al. 1999). In addition to caves and mine tunnels, bridges and old buildings may be utilized as roosts (Barbour and Davis 1969; Pierson et al. 1999).

Moths are the primary prey of Townsend's big-eared bats (Piaggio 2005). Piaggio (2005) reports moths making up over 90 percent of its diet. Barbour and Davis (1969) report finding no other insect order being consumed by Townsend's big-eared bats. Pierson et al. (1999) summarized other research that includes consumption of other invertebrate orders in small amounts. Small moths, beetles, and a variety of soft-bodied insects also are taken in flight using echolocation, or by gleaning from foliage (Jameson and Peeters 1988; Zeiner et al. 1990; Gruver and Kenaith 2006). They are known to drink water. This bat forages relatively close to its roosts sites (Gruver and Kenaith 2006).

Flight is slow and maneuverable, with the species capable of hovering (Zeiner et al. 1990; Gruver and Kenaith 2006) and gleaning insects off foliage (Gruver and Kenaith 2006). Foraging usually begins well after dark (Kunz and Marten 1982). This bat will forage above and within the canopy (Pierson et al. 1999), often along forest edges and riparian areas (Piaggio 2005), and seems to be well adapted to a moderately cluttered canopy (Gruver and Kenaith 2006). Habitat connectivity between roosting and foraging sites may be important for this species, especially because individuals tend to avoid open spaces (Gruver and Kenaith 2006).

This bat is associated with a wide range of vegetative types, including forests, desert scrub, pinyon-juniper woodlands, and agricultural development (Gruver and Keinath 2006; Kunz and Martin 1982; Piaggio 2005). Roost structure is believed to be more important than the local vegetation (Gruver and Keinath, 2006; Pierson et al. 1999) and the presence of suitable caves or cave-like structures defines the distribution of this species more so than does suitable foraging habitat (Barbour and Davis 1969; Pierson et al. 1999; Piaggio 2005; Gruver and Keinath, 2006).

There are no known big-eared bat roost in the project area. There are several mine adits, and there are other bat species reported near these sites (USDA Forest Service 2013). Suitable foraging habitat exists across the project area, although it is limited by a lack of open water access to off-Forest areas at low elevations.

Townsend's Western Big-eared Bat Environmental Consequences

No Action Alternative

The no action alternative would not affect the western big-eared bat because no activities would occur. A discussion of the implications of a large wildfire may give context to the action alternative effects.

Should a large, stand-replacing wildfire occur in the project area there would be changes to foraging habitat. While not quantifiable, the area would likely be more open, and therefore more suitable, foraging habitat. Fire damaged trees may host more insect prey. However, there would remain a lack of water in the project area.

Action Alternatives

Direct and Indirect Impacts

It is unlikely the action alternatives would directly impact Townsend's big-eared bats because they do not appear to be present in the project area. There may be minor impacts to big-eared bat habitat in the short term, with the implication that there would be vegetative (that is, foraging habitat) diversity and lowered fire risk in the long term. Impacts to foraging habitat would include a decrease in the amount of clutter in treatment units, which may benefit prey capture; and increased vegetative diversity in the several years after treatment, which may increase prey diversity. The treatments would in effect open up low elevation Douglas-fir and ponderosa pine habitat, which would be more suitable than the dense conditions existing there now.

With that treatment in mind as an improvement in foraging habitat quality, the non-mechanical fuels treatment, pre-commercial thin, and mechanical treatments would affect about 8,527 acres, and some overlap of about 1,715 acres of non-mechanical treatment. In addition, broadcast burning would occur across the whole project area. Broadcast fire effects to vegetation are expected to vary, and therefore would have varying effects on bat foraging habitat, with the likelihood of improving quality for big-eared bats and foraging opportunities as a result of more openness.

Treatment units do not include known adits, so if this species is using an adit as a roost, there would be no increase in disturbance than what may already exist.

Cumulative Impacts

The area for assessing cumulative impacts to this species is the project area boundary. This area is sufficient in size to contribute to all life history aspects of the species or include suitable habitat for multiple home ranges.

Private landowner activities can influence big-eared bat use of an area. Activities such as thinning, timber harvest, and land clearing can affect foraging habitat, and roost sites if large snags are removed. No activities are known or planned. Private land ownership is a small portion of the project area, about five percent.

This project is unlikely to add cumulatively to the effects of any other activities in the project area for several reasons. First, these bats do not appear to be residents of the area. Second, the area affected would be foraging habitat only, and it would be improved in the sense that there would be less canopy clutter and therefore easier foraging.

Western big-eared bat determination

It is my determination that the no action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the western big-eared bat in the planning area. This determination is based on the following rationale:

- Big-eared bats are not likely present.
- Roosting habitat for big-eared bats is not likely present; there are some adits in the vicinity, but no big-eared bat records associated with them.
- A landscape-scale fire may improve foraging habitat at lower elevations of the project area by opening the forest canopy.

It is my determination that either action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the western big-eared bat in the planning area. This determination is based on the following rationale:

- Big-eared bats are not likely present.
- Roosting habitat for big-eared bats is not likely present; there are some adits in the vicinity, but no big-eared bat records associated with them.
- Thinning by mechanical means and fire would open the forest canopy and improve big-eared bat foraging opportunities.
- The project area habitat is generally not associated with high quality big-eared bat habitat such as that found in drier climates and riparian areas in them.

Fisher

Life History, Habitat, and Distribution

The fisher is a medium-sized member of the weasel family (*Mustelidae*) (US Fish and Wildlife Service 2011b). It is distributed across the North American boreal forest from southeastern Yukon Territory and adjacent Northwest Territories to the Canadian Atlantic seaboard (ibid). In the contiguous US, it is found

in northwest California and southwest Oregon, southern Sierra Nevada Mountains, north-central Idaho and western Montana, northern tier of Great Lakes states, and the northern Appalachians (ibid).

In June 2011, the US Fish and Wildlife Service determined that listing the fisher as threatened or endangered was not warranted, and analyzed many factors that may affect the fisher's habitat or range in the Northern Rocky Mountains, including forest management, wildfire and forest disease, and effects of small and isolated populations (US Fish and Wildlife Service 2011b). The Service determined that there are not threats of sufficient imminence, intensity, or magnitude to indicate the fisher is in danger of extinction in the Northern Rocky Mountains (ibid).

Fishers are generally associated with mature coniferous forests with large trees and coarse woody debris (Samson 2006). In Idaho, fisher prefer old growth and mature forests in the summer, old and young forests in the winter, and riparian areas in general (ibid). Old and large trees can provide denning and resting sites, as can accumulations of woody debris (US Fish and Wildlife Service 2011b). Canopy cover of at least 40 percent appears important (ibid; Lofroth et al. 2010). In Idaho, fishers inhabit mountain ranges and riparian areas up to about 6,500 feet (Jones 1991).

Fisher home ranges in Idaho range in size from 7,400 acres to 29,700 acres for males and from 1,480 acres to about 18,500 acres for females (US Fish and Wildlife Service 2011b).Therefore, the project area could theoretically support one to several adults. Home ranges in Idaho and Montana are larger than in many parts of its range which may reflect fragmentation or low quality habitat (US Fish and Wildlife Service 2011b). While timber management can change habitat suitability, it can help to increase it, as well, by managing for large trees and old forest types, creating snags, increasing woody debris accumulations, and managing for prey species' habitat (ibid). Forest management does not appear to threaten the fisher (ibid).

Forest insect and disease outbreaks can affect fishers. Beetle outbreaks are becoming more common in the Rocky Mountains, including the project area. In the Northern Rocky Mountains, fisher habitat is not affected by beetle outbreaks as much as in other parts of the fishers' range (US Fish and Wildlife Service 2011b). Fisher habitat is often structurally complex, and a loss of the dominant tree canopy may not adversely affect fisher habitat, and may in fact increase habitat quality by increasing downed woody debris and denning and resting habitat (ibid). The Service did not determine that the current beetle epidemic is negatively affecting fishers in the Northern Rocky Mountains.

Fishers have large home range and inhabit their range at low densities. This can make them susceptible to local extirpation or extinction. Primary concerns with this susceptibility stem from potential habitat management and overharvest from trapping, scientific/educational research, or recreation (US Fish and Wildlife Service 2011b). Habitat management was discussed above. There is no trapping season for fisher in Idaho and incidentally trapped fishers are often released alive, when possible (ibid). Despite limited information about the number of live releases or incidental kills, and the fate of released fishers, the Service concluded the fisher is not threatened by harvest for any purpose (ibid). Thus, anthropogenic factors do not threaten the continued persistence of fishers (ibid).

Fisher distribution is thought to be similar to historic levels in the Northern Rocky Mountains (US Fish and Wildlife Service 2011b). In Idaho, fishers are found in the Salmon River Mountains and north (ibid). There are numerous records in the Upper North Fork drainage and the project area.

Fisher Environmental Consequences

No Action Alternative

There would be no effects to the fisher from the no action alternative as there are no activities planned. Below is a discussion of the possible implications of a severe wildfire, insect, or disease outbreak on fishers and their habitat.

A severe wildfire has the potential to affect fisher habitat. Fishers prefer riparian and older forest habitats for the structure they provide. A severe wildfire has the potential to decrease that structure and amount of area in the watershed, especially in riparian areas because these areas tend to have accumulations of downed wood and dense canopies which can carry and intensify fire. Conversely, increased moisture levels found in riparian areas may also decrease the fire severity in riparian areas.

Insect and disease outbreaks would be less severe than wildfire. These events may improve long term habitat by increasing the available down woody debris and snags, similar to a wildfire. Riparian corridors are the least likely to be influenced by disease and insects as the cool and moist environment found there is beneficial for trees in fighting these agents. The increase in down woody debris would provide more habitat for prey, and more hunting, denning, and resting sites. An outbreak may, however, fragment habitat at the larger landscape level by reducing forested cover between suitable habitat patches.

Action Alternatives

Direct and Indirect Impacts

Direct impacts to fishers are unlikely because they are very mobile and could easily avoid anthropogenic activity, as they likely already do. Indirect impacts to fishers include disturbance and impacts to habitat. For the same reason they can avoid direct impacts, fishers could avoid disturbance. It is unknown for how long disturbance must be to adversely affect them, but given their wide ranging nature, they are unlikely to be in any one place for long.

The project treatments are targeted primarily at dry forest types within the watershed. Even though these forest types are in part very dense, they still are marginal fisher habitat. Treatments in these vegetation types are not likely to affect fisher use of the project area. Project buffers on riparian areas are established so that suitable habitat would not be affected by silvicultural treatments. Prescribed fire may be allowed to back into riparian zones, but given the planned conditions for ignitions, it is highly unlikely riparian areas would be consumed.

Likewise, treatments in identified old forest stands are unlikely to affect fisher use of these stands where they are suitable fisher habitat. Thinning would be done by hand or fire, with the design of protecting these stands from being consumed by wildfire. There may be a short term reduction in suitability, but not a complete loss.

Prescribed fire treatments would have varied impacts on forest cover. In some areas where fire intensity is highest, there would be a reduction in habitat quality, while in other areas, low intensity fire would not greatly affect quality because there would be little change in cover and downed wood. Overall canopy over is unlikely to decrease below the 40 percent threshold across most of the burned stands.

Cumulative Impacts

There are no other projects scheduled in fisher habitat within the project area. Therefore, this project would not contribute cumulatively to the effects of any other projects. Projects on adjacent Forests on Chief Joseph and Lost Trail Passes would have no effect on fishers.

Because fishers have large home ranges and occur in low densities on the landscape, events such as wildfire that alter or eliminate suitable habitat may impact local fisher populations. The Mustang Complex fire in 2012 may have reduced fisher habitat in areas where there was severe wildfire by eliminating overstory canopy and killing individual fishers. The remaining patches of suitable habitat may not be of sufficient size or proximity to support an individual fishers or populations for some time to come.

The action alternatives, while altering some fisher habitat quantity and quality, would still support the availability of fisher habitat in the project for the short and long term by reducing the risk that fire would eliminate a large portion of habitat in the upper North Fork watershed. The impacts of this project are minor and would not add adverse cumulative impacts to fishers in this portion of Idaho or the northern Rocky Mountain distribution of fishers.

Fisher determination

It is my determination that the no action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the fisher in the planning area. This determination is based on the following rationale:

- A severe wildfire in the project area could reduce or eliminate fisher habitat in the short term.
- In the long term, there would be a lack of mature, forested, riparian habitat as it can take up to two centuries for complex habitat to develop.
- A loss of the Upper North Fork fisher habitat would not adversely impact range-wide fisher populations, although it may cause a long term absence of fishers in the upper watershed.

It is my determination that either action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the fisher in the planning area. This determination is based on the following rationale:

- Primary habitat, riparian areas, is not going to be actively treated in the sense of harvesting timber. Treatments are targeting protection of old growth and riparian habitat from the effects of prescribed and wild fire.
- Old growth stands on the landscape are going to be protected or managed for long term existence.
- Primary mechanical treatments would occur in habitats that are not suitable for fishers.
- Landscape connectivity would not be adversely impacted by prescribed fire because treatments, while reducing fuels and opening the forest canopy generally, would be patchy and there would remain ample forest suitable to function as connectivity habitat.

Boreal Owl

Life History, Habitat, and Distribution

Boreal owls occupy boreal forests throughout the northern hemisphere forming an almost continuous band across North America and Eurasia (Hayward 1994). Boreal owls occur in forested landscapes where they nest exclusively in tree cavities or artificial nest structures (ibid). As year round residents, boreal owls use similar habitats during all seasons. In Idaho, boreal owl preferred habitat is spruce/fir, and aspen where available, then followed to lesser degrees by Douglas-fir, lodgepole pine and other mixed conifer (Idaho Department of Fish and Game 2005). Boreal owls feed primarily on small mammals such as voles, pocket gophers and mice (ibid). The best foraging habitat is found in spruce/fir stands (ibid). Suitable habitat occurs in the project area. Most boreal owl breeding sites are above 5100 feet in elevation (ibid).

Preferred nest sites are cavities excavated by large woodpeckers (Idaho Department of Fish and Game 2005). Thus, they prefer mature and old forests with large trees and snags.

There are boreal owl observation records in the project area (Idaho Department of Fish and Game 2014). Specific boreal owl surveys have not been conducted in the project area for this project. Boreal owls have been documented in suitable habitat across the Salmon-Challis National Forest. It is expected that this species occurs within Upper North Fork drainage and within the project area. Long term population trends are unknown. There are about 10,700 acres of suitable boreal owl habitat in the project area, about 1053 acres being the preferred spruce and fir types; the remaining includes Douglas-fir and lodgepole pine, which is less-preferred.

Boreal Owl Environmental Consequences

No Action Alternative

There would be no effects to the boreal owl from the no action alternative as there are no activities planned. Below is a discussion of the possible implications of a severe wildfire, insect, or disease outbreak on boreal owls and their habitat.

Insect and disease outbreaks are unlikely to have adverse impacts on boreal owls. Such agents are unlikely to affect the spruce and fir stands, which are the primary vegetation type preferred by this species. Douglas-fir and lodgepole pine may be affected by disease or insects more readily and in fact have already been attacked by beetles. In the short term there may be a decrease in overstory cover in these vegetation types, but in the long term there would be an increase in snag nesting sites. As the Douglas-fir and lodgepole pine dies, fir and spruce seedlings and trees may replace them, which would benefit this species in the long term because there would be replacement habitat available.

The consequences of a severe fire are more likely to have an adverse impact on this species. A fire that severely burns over the larger watershed would eliminate nesting and foraging habitat across a large area. It would take many years for the forest to regrow to a size, structure, and species composition suitable for boreal owl nesting and foraging. It has been estimated that regeneration of stands to a suitable nest site diameter would take about two centuries in high elevation spruce/fir stands (Idaho Department of Fish and Game 2005).

Action Alternatives

Direct and Indirect Impacts

The project may affect the boreal owl nesting and foraging habitat, particularly the dense Douglas-fir dominated stands. About 2516 acres would be affected by treatments. This includes about 168 acres that overlap meadow units, and 2013 acres of mechanically treated stands. Parts of these mechanically treated units would then include additional precommercial or non-commercial thinning. The effect of these treatments would be to reduce understory complexity in the short term. This may benefit the owl by aiding its ability to capture prey. In the long term, the treatment would promote the growth of the residual trees, thus increasing suitability of the residual stands for use as nesting and foraging habitat. In addition, the broadcast burning would decrease fuels and thereby reduce the risk of a catastrophic fire eliminating large blocks of habitat. Additionally, vegetation diversity that would become established after burning would likely benefit small mammal prey.

Cumulative Impacts

The area for assessing cumulative impacts to this species is the project area boundary. This area is sufficient in size to contribute to all life history aspects of the species or include suitable habitat for multiple home ranges.

There are no other activities planned in boreal owl habitat in the project area. Therefore, this project would have no cumulative effects to the boreal owl.

Boreal owl determination

It is my determination that the no action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the boreal owl in the planning area. This determination is based on the following rationale:

- There are known boreal owls in the project area.
- A severe fire could reduce or largely eliminate boreal owl habitat.
- In the long term, it would take about two hundred years for suitably-sized trees to regrow.

It is my determination that either action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the boreal owl in the planning area. This determination is based on the following rationale:

- There are known boreal owls in the project area.
- A small part of available habitat would be actively treated; portions of the remaining habitat would be burned only.
- In the long term, decreasing the overstory canopy may increase prey abundance and thus foraging opportunities.

Flammulated Owl

Life History, Habitat, and Distribution

The flammulated owl is small owl that is typically associated with more open, drier forest types in western North America (NatureServe 2013). During the breeding season their range extends from southern Canada to Mexico (ibid). This owl preys on insects, in particular moths and beetles (Samson 2005). Nest cavities are those formed by northern flickers or pileated woodpeckers and are often in ponderosa pine (ibid). In adjacent Region 1, the estimate for home range size is about 27.5 acres (Samson 2006).

Typical habitat includes ponderosa pine and Douglas-fir stands that are open and generally on a southern or western aspect. In the project area there is little suitable habitat. Forested stands are dense and many stands have small diameter trees relative to the size preferred by this species. Using the Forest vegetation database, there are about 700 acres of suitable old single-strata ponderosa pine and Douglas-fir forest in the project area. These stands are distributed in small clumps in the southern half of the project area; most clumps are less than 20 acres. There are three groups that are at least 27.5 acres.

There are records of this species in the project area. The nearest records are to the southwest about three miles.

Little information is available on regional or range-wide populations, but they appear to be stable (NatureServe 2013).

Region 1 indicates habitat for this species is well-distributed and abundant, there is no evidence the population is decreasing, forested habitats and connectivity have increased since European settlement, and timber harvest levels are insignificant relative to the greater availability of habitat across Region 1 (Samson 2005). Similar conditions regarding an increase in forested habitats and forested connectivity have occurred in the watershed on the Salmon-Challis National Forest. However, the forested habitats for this species in the project area supply little flammulated owl habitat because the small tree size and closed forest dominance.

Flammulated Owl Environmental Consequences

No Action Alternative

There would be no effects from the no action alternative because no activities would occur.

However, over time, conditions suitable to nesting and foraging habitat may develop, albeit slowly. For a long time the canopy would remain closed, which is not optimal for foraging. Large diameter nest trees and open forest foraging sites would be long in developing.

Should a large-scale, stand-replacement wildfire burn through the suitable vegetation types, it is likely to take a very long time to return to having any suitable habitat. Much of the current project area is in intermediate diameter, densely grown stands with high canopy cover and crown overlap. As such, these are likely to burn severely. Replacement seed sources would be found at the edges of the burned areas, and so it could take a very long time for trees to naturally reseed the area.

Action Alternatives

Direct and Indirect Impacts

Direct effects to flammulated owls are unlikely because there is little suitable habitat, and preferred habitat would be protected; i.e., large diameter ponderosa pine and Douglas-fir.

Under either of the action alternatives, forested stands would be thinned. The goal of reducing the threat from fire, insects, and disease would result in decreasing the time it would take for the affected stands to develop into more suitable flammulated owl habitat and increase the amount of suitable owl habitat in the long term. There would be a decrease in the dense canopy cover in ponderosa pine and Douglas-fir stands, and in time the remaining trees would grow larger sooner than if left to occur without intervention. This would shorten the time until more suitable nesting habitat becomes available. Foraging habitat would be increased immediately as the stands would become more open.

Thinning would occur along the edge of only one patch of currently suitable habitat that is the size of one home range.

Cumulative Impacts

The area for assessing cumulative impacts to this species is the project area boundary. This area is sufficient in size to contribute to all life history aspects of the species or include suitable habitat for multiple home ranges.

There are no other projects scheduled in flammulated owl habitat. Therefore, this project would not contribute cumulatively to the effects of any other projects.

Flammulated owl determination

It is my determination that the no action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the flammulated owl in the planning area. This determination is based on the following rationale:

- There is little flammulated owl habitat in the project area.
- There are records of flammulated owls in the project area.
- In adjacent Region 1, flammulated owl populations are doing well.

It is my determination that either of the action alternatives may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the flammulated owl in the planning area. This determination is based on the following rationale:

- There is little flammulated owl habitat in the project area.
- There are records of flammulated owls in the project area.
- In adjacent Region 1, flammulated owl populations are doing well.
- Of the available habitat in the project area, very little will be affected. Even more will be created as a result of thinning. This increase in habitat area will lead to an increase in habitat quality, as well, as the trees in the suitable stands grow larger and become better suited as foraging and nesting habitat.

Three- toed Woodpecker

Life History, Habitat, and Distribution

The three-toed woodpecker is a wide ranging, heavy billed woodpecker that's distribution coincides with that of spruce forests, although it can be found in other forest types within its range (Leonard 2001). It is a specialist in foraging on bark beetles, but will also consume wood-boring beetles (ibid). It forages in lightly or moderately burned trees, in addition to unburned trees (Leonard 2001).

Because of its food preference, this species is associated with older forests that have ample bark beetles, or recently disturbed forests that have an irruption of beetle activity (Leonard 2001).

There is little information available on home range size (Leonard 2001). Populations can vary widely with beetle outbreaks (ibid) and one would expect more individuals in disturbed forests. It otherwise exists at low densities.

There are no recorded observations of three-toed woodpeckers in the project area.

Three-toed Woodpecker Environmental Consequences

No Action Alternative

There would be no effects to the three-toed woodpecker from the no action alternative as there are no activities planned. Below is a discussion of the possible implications of a severe wildfire, insect, or disease outbreak on the three-toed woodpeckers and their habitat.

There are some wildlife species that would benefit from the events we are examining. A severe fire, insect, or disease event would benefit three-toed woodpeckers. Fire and insect outbreaks in particular provide food for these woodpeckers. These types of outbreaks occur in forests mature enough (i.e., with trees of sufficient diameter) to provide nesting habitat, as well. This species evolved in forests that had large disturbances. It, like the black-backed woodpecker, is probably able to detect large fires or insect

outbreaks from long distances. As such, individuals would be able to move around a region over the course of their life to locations of suitable habitat.

If there was a large, stand replacing fire in the project area, it, combined with other large fires would continue to provide foraging opportunities into the next decade for these birds because of the amount of damaged trees. Past ten years, when post fire beetle numbers and use have declined, a severe fire in this part of the watershed and including the 2012 fire, there may be a decrease in the amount of suitable habitat for the lack of medium to large diameter trees for nesting. Furthermore, there would be an abundance of regeneration in trees, trees which are vigorous and not prone having beetles.

Action Alternatives

Direct and Indirect Impacts

The action alternatives would both affect the same amount of habitat. In the short term, there are going to be fewer stressed trees, which means fewer beetles, which means there would likely be less potential foraging habitat. Post treatment broadcast burning would inevitably kill and injure some trees, and as such become suitable for isolated populations of beetles. In the long term, retained trees would grow larger with the greater spacing, and in the future there would be more suitable, potential nest sites. At some point there would be stands of very large trees that may be susceptible to beetles and become suitable foraging for three-toed woodpeckers.

In the project area, there is not a lot of spruce and fir that would be impacted (87 acres), more when including lodgepole pine (651 acres). These are the primary habitats that would be affected. It is reasonable to assume a large beetle outbreak in Douglas-fir stands would draw in woodpeckers, so thinning Douglas-fir would decrease the chances that those stands would become suitable any time in the near future.

Broadcast burning would increase the available number of stressed trees, and therefore may increase foraging suitability. However, along with thinning it would also increase the vigor of the retained trees in the long term, making them less susceptible to beetles.

Cumulative Impacts

The area for assessing cumulative impacts to this species is the project area boundary. This area is sufficient in size to contribute to all life history aspects of the species or include suitable habitat for multiple home ranges.

There are no other projects planned in the cumulative impacts boundary, and as such there would be no cumulative impacts.

Three-toed woodpecker determination

It is my determination that the no action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the three-toed woodpecker in the planning area. This determination is based on the following rationale:

- A severe fire would provide a beneficial impact on the three-toed woodpecker because food supplies and potential nest sites would become abundant.
- If no fire occurs, there would be little change in current habitat suitability in the near term, and in the longer term there is the potential for an increase in habitat suitability as overstocked and stressed timber stands become susceptible to beetles.

- A lack of records in the project area, and on the Forest in general, indicates that this species is not found in the area. There would thus be no impact to any population from this alternative.

It is my determination that either action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the three-toed woodpecker in the planning area. This determination is based on the following rationale:

- Thinned stands would be more resilient to beetle attack, and therefore less suitable for woodpeckers as foraging sites.
- There may be a snag increase with implementation of the broadcast burn.
- A lack of records in the project area, and on the Forest in general, indicates that this species is not found in the area. There would thus be no impact to any population from this alternative.

Northern Goshawk

Life History, Habitat, and Distribution

The northern goshawk is a large forest raptor found from the arctic, east across the boreal forests of Canada, and south into the US. In the western US, it is associated most often with mature coniferous forests for nesting, and a wide-variety of habitats for hunting prey.

Northern goshawks prefer nesting in mature, unmanaged or lightly managed forest habitats with relatively closed canopies (greater than 60 percent), typically on the lower one-third of north, east, and west aspects with less than 30 percent slopes, and within 600 feet of water (Bull and Hohmann 1992). Breeding habitat is generally composed of a series of nested spatial scales that includes a 25-30-acre nest stand (and alternate nest stands) within a post-fledging area (approximately 300-600 acres); and within an approximately 3700-5200 acre foraging area (Reynolds et al, 1992; Andersen et al, 2003).

Northern goshawk home range sizes in eastern California averaged 13.4 km^2 (3,010 acres) for females and 24.0 km^2 (5,930 acres) for males, with an overall average of 15.5 km^2 (3,830 acres) depending on habitat characteristics (Squires and Reynolds 1997). Goshawks use a variety of habitats for foraging but prefer mid- to late-successional forest and rarely use openings (Reynolds et al. 1992). Information on dispersal distance within home ranges and size of defended home ranges is lacking for this species. As a result, delineation of home ranges for the purposes of this analysis was based on the average size of home ranges for males as this area would represent the largest area that a nesting pair would likely need for forage, nesting, and roosting activities over the course of a nesting season. There is ample space within the project area for multiple nesting pairs.

Because the goshawk forages in a wide variety of habitats, any given area likely has more foraging habitat than nesting habitat. In the project area there are about 13,500 acres of foraging habitat. There are about 9000 acres of nesting habitat.

There is one northern goshawk observation recorded in the project area and no known nest locations. Goshawks will traditionally reuse nests often have several alternate nest locations within close proximity. Goshawks are well known to vigorously defend their core nest area, and are thus somewhat easy to relocate once a nest is discovered.

Northern Goshawk Environmental Consequences

No Action Alternative

There would be no effects to the northern goshawk from the no action alternative as there are no activities planned. Below is a discussion of the possible effects of a severe wildfire, insect, or disease outbreak on northern goshawks and their habitat.

A severe fire could eliminate suitable nesting and foraging habitat by killing large diameter overstory trees and making suitable foraging habitat unsuitable. The lack of live canopy would make the habitat unsuitable for nesting. A severe fire would likewise reduce foraging habitat quality or eliminate it altogether until such time live medium sized and larger trees are present.

Likewise, a severe disease or insect outbreak could similarly kill the live crowns on suitable large diameter nesting trees and reduce foraging habitat quality.

Action Alternatives

Direct and Indirect Impacts

Direct impacts to northern goshawks are unlikely as there are no known birds or active territories in the project area. Goshawks are very adept at making themselves known to those entering their territories, especially in nest site vicinity, and they respond readily to callback surveys. That none have been observed does not necessarily indicate there are no goshawks present in the treatment units. Design criteria have been established to manage for raptor nest discoveries (see appendix A).

Indirect impacts of implementing the action alternatives are the same and include potential changes to habitat structure, canopy cover, and disturbance. As for disturbance, it appears there are no goshawks in the project area, as addressed above, so these effects would be discountable.

The action alternatives would change the forest structure on all units, and this amounts to about 3,015 acres of goshawk habitat. Short term impacts for thinning units include a decrease in canopy cover, which generally will make potentially suitably nesting habitat less or not suitable. In the long term, crowns will grow together and tree diameters will increase, which will increase nesting habitat suitability. All treatments will open the understory which will make it easier for goshawks to forage. The shaded fuel breaks are the least likely to be used for foraging because the canopy will be the most reduced in these units. The broadcast burning will have varied impacts on foraging habitat. Immediately after burning, foraging habitat will be more open and prey more accessible In the longer term understory vegetation may be invigorated, and this may improve habitat for prey species.

Treatments adjacent to the single observation location are non-commercial fuels and prescribed fire only. This area is a riparian area, as well, and project design features are meant to protect riparian areas. As a result, impacts to goshawk habitat would be minimal.

Cumulative Impacts

The area for assessing cumulative impacts to this species is the project area boundary. This area is sufficient in size to contribute to all life history aspects of the species or include suitable habitat for multiple home ranges.

There are no other projects in goshawk habitat in the project area. As such, this project would not contribute cumulatively to effects of any other projects.

Northern goshawk determination

It is my determination that the no action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the northern goshawk in the planning area. This determination is based on the following rationale:

- A severe fire could eliminate suitable nesting and foraging habitat.
- There is only one observation in the project area, and no known nests, so it is unlikely an individual goshawk would be affected.

It is my determination that either action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the northern goshawk in the planning area. This determination is based on the following rationale:

- There is only one observation in the project area, and no known nests, so it is unlikely an individual goshawk would be affected.
- Thinning and fuel treatments in the broader project area would make the habitat more suitable for goshawks because the understory would be more open, thus increasing hunting opportunities.
- Treatments are likely to allow better suited habitat – larger diameter trees and more cover from the dominant canopy – persist into the future.
- Habitat in the area around the known observation would receive some of the least intensive, and most protective treatment by noncommercial thinning and prescribed fire.

Columbia Spotted Frog

Life History, Habitat, Distribution, and Population and Habitat Trend

The Columbia spotted frog is found from southeast Alaska to Nevada, Utah, Wyoming and Idaho (US Fish and Wildlife Service 2014b). They live in springs and seeps, meadows, marshes, ponds, streams where there is abundant vegetation (ibid). They use riparian corridors for migration routes (ibid).

There are associated with slow moving water and ponds, constant water temperature (US Fish and Wildlife Service 2014b). A mucky substrate appears necessary for hibernation (ibid).

They are strongly attached to an area, but can disperse up to five kilometers to suitable habitat (US Fish and Wildlife Service 2014b). They may also travel overland up to one kilometer between suitable habitats (USDA Forest Service 2004).

There are about 93 acres of riparian or water habitat in the project area. Riparian habitat is marginal, however, in that water velocities are high and there is a general lack of slow, pooled water on Forest Service land. There are some stretches of slow water on private land. Upland areas are generally too dry to be suitable. Although these frogs may travel overland through unsuitable habitat to reach other suitable areas, the overall lack of suitable habitat reaches in the project area infers extreme unlikelihood that they would be found anywhere but near their preferred habitat.

There is one spotted frog observation in the project area. It appears in an intermittent stream channel. There has been insufficient population monitoring to date of the Columbia spotted frog on the Salmon-Challis National Forest. Nonetheless, they are widespread in suitable habitats in their range and appear to be well-distributed and the most abundant amphibian on the Forest (USDA Forest Service 2004) and is well-represented in the state (Idaho Department of Fish and Game 2012).

Columbia Spotted Frog Environmental Consequences

No Action Alternative

There would be no effects to the Columbia spotted frog from the no action alternative as there are no activities planned. Below is a discussion of the possible consequences of a severe wildfire, insect, or disease outbreak on Columbia spotted frogs and their habitat.

A severe wildfire may adversely impact spotted frogs through an increase in water temperature during the fire, and for prolonged periods after the fire. A severe fire is likely to lead to increased sedimentation and stream channel morphology changes that would reduce habitat suitability for these frogs. Increased sediment delivery and scouring are would reduce the available breeding habitat.

An insect or disease outbreak is unlikely to adversely impact this species. Riparian vegetation is less likely to be influenced by insects or disease due to the moist environment. While upslope trees may be affected by insects or disease, understory saplings and shrubs are perhaps not, and there is therefore less likelihood of a sedimentation increase like that potential from a severe fire event.

Action Alternatives

Direct and Indirect Impacts

There are unlikely to be any direct impacts to spotted frogs as a result of either action alternative. There is but one observation record in the project area, and habitat is marginal.

At most, 17 acres of riparian habitat would be impacts by either action alternative. Effects to potentially suitable habitat are limited by riparian buffers that limit activity in suitable habitats. The most intensive activity in or along riparian habitat is a shaded fuel break on the north side of Pierce Creek where the stream gradient is relatively low, although suitable pooled water is still lacking.

By and large, the impacts are speculative and very unlikely based on the lack of records and poor habitat quality. If there are frogs present, they are unlikely to be outside the immediate riparian area as upland areas are very dry, and therefore unsuitable. Treatments are unlikely to directly affect habitat for spotted frogs. If heavy equipment is operating or trees are being removed during rainy periods or migration when frogs may be out of preferred riparian habitat, some may be injured or killed. This is, however unlikely as they are not abundant in the project area, nor is their habitat.

Cumulative Impacts

The area for assessing cumulative impacts to this species is the project area boundary. This area is sufficient in size to contribute to all life history aspects of the species or include suitable habitat for multiple home ranges.

There are no other Forest Service projects scheduled in spotted frog habitat. The most suitable habitat is on private property along the North Fork of the Salmon River. This project is unlikely to affect that habitat. Therefore, there would be no cumulative impacts as a result of this project.

The effects of the project are unlikely to affect the spotted frog viability at the Forest scale. Records are scant in the project area and habitat is limiting.

Columbia spotted frog determination

It is my determination that either action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the Columbia spotted frog in the planning area. This determination is based on the following rationale:

- There are scant records near the project area and little suitable habitat.
- A severe wildfire could eliminate or reduce quality in the available riparian habitat.
- A severe wildfire could unleash enormous sediment loads and scour pools along the North Fork, thereby eliminating any potential habitat that exists.

It is my determination that either action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the Columbia spotted frog in the planning area. This determination is based on the following rationale:

- There are scant records near the project area and little suitable habitat.
- Treatments along the private property in the lower part of the project area may help to protect habitat on private property from being consumed by wildfire; private property has the best suitable habitat in the project area (small ponds, ditches).
- Reducing the risk of a stand replacement fire in the watershed decrease the risk that there would be increased sedimentation that would affect reproductive success.

Columbia spotted frog Management Indicator Species determination

Any of the alternatives has the potential to impact the Columbia spotted frog. However, given the lack of observations in the project area and lack of high quality habitat on the Forest in the project area, any impacts are likely to be inconsequential to the population of frogs on the Forest or in the Region. The no action alternative presents the greatest threat if a severe fire occurs and results in a high flow water and debris event that washes out any suitable habitat on the Forest, and the more suitable locales off the Forest. While action alternative treatments have a remote chance of impacting individuals, they would provide for better long term mitigation of severe fire risk, and as such would protect the little habitat available. Because there is so little habitat available and limited observations, the impact is unlikely to affect the population on the Forest or in the Region.

Pileated Woodpecker

Life History, Habitat, Distribution, and Population and Habitat Trend

The pileated woodpecker is a large bird associated with mature forests for its nesting and foraging requirements. The relationship of this species with mixed conifer forests communities containing large diameter live trees, standing dead and down logs, particularly in multi-storied stands, is fairly well understood, as is the effect of timber management activities on the characteristics of such stands (USDA Forest Service 2004). Pileated woodpeckers commonly occur in the ponderosa pine, Douglas-fir and mixed pine and fir stands where most forested vegetative management occurs on this forest, and are affected by changes in habitats they provide (ibid).

There is insufficient information to detect a Forest trend, but regionally there has been a regional upward trend in abundance of this species (USDA Forest Service 2004).

There are about 36,000 acres of suitable vegetation type in the project area. About half of this, 17,530 acres, is of sufficient size to be pileated woodpecker habitat. There are about 7860 acres of pileated woodpecker habitat in the project area. There are numerous records of pileated woodpecker observations in the project area.

Pileated Woodpecker Environmental Consequences

No Action Alternative

The no action alternative would not affect the existing trend of this species on the forest or the region. This species' habitat is well-distributed, and it is believed individuals are likewise. The regional trend is unlikely to be affected by the no action alternative.

A large scale insect or disease outbreak may increase the local abundance of this species with more food being available for the infestation period. After the peak, it is assumed the population would return over time to pre-infestation levels.

A large scale fire would likewise lead to an increase in invertebrates in the short term. In the long term, there would be a decrease in nesting habitat as the largest snags fell over and before new trees grew to sufficient diameter to be suitable for nesting. As standing snags fell to the ground they would still be suitable for foraging, but not as much as immediately after a fire.

Action Alternatives

Direct and Indirect Impacts

The action alternatives are unlikely to directly impact adult pileated woodpeckers. There is a slight chance that juveniles could be injured or killed if a nest tree was cut down. Even so, this would not affect the population on the Forest or regionally. Design criteria include retaining snags in project units to the extent practicable for safety, in particular snags that are non-merchantable or have evidence of wildlife use.

The treatments by and large would make habitat more suitable for long term woodpecker use because the residual trees would eventually grow larger and be better suited for nest sites. The insect and disease risk would be lessened for the stands, but the broadcast burning treatment would create some new foraging opportunities.

Cumulative Impacts

The area for assessing cumulative impacts to this species is the project area boundary. This area is sufficient in size to contribute to all life history aspects of the species or include suitable habitat for multiple home ranges.

There are no other Forest Service projects ongoing or planned in the project area. Pileated woodpeckers may be affected by vegetation management on private property. Public land is far more extensive than private land in the project area, however, and any effects on private land would be overshadowed by those on public land. This project is unlikely to add cumulatively to the effects of any projects on private land.

The project would not affect the viability of the pileated woodpecker at the forest scale.

Pileated woodpecker Management Indicator Species determination

Any of the alternatives may impact the pileated woodpecker. A severe wildfire may provide short term abundance in foraging habitat, but may eliminate long term large-diameter snag availability. The action alternatives may increase forest health by increasing residual tree spacing, thereby decreasing insect-susceptibility and reducing foraging habitat quality. This may be offset by the large area burned with prescribed fire, which will increase snag availability and foraging opportunities. The action alternatives may impact individuals, if present, but would reduce the long term threat of removing a large area of potential nesting habitat. None of the alternatives, however, are likely to contribute to a measureable impact on populations of pileated woodpeckers at the Forest or Regional scale.

Migratory Bird Assessment

Under the National Forest Management Act (NFMA), the Forest Service is directed to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." (Public Law 94-588, Sec 6 (g) (3) (B)). The Landbird Conservation Strategic Plan (USDA Forest Service 2000), Executive Order 13186 (2001), and the Partners in Flight North American Landbird Conservation Plan (2004) all reference goals and objectives for integrating bird conservation into forest management and planning.

A Memorandum of Understanding between the USDA Forest Service and the US Fish and Wildlife Service to Promote the Conservation of Migratory Birds was signed (USDA Forest Service and US Fish and Wildlife Service 2008). The intent of the memorandum of understanding is to strengthen migratory bird conservation through enhanced collaboration and cooperation between the Forest Service and the Fish and Wildlife Service as well as other federal, state, tribal and local governments. Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities.

The Idaho Bird Conservation Plan (Idaho Partners in Flight 2000) has a prioritized list of bird species, as well as habitats. Within the Upper North Fork project area, there are several identified habitat types, including the high elevation mixed conifer forest (whitebark), lodgepole pine (subalpine lodgepole, montane lodgepole), low elevation mixed conifer (Douglas-fir), aspen, sagebrush, marsh (marshes, lakes, ponds), and riparian.

The Salmon National Forest is proposing to manage lands on the North Fork Ranger District and located in the North Fork Salmon River fifth field watershed. Proposed management is intended to implement direction contained within the Salmon National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service 1988). Opportunities to promote conservation of migratory birds and their habitats in the project area were considered during development and design of the Upper North Fork Restoration Project (memorandum of understanding Section C: items 1 and 11 and Section D: items 1, 3, and 4).

Analyses for select species have been completed (sensitive and management indicator species).

Project design criteria considerations have been developed, along with Forest Plan adherence, and may benefit migratory birds. These include:

- Riparian buffers where felling or harvesting would not occur.
- Burn prescriptions that eliminate active ignition in riparian areas and old growth units.
- No broadcast burning in some units for consideration of other wildlife, which in turn would limit the impact of prescribed fire on some species of migratory birds.
- Snag and down wood retention guidelines.
- Burn weather and fuel condition guidelines to manage fire.
- Reducing fuels near existing whitebark pine so as to not ignite remaining specimens.

Environmental Consequences for Migratory Birds

No Action Alternative

With no action, the greatest threat to migratory bird habitat is a severe wildfire. Gaging by nearby wildfires, particularly in 2000 and 2012, this high elevation part of the watershed could very well suffer severe wildfire effects with high burn severity over much of the landscape. This scenario would result in a loss of habitats for many bird species in the short term, and likely a vegetation shift and loss of some habitat types over a long period of time.

Insect or disease impacts are less likely to cause a vegetation shift because seed sources of the present species would continue to be available for some time, and young trees of those species would replace the dying trees. However, if an outbreak is very severe, whole stands could be lost and any existing structure or potential future structure could be lost. For example, intermediate-aged stands would not develop into mature stands with large diameter trees, thus postponing development of those characteristics for perhaps several hundred years. This would affect the bird species distributions differently, depending on individuals' habitat preferences. Species that do well in dense young forests may do better than those preferring old, mature forests.

Action Alternatives

Direct impacts to migratory birds include loss of individuals, most likely juveniles that have not yet fledged, due to harvest, thinning, and prescribed fire activities. Should prescribed fire treatments occur during the fall, these losses are unlikely. The potential timeframe would be over the course of 10-15 years to complete implementation of the project, but would not occur over the entire project area simultaneously. Certainly, given expected variation in burn intensity, not all of each burn unit is expected to burn completely, and there would be pockets of unburned or lightly burned areas within them (for example, the old growth units). With the variable timing and spacing of treatments, it is expected there would remain ample suitable habitat for most of the species using the project area.

Temporary losses in low cover (grasses, shrubs) would occur in parts of some burn units. However, light burning of the type intended is likely to result in vigorous resprouting. In forested stands, there may be an increase in fire-killed trees in some areas whereas there may be none in others. Thinning would reduce stand density, particularly in the Douglas-fir dominated stands, but Douglas-fir would remain the dominant cover type. In the decades to come there would be a shift to more mature conifer forests of this type, away from the intermediate aged stands that now dominate the project area.

At the Forest level, the changes in available habitat would be discountable. By making part of the forested stands in this project area more fire resilient, there may be a slight shift in bird species use and abundance, but not so great a shift as to cause a particular species to become absent in the project area or on the Forest.

By far, there will be a largely beneficial impact from the proposed treatments for migratory birds. Many of the stands now present, in particular at lower elevations, are overly dense and will take many decades to develop into mature stands. Treatments would shorten the time frame for development. Furthermore, the proposed treatments would increase the resiliency of these stands to fire, insects, and disease, thus increasing the chances that the forest stands will remain on the landscape for a long time, providing a variety of habitats for migratory birds.

Private ownership within the project area and the potential vegetation changes associated with it are the only potential source of change to account for any cumulative effects. Riparian dependent species would be the most likely affected because of the proximity of private ownership to the Upper North Fork

Salmon River. However, the largest portion by far of the ownership in the project area is public as National Forest. Thus, the impacts from this project are unlikely to add cumulatively to activities occurring on other ownership.

Management Area 4A and Big Game Cover, Forage, and Security Assessment

Several issues regarding big game were brought forward early in project development. For elk these issues include elk habitat effectiveness, elk vulnerability, and elk winter range. For mule deer, similar habitat management concerns were presented.

Management Area 4A Existing Condition

Management Area (MA) 4A is designed for big game winter range, namely for deer and elk, and occurs in part of the project area. In this management area, the central corridor along US 93 is not under Salmon-Challis National Forest management, as are the lower ends of Hughes Creek and Sheep Creek. There are about 3978 acres of this Management Area within the project area boundary, parts of a larger winter range management area of about 11,361 acres. Of the MA4 ownership in the project area, 3,276 acres are Salmon-Challis National Forest; the rest is private. Of all MA4, 1,375 acres are private and 9,986 acres are National Forest. About 1,087 acres of National Forest in this management area would be treated using non-fire methods; that is, precommercial thinning, shaded fuel break, helicopter, skyline, or tractor removal. Furthermore, of this area (1,087 acres), 491 acres are suitable cover habitat (70 percent or higher canopy closure).

Table 61 displays the suitable habitat within the individual winter range management area. Note that in the whole MA4 unit, the amount of canopy closure greater than or equal to 70 percent is about 28 percent of the area, which meets the Forest Plan standards and guidelines (of 25 percent for cover). Private land is much developed and does not provide suitable cover.

Table 61. Big game winter range (Management Area 4A) in the North Fork Salmon River drainage (National Forest System lands) (Private and National Forest System lands; derived from Forest project vegetation database)

Canopy Cover (percent)		Acres		Percent of Management Area 4A Unit[a]	
		Private	NFS	Private	NFS
0	Forage	1356	37	12	0
1		3	2212	0	19
10		0	756	0	7
20		11	495	0	4
30		2	1032	0	9
40		0	617	0	5
50		1	1136	0	10
60		1	589	0	5
70	Cover/Thermal	2	1613	0	14
80		1	1075	0	9
90		0	430	0	4
100		0	18	0	0
Total		**1375**	**10,009**	**12%**	**88%**

a - Note: Due to rounding, figures add up to less than 100 percent

Management Area 4A Direct, Indirect and Cumulative Impacts

Table 62 displays the treatment types that would affect the stands with 70 percent cover or more in this management area. These are the mechanical treatments that would be used to thin the dense forested stands and reduce density to act as fuel breaks.

Table 62. Acres of big game winter range cover habitat affected by the project

Treatment Type	Acres
Helicopter	164
Shaded Fuel Break	132
Pre-commercial Thin	75
Tractor	69
Skyline	51
Total	**490**

These treatments will reduce the canopy cover values below 70 percent for the near future, and longer and more intensively in the shaded fuel break units. This further reduction in canopy cover brings the total hiding cover value below the Forest Plan standard and guideline of 25 percent (to 23.2 percent) for the near future within the whole of Management Area 4A, including private ownership. On just the National Forest System lands, the total suitable cover habitat will be 26.4 percent. A site-specific Forest Plan amendment would be required for this project to allow treatments to occur within this management area if the non- National Forest System are considered. However, because Forest management does not apply to non- National Forest System lands (private property in this case), when we consider only National Forest System lands, there would be no need for an amendment.

Within the larger big game winter range management area, there has been almost no timber harvest since the year 2000. Total timber harvest has been about 75 acres. There were small harvests associated with the Gibbonsville projects in 2006 and 2007. In 2011 there was a small overlap of one unit with the big game winter range management area near Hughes Creek. Neither of these projects caused a significant reduction in winter range, in particular cover or security habitat, as the treatments mostly occurred in vegetation with less than 70 percent canopy closure. Therefore, this project would not contribute cumulatively to those of these other projects.

Elk Security Existing Condition

Much of the project area is roadless by legal declaration or for a lack of access routes. By and large these areas provide security habitat for big game. In the parts of the project area where there are roads, security can become an issue. Much of this is resolved through access closures during hunting seasons. In fact, part of the design criteria for this project includes no motorized off-road hunting access (the normal operating procedure) during hunting season, even though roads may be open to vehicles and personnel associated with project implementation.

Road access exists in portions of the project area (see the figure below). Open road density in elk habitat may influence elk vulnerability to disturbance or harvest through human access, particularly motorized access. General guidelines for open road density are 1.0 linear miles per square mile (Lyon 1983). Across the project area, open road density, as measured by miles of road open to motor vehicle traffic in the project area boundary, is 0.9 linear miles per square mile. When trails open to motorized use are included, this increases to 1.0 miles per square mile. There are portions of the project area that have a greater density of roads than others; however most of the project area is not accessible by road using a motorized vehicle.

Elk security cover is calculated by considering 250-acre coniferous patches at least one-half mile from an open road for security areas of over 30 percent the area (Hillis et al. 1991). There are four such patches, totaling 12,873 acres (31 percent of the project area). Table 63 shows the area of each. This assessment is done within the project boundary.

Table 63. Elk security areas in the Upper North Fork project boundary

Security area	Acres
A	500
B	3313
C	3501
D	5550
Total	12,873

These security areas take into consideration National Forest lands that are forested in general, and include even low levels of canopy closure. Security areas are analyzed here with regard to motorized access during hunting season. These areas are believed to provide locations in which elk may find refuge from motorized-based disturbance during hunting season.

The Pierce Creek Trail #6121 route designation (per the Salmon-Challis National Forest Travel Supplemental Management Decision) was taken into consideration in the analysis of elk security habitat. The trail access designation contributed to a greater amount of security habitat than existed prior to the decision on the Upper North Fork project.

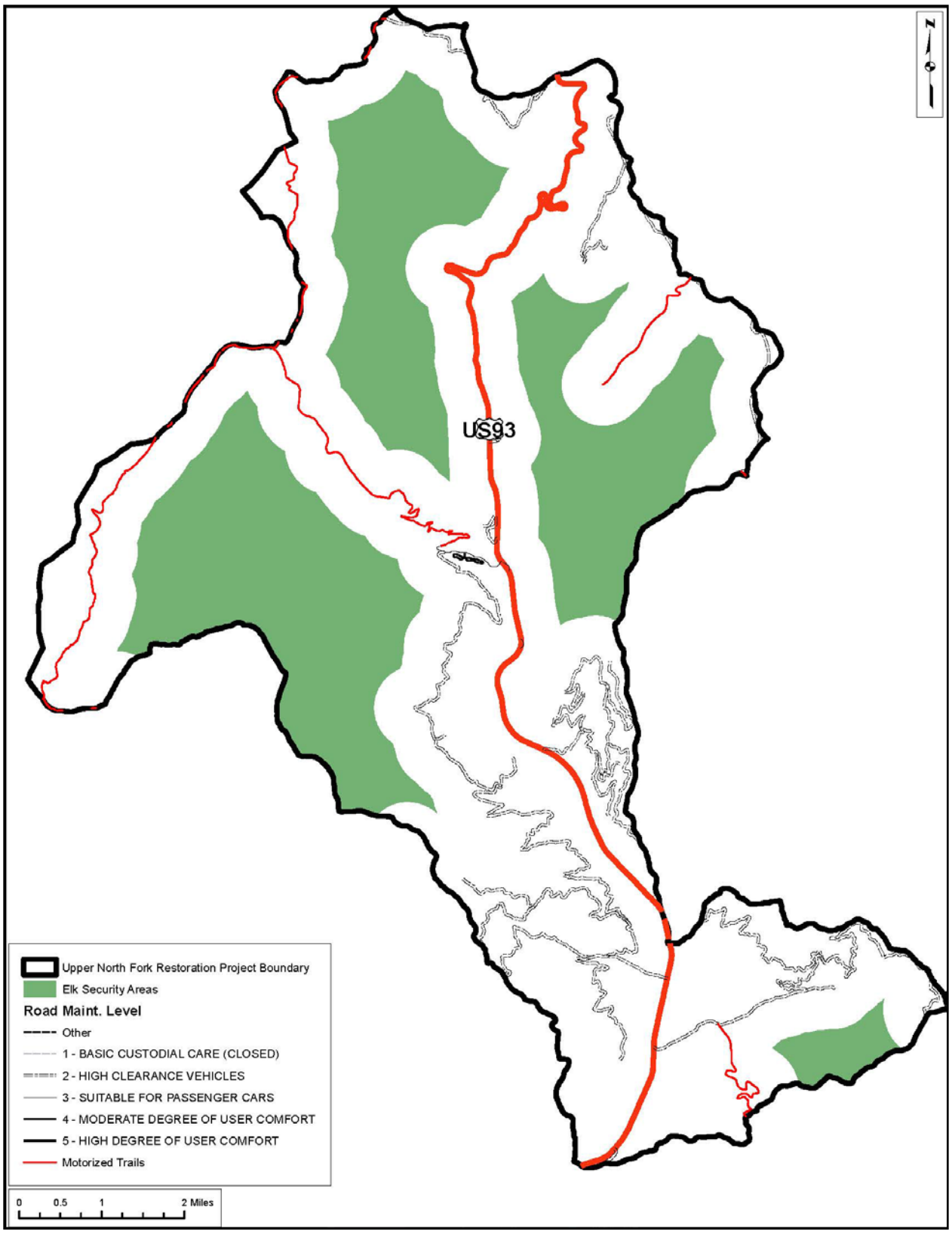


Figure 21. Motorized road access and elk security areas in the Upper North Fork project area

Direct and Indirect Impacts to Security Habitat

The no action alternative would not impact security habitat because it would not be affecting motorized road and trail access.

This project will not directly or indirectly impact security habitat as above defined because we will not be affecting motorized road and trail access. That is, there would be no permanent decrease or increase in the distance of motorized access routes in the project area. Treatments that occur in these security areas will reduce the available cover, but some cover will remain, even in the shaded fuel break units. As such, the amount of existing habitat will remain unchanged.

Cumulative Impacts to Security Habitat

Because there are no direct or indirect impacts, there can be no cumulative impacts to security habitat.

Big Game Forage and Cover Habitat Existing Condition

Forage and cover are two key components for elk (and deer) habitat. Cover habitat has been described above in the Management Are 4A discussion and the habitat description used there is the same. Elk can find forage in many areas, but optimal forage includes grass, sage, mahogany, brush, and open pine and Douglas-fir stands. Guidance for elk habitat management in central Idaho (USDA Forest Service and Idaho Department of Fish and Game 1997) indicates habitat that is not cover is forage (less barren areas, water, and rock cover). Eliminating the private land as not available for forage (which may or may not be entirely true), there remains 16,962 acres of forage in the management area.

Table 65 displays to forage cover in the project area.

Table 64. Big game cover and forage figures for the Upper North Fork project area

Habitat type	Acres	Percent of project area[a]
Cover	21,344	51.5
Forage	16,962	40.9
Other (Rock, road, water, other ownership)	3117	7.3
Total	**41,423**	**100.0**

a - Note: Due to rounding, figures add up to less than 100 percent

As indicated above 51.5 percent of the project area is cover, and 40.9 percent is forage habitat. Standards long used in game management are 40 percent cover/ 60 percent forage (Thomas et al. 1979). Thus, existing forage does not meet that measure.

Figure 22 shows forage and cover available in the project area.

Figure 22. Elk cover and forage habitat in the project area (all ownership)

Direct and Indirect Impacts to Cover and Forage Habitat

Impacts to cover and forage habitat will occur across the whole project area. Within the silviculture treatments, the effects of thinning are reliably predictable. There is more variability in effects expected within the burn units because the potential burn intensity will vary depending conditions like fuel moisture, wind, et cetera.

In the all treatment units, thinning,understory fuels treatment, and meadow treatment will reduce the canopy cover below the 70 percent threshold. As such, any cover habitat that coincides with the treatment units will become forage habitat. This sum is 3,725 acres. The new total foraging habitat within the project area would be 20,687 acres, 49.9 percent. This still does not meet the recommended 60 percent. However, in addition to the mechanical treatments, broadcast burning will further increase the forage capability of the project area, and conversely decreasing cover. In mechanically treated units, a low-intensity underburn will be used to burn activity fuels and piles, and this will not change the overstory cover. In the larger remaining portion of the project area, a mixed- to severely-lethal prescribed fire would be used to consume understory and intermediate vegetation and fuels.

The severity for the broader prescribed burn would be 25 to 75 percent of overstory trees being killed, and 75 percent or more for the high severity category. This would create a mosaic of burned patches on the landscape. With the uncertainty in severity, it is impossible to predict the outcome for cover values. In a most severe case, there would be a complete loss of cover habitat in the units not mechanically treated. The targeted range would be somewhere between for all burn units, leaving most of the project area, except for the mechanical units, with somewhere from 25 to 75 percent canopy cover. It is more likely that 25 percent consumption will be achieved. Post treatment structural stages that would be suitable cover habitat (old single- and multi-strata forest) total about 13,867 acres. This is 33.5 percent cover. Unburned or lightly burned forest wherein sapling-stage vegetation remains would also contribute to hiding cover. Post treatment (now post broadcast burn) forage would total 24,439 acres, or 59.0 percent of the project area. This ratio is better balanced, although both figures are below the desired level of 40 and 60 percent, respectively.

Table 65. Big game cover and forage figures after treatment for the Upper North Fork project area

Habitat type	Acres	Percent of project area
Cover	13,867	33.5
Forage	24,439	59.0
Other (Rock, road, water, other ownership)	3,117	7.3
Total	**41,423**	**100.0**

Treatments in shaded fuel breaks and along the roads within these units will reduce hiding cover for big game. Proposed treatments would occur up to 400 feet from the road and within the unit. There are seven units so affected, some with minor inclusions of road segments, and some that have roads either passing through them for some longer distance or bordered by a road. These units are displayed in table 66 and figure 23.

Table 66. Shaded fuel break units with a 400 foot buffer of ladder fuel treatment

Unit Number	Location	Acres	Approximate linear distance of road within or adjacent to the unit
16	Lost Trail Pass	303	0.7 miles
17c	Pierce Creek	70	1.1 miles
226	Votler Creek	140	1.8 miles
227	East side of US 93	84	1.9 miles
228	Twin Creek Campground	82	1.2 miles
229	Bloise Gulch	56	1.1 miles
230	Vineyard Gulch	14	0.2 miles

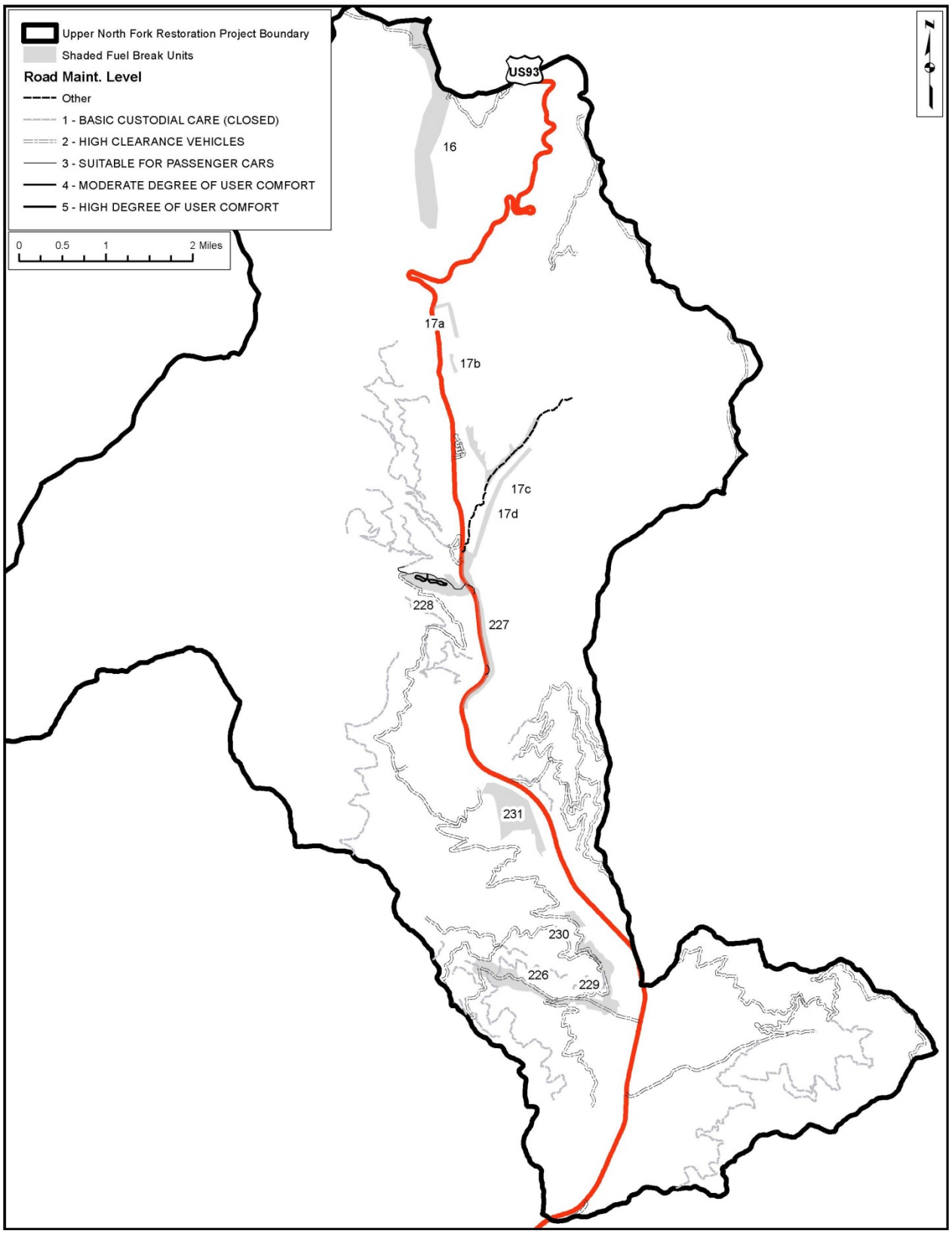


Figure 23. Shaded fuel break treatment units in the Upper North Fork project area, including road access. Four hundred foot treatment distances would occur where an access road intersects a shaded fuel break.

Cumulative Impacts to Cover and Forage Habitat

Other vegetation management and forest fires are the dominant activities affecting big game habitat in the project area and the adjacent Forest land base. Because there is a history of fire prevention coupled with increased forest density, the decrease in big game forage habitat has become an issue. Most recent silviculture activities tend to increase available forage in the short term by thinning very dense stands, which releases understory vegetation to become available as forage. Likewise, moderately-intense wildfires and prescribed fires can do the same.

The 2012 Mustang fire affected big game habitat by greatly reducing cover habitat in large patches, and conversely increasing future foraging habitat. The immediate effect was a reduction in cover habitat, which may cause big game animals to be at risk from predators, human disturbance, and hunting mortality in areas where they previously had security and cover habitat. In reviewing recent aerial imagery, riparian areas, albeit narrow in this xeric climate, show a flush of regeneration where there was overstory kill from the fire. There also exist large patches of unburned or moderately burned timber that could provide cover during spring through fall, and where big game would be pushed out only upon deep snowfall. In the long term, an abundance of standing snags may subsequently provide coarse woody debris windfalls which may provide moderate security from predators.

Along the west edge of the project area (the east edge of the Mustang fire boundary), big game may shift their movements such that the project area provides cover habitat and the regenerating burn area provides forage. The project area in that vicinity is proposed to have prescribed fire treatment only.

Along the northeast edge of the project area on the Beaverhead-Deerlodge National Forest the mature lodgepole pine is showing signs of beetle attack and likely will not last much longer. There are stands of other types, as well, so there will be cover available to deer and elk moving east and west over the Continental Divide. Treatments, both silvicultural and prescribed fire, should increase the forest's resiliency to wildfire and insects and disease in the upper reaches of the watershed. For big game, the proposed treatments would supplement regeneration of early-seral vegetation from naturally declining pine stands.

This project would add to the increase in wildfire-and potential beetle kill- generated forage. Treatments would also reduce the risk that the available cover in the watershed, already reduced to the west, would be lost to a wildfire.

Botany

Introduction

The purpose of this section is to analyze and display the biological effects of the proposed activities on all federally listed (threatened, endangered, proposed) and Forest Service sensitive plant identified in the Forest Land and Resource Management Plan that are known to occur, or have the potential to occur within the Salmon Challis National Forest proposed Upper North Fork HFRA Ecosystem Restoration Project area. This section analyzes the effects of a no action alternative and two action alternatives for the Upper North Fork Project.

Guiding Policy and Regulation

Endangered Species Act of 1973 (as amended): "…all Federal departments and agencies shall seek to conserve endangered species and threatened species…..to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats."

Forest Service Manual 2670: “Manage habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations…Manage National Forest System habitats and activities for threatened and endangered species to achieve recovery objectives….Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service Actions.”

Consultation to Date

There has been no previous consultation with the U.S. Fish and Wildlife Service (US Fish and Wildlife Service) regarding this project. Federally-listed plant species are not known or suspected from the project area and thus consultation with the US Fish and Wildlife Service is not warranted for plants for the Upper North Fork Project.

Existing Environment

The physical and biological landscape descriptions are in the silviculture section starting on page 29.

Biological Assessment/Review

Survey Information

Pre-Field Review

Plants

The Salmon Challis National Forest does not have the potential or known occurrences or suitable habitat for listed endangered, threatened or candidate plant species. The Upper North Fork project, under any alternative would not have any impact to Federally-listed plants. Therefore a fully developed Biological Assessment to address impacts to Federally -listed plants is not warranted.

Biological Evaluation

The purpose of the biological evaluation (BE) is to analyze and present the anticipated biological effects of the proposed activities on all Forest Service sensitive plant species that are known to occur, or have the potential to occur within the Salmon Challis Upper North Fork Project area, and to determine whether the Upper North Fork Project would result in a trend toward a Sensitive species becoming Federally listed as threatened or endangered under the Endangered Species Act (1973, as amended).

Survey Information

Pre-Field Review

Plants

Using pre-field examination for species that had ranges overlapping the project area and/or consideration of habitats found there, the potential exists for sensitive plant species to be found in the Upper North Fork Project area:

Twenty one species are listed as sensitive on the Salmon-Challis National Forest and are assessed in this document for possible effects from the Upper North Fork Project.

- Lost River milkvetch (*Astragalus amnis-amissi*)
- Lemhi milkvetch (*Astragalus aquilonius*)
- Mesic (meadow) milkvetch (*Astragalus diversifolius*)

- White Clouds milkvetch (*Astragalus vexilliflexus var. nubilus*)
- Maritime sedge (*Carex incurviformis*)
- Douglas' biscuitroot (*Cymopterus douglassii*)
- Rockcress draba (*Draba densifolia var. apiculata syn. Draba globosa*)
- Stanley whitlow-grass (*Draba trichocarpa*)
- Guardian buckwheat (*Eriogonum meledonum*)
- Welsh buckwheat (*Eriogonum capistratum var. welshii*)
- Challis crazyweed (*Oxytropis besseyi var. salmonensis*)
- Lemhi penstemon (*Penstemon lemhiensis*)
- Marsh's bluegrass (*Poa abbreviata ssp. marshii*)
- Wavy-leaf thelypody (*Thelypodium repandum*)
- Idaho pennycress (aka Stanley thlaspi) (*Thlaspi idahoensis var. aileeniae syn. Noccaea idahoensis var. aileeniae*)
- Sacajawea's bitterroot (*Lewisia sacajaweana*)
- Pink agoseris (*Agoseris lackschewitzii*)
- Flexible alpine collomia (*Collomia debilis var. camporum*)
- Salmon twin bladderpod (*Physaria didymocarpa var. lyrata*)
- Idaho range lichen (*Xanthoparmelia idahoensis*)
- Whitebark pine (*Pinus albicaulis*)

Survey Results

Plants

Surveys for R4 sensitive plant species have been conducted for portions of this project. Unsurveyed areas exist in the project area. The unsurveyed areas are primarily zones with no proposed activities or are proposed for prescribed fire within the project boundary. For the purposes of this analysis are considered occupied if they remain unsurveyed. The design criteria stipulate in the case of Lemhi penstemon special timing for prescribed fire to allow for seed development and dispersal and manage potential effects.

Species Accounts (partially adapted from 2013 Salmon Challis Project Species Accounts)

Plants

Lost River milkvetch (Astragalus amnis-amissi)

Range and Distribution: Occurrence records indicate this species is limited to the eastern and western slopes of the southern half of the Lost River Range, and the southern end of the Lemhi Range, in Custer and Butte Counties. It occurs at elevations from about 5,500 feet in the canyons of the southern Lemhi Range, to about 7,000 feet in the Lost River Range. Forest GIS/Conservation Data Center records show no known occurrence within or adjacent to the action area, and no appropriate habitat exists for this species on site and no plants were found during surveys.

Habitat Requirements and Natural History: Lost River milkvetch occurs on ledges and rock crevices on nearly vertical limestone cliffs and at the base of talus slopes, where this species prefers moist, shaded microsites (Moseley 1989, USDA Forest Service 1990).

Potential for Occurrence within the Project Area: Plants may exist in unsurveyed areas within the project boundary. However other habitat components are limited or absent and this species is not likely present in the Upper North Fork Project area.

Lemhi milkvetch (Astragalus aquilonius)

Range and Distribution: Lemhi milkvetch is endemic to east-central Idaho and occurs in Custer, Butte, and Lemhi Counties at lower elevations.

Habitat Requirements and Natural History: Lemhi milkvetch occurs on shale or clay in washes of gullies clay bluffs, on steep eroded canyon banks, or on the sand of gravel bars along streams within the shrub-steppe zones at lower elevations (mostly below Forest Service boundaries).

Potential for Occurrence within the Project Area: Records show no known occurrence within or adjacent to the action area and no potential habitat is present within the action area.

Mesic (meadow) milkvetch (Astragalus diversifolius)

Range and Distribution: Records show no known occurrence within or adjacent to the action area, with this species generally limited to the larger intermountain valleys of the Big Lost River.

Habitat Requirements and Natural History: Mesic milkvetch occurs on moist, often alkaline soils. Suitable habitat is moist, usually alkaline meadows and swales in sagebrush valleys. It has been found on the edge of an alkaline seepage area growing with rabbitbrush.

Potential for Occurrence within the Project Area: Potential habitat does not occur within or adjacent to the action area, representing no likelihood of occurrence for mesic milkvetch.

White Clouds milkvetch (Astragalus vexilliflexus var. nubilus)

Range and Distribution: White Cloud milkvetch is restricted to the eastern slope of the White Cloud Peaks and across the valley of the East Fork Salmon River on the western slope of the Boulder Mountains in Custer County, Idaho. Its known global distribution measures approximately 21 km (13 mi) x 10 km (6.2 mi). It occurs along ridge crests and associated slopes in the subalpine zone between approximately 2650 -2895 m (8,700 - 9,500 ft) elevation. Sites are dry, rocky, open, relatively sparsely vegetated, and usually underlain by substrates of the Challis Volcanic Group.

Habitat Requirements and Natural History: White Clouds milkvetch occurs in subalpine and alpine areas on scree slopes and within sagebrush communities (USDA Forest Service 1990).

Potential for Occurrence within the Project Area: Conservation Data Center/forest GIS records show no known occurrence within or adjacent to the action area and the project area is not near the known distribution of the species.

Maritime sedge (Carex incurviformis var. incurviformis)

Range and Distribution: Maritime sedge is a widely distributed but rare, low-growing perennial that forms loose clumps, which arise from creeping rootstocks. It occurs on wet rock ledges and moist tundra

in the alpine zone. The only known occurrence of maritime sedge on the Forest is within the Kane Lake cirque

Habitat Requirements and Natural History: Maritime sedge is a widely distributed but rare, low-growing perennial that forms loose clumps, which arise from creeping rootstocks. It occurs on wet rock ledges and moist tundra in the alpine zone.

Potential for Occurrence within the Project Area: Potential habitat does not occur within or adjacent to the action area, representing no likelihood of occurrence for maritime sedge.

Douglas's biscuitroot (Cymopterus douglassii)

Range and Distribution: On the Lost River Ranger District it occurs at high elevations over 9,000 feet.

Habitat Requirements and Natural History: Populations occur in alpine and subalpine zones on open slopes, ridges, and summits with calcareous or dolomitic substrates (USDA Forest Service 1990).

Potential for Occurrence within the Project Area: This plant is endemic to the central Lost River Range and central Lemhi Range in Custer and Lemhi Counties. Records show no known occurrence within or adjacent to the action area. The action area is outside the recognized range of Douglas' biscuitroot, with no likelihood of occurrence within the action area.

Rockcress draba (Draba densifolia ssp. apiculata)

Range and Distribution: In Idaho occurs in an alpine fell-field habitat and has been found along the crest of the White Cloud Peaks on the divide between Big Boulder Creek and Warm Springs Creek south of Snow Lake and on Peak 10,815 southwest of Railroad Ridge.

Habitat Requirements and Natural History: Rockcress draba is found on moist gravelly alpine meadows and talus slopes, often on limestone derived soils. Found in elevation generally from 10,000 to 12,000 feet (USDA Forest Service 1990).

Potential for Occurrence within the Project Area: Records show no known occurrence within or adjacent to the action area. The action area is outside the recognized range of rockcress draba, with no likelihood of occurrence within the action area.

Stanley whitlow-grass (Draba trichocarpa)

Range and Distribution: This species is considered a Stanley Basin endemic, therefore the action area is outside the range of this species.

Habitat Requirements and Natural History: Found on steep slopes on granitic parent material in shallow soils (USDA Forest Service 1990).

Potential for Occurrence within the Project Area: Records show no known occurrence within or adjacent to the action area. The action area is outside the recognized range of Stanley whitlow grass, with no likelihood of occurrence within the action area.

Guardian buckwheat (Eriogonum meledonum)

Range and Distribution: This species is a Stanley Basin endemic.

Habitat Requirements and Natural History: Found on unstable scree slopes on granitic parent material (USDA Forest Service, 1990).

Potential for Occurrence within the Project Area: The Upper North Fork Project area is outside the range of this species, with no likelihood of occurrence within the action area. Records show no known occurrence within or adjacent to the action area.

Welsh's buckwheat (Eriogonum capistratum ssp. welshii)

Range and Distribution: Known from the White Knob Mountains, Boulder Mountains, Lost River Range and Pahsimeroi Mountains.

Habitat Requirements and Natural History: This plant is endemic to east-central Idaho where it primarily occurs on dry, windswept, sparsely vegetated sites characterized by shallow, clay-loam soils on convex topographic positions, sites are drought prone and unproductive(Murphy 2002). Known occurrences in Idaho are between 6,000 and 7,800 feet in elevation. Welsh's buckwheat ranges from valley bottom alluvial fans and benches to foothill ridges and bluffs. Associated vegetation consists primarily of fringed sagebrush (*Artemisia frigida*), Sandberg's bluegrass, bluebunch wheatgrass, ricegrass, and cushion like forbs.

Potential for Occurrence within the Project Area: Welsh's buckwheat is endemic to the valleys and foothills of the upper Big Lost River and the Pahsimeroi River basins within the rain shadows of the White Knob Mountains, Boulder Mountains, Lost River Range, and Pahsimeroi Mountains (Murphy, 2002). The action area is not within the recognized habitat and range of this species. Records show no known occurrences within or adjacent to the Upper North Fork Project area.

Challis crazyweed (Oxytropis besseyi var. salmonensis)

Range and Distribution: Challis crazyweed grows in dry mountain valleys that drain into the Salmon River south of Challis.

Habitat Requirements and Natural History: Challis crazyweed inhabits Wyoming big sagebrush with bluebunch wheatgrass, Sandberg's bluegrass, and salt desert shrub habitats, where it occurs in sandy washes and open slopes with rocky volcanic soils (USDA Forest Service 1990).

Potential for Occurrence within the Project Area: The Upper North Fork Project area is outside the recognized range of this species, with no likelihood of occurrence within the action area. Records show no known occurrences within or adjacent to the project area.

Lemhi penstemon (Penstemon lemhiensis)

Range and Distribution: Lemhi penstemon is considered a regional endemic of Lemhi County in Idaho and Beaverhead, Deer Lodge, Ravalli and Silverbow counties in Montana.

Habitat Requirements and Natural History: The species is not restricted to any particular geological substrate, and has been found on granitic soils as well as limestone and other sedimentary substrates. Soils are often very gravelly; however, soil texture is highly variable and ranges from sand to fine clay. Lemhi penstemon prefers open habitats such as rock outcrops and steep, rocky slopes with natural soil slippage. This adaptation is underscored where plants have colonized road banks.

Potential for Occurrence within the Project Area: Currently there are three known occurrences within the project area. Once occurrence is located along the edge of a precommercial thin unit (unit 169), one

occurrence is on the edge of a noncommercial fuels treatment unit (unit 264), and one occurrence is along the edge of the project boundary adjacent to a prescribed burn unit. All three occurrences should be avoided during treatment to prevent direct impacts.

Additional occurrences may be present in areas not planned for treatment or within prescribed fire areas. Prescribed fire operations are limited to avoid burning during the flowering period (May 15 to June 30) in all mechanical and prescribed fire treatment units from Votler Creek north to Johnson Gulch all west of Highway 93, except upon site specific discussion with qualified specialist (appendix A, design criteria #142).

Marsh's bluegrass (Poa abbreviata ssp. marshii)

Range and Distribution: Known occurrences of Marsh's bluegrass in Idaho are in mountain passes above 10,000 feet in elevation.

Habitat Requirements and Natural History: This dwarf perennial alpine grass occurs in alpine areas in pockets of soil within scree and talus slopes.

Potential for Occurrence within the Project Area: Known occurrences of Marsh's bluegrass in Idaho are in mountain passes above 10,000 feet in elevation. There is no suitable habitat, and the Upper North Fork Project area is below the recognized elevational range of Marsh's bluegrass; therefore, there is little to no likelihood of occurrence within the action area.

Wavy-leaf thelypody (Thelypodium repandum)

Range and Distribution: *Thelypodium repandum* is endemic to east-central Idaho. It occurs in Custer and a small portion of Lemhi counties. Populations are found along the Salmon River and lower elevations of its tributaries from Ellis, south to Clayton; along the lower East Fork Salmon River and its tributaries; and south of Challis along the Lost River Range.

Habitat Requirements and Natural History: Wavy-leaf thelypody is found on steep shale banks derived from volcanic and metamorphic rocks. The plant is associated with bunchgrass and herbaceous perennials between 4,900 to 7,000 feet in elevation (USDA Forest Service 1990).

Potential for Occurrence within the Project Area: Records show no known occurrences of Wavy-leaf thelypody within or adjacent to the Upper North Fork Project area. Limited habitat is present and the project is within the elevational range of the species, but due to distance from known occurrences, and none were located in field surveys, therefore presence is unlikely.

Idaho pennycress (aka Stanley thlaspi) (Thlaspi idahoensis var. aileeniae syn.r Noccaea idahoensis var. aileeniae)

Range and Distribution: It is an endemic to the Stanley Basin area, occurring in the upper Marsh Creek valley, south through the Stanley basin and Sawtooth Valley to the upper Big Wood river valley near Easley Creek (Moseley 1988).

Habitat Requirements and Natural History: This species generally occurs in sandy soil textures, on glacial outwash terraces, and on residual bedrock ridges.

Potential for Occurrence within the Project Area: Stanley thlaspi is a Stanley Basin endemic, and the Upper North Fork Project area is outside the recognized range of this species. Records show no known occurrence within or adjacent to the action area.

Sacajawea's bitterroot (Lewisia sacajaweana)

Range and Distribution: Sacajawea's bitterroot is endemic to central Idaho with just over two dozen populations known to exist. Roughly three-fourths of these populations are on the Boise National Forest with scattered populations also occurring on the Payette, Sawtooth, and Salmon-Challis National Forests. The only known population on the Salmon-Challis National Forest is located on the northern extreme of the forest in the vicinity of Bull Trout Lake.

Habitat Requirements and Natural History: Sacajawea's bitterroot can be found in montane and subalpine habitats ranging from 5,000 to 9,500 feet. The plant is dormant most of the year. Shortly after snowmelt, a rosette of succulent leaves emerges, followed by showy white flowers that hug the ground. After flowering, all aboveground signs of the plant disappear, with the tuberous carrot-like root hidden just below the surface.

Potential for Occurrence within the Project Area: Records show no known occurrences of Sacajawea's bitteroot within or adjacent to the Upper North Fork Project area. Limited habitat is present and the project is within the elevational range of the species, but due to distance from known occurrences, and none were located in field surveys, therefore presence is unlikely.

Pink agoseris (Agoseris lackschewitzii)

Range and Distribution: Pink agoseris is a regional endemic of east-central Idaho, western, central and south central Montana, northwestern Wyoming, and barely reaching southern Alberta.

Habitat Requirements and Natural History: This species occupies perennially wet montane and subalpine meadows, marshes, and swales or at the edge of meadows. These habitats represent a range of substrates and vegetation types but are sparse and discontinuous across the landscape, and its distribution is characterized as somewhat patchy.

Potential for Occurrence within the Project Area: Records show no known occurrences of Pink agoseris within or adjacent to the Upper North Fork Project area. Limited habitat is present and the project is within the elevational range of the species, but due to distance from known occurrences, and none were located in field surveys, therefore presence is unlikely.

Flexible alpine collomia (Collomia debilis var. camporum)

Range and Distribution: All known occurrences of flexible alpine collomia are on the Salmon portion of the Salmon Challis National Forest.

Habitat Requirements and Natural History: Species accounts from the Idaho Conservation Data Center suggest that flexible alpine collomia occurs in quartzite scree, granitic talus, or other areas of poor soil development between 3,800 feet to 8,900 feet in elevation.

Potential for Occurrence within the Project Area: There are two known occurrences of alpine collomia in the Upper North Fork Project area. One occurrence is within a helicopter treatment unit (unit 50a), and one large occurrence of nearly 4 acres is partly located within a proposed prescribed fire unit. It is recommended that both occurrences be avoided to prevent direct impacts. This would include establishing firelines, or any ground clearing to support logging activities. Other occurrences may exist within the unsurveyed portions of the project such as prescribed fire units. The likelihood of impacts to this plant from prescribed fire is low due to the nature of the habitats it occurs (rocky talus slopes).

Salmon twin bladderpod (Physaria didymocarpa var. lyrata)

Range and Distribution: At this time, the only known population of this species on the Salmon-Challis National Forest is located on the Leadore District. Other populations occur on adjacent BLM administered lands.

Habitat Requirements and Natural History: *Physaria didymocarpa var. lyrata* occurs on rocky, sparsely vegetated, gentle to steep southerly slopes. It can be found from upper to lower slope positions. Vegetation cover is low and bare ground and rock coverage high. The substrate is dominated by rocks 1 - 3 inches in diameter, and can be loose, or more often fairly stable. Parent material consists of rocks belonging to the Challis volcanics group. All populations occur between 4,500 to 6,800 feet in elevation.

Potential for Occurrence within the Project Area: and the Upper North Fork Project area is outside the recognized range of Salmon twin bladderpod. Records show no known occurrence within or adjacent to the Upper North Fork Project area.

Idaho range lichen (Xanthoparmelia idahoensis)

Range and Distribution: Currently the five occurrence records suggest that Idaho range lichen is found in lower elevations, between 4,260 to 5,212 feet, and has only been observed on the Salmon District BLM in the Lemhi River drainage to date.

Habitat Requirements and Natural History: This species is found on bare bentonite hills and flats, bare clay outcrops, and hills on mostly south facing slopes within the sagebrush community.

Potential for Occurrence within the Project Area: and the Upper North Fork Project area is outside the recognized range Idaho range lichen. Records show no known occurrence within or adjacent to the Upper North Fork Project area.

Whitebark pine (Pinus albicaulis) - adapted from the Upper North Fork Project silviculture report

Range and Distribution: Whitebark pine is prevalent on the harsh high elevation sites along the Continental Divide, and is a major species that grows in high elevation forests all across the northern Rocky Mountains, where its cold tolerance, superior hardiness on the harsh microsites that may exist after a fire, unique method of seed dispersal, and resistance to lower intensity fires allow it to compete successfully in the upper subalpine zone. It is also distributed in the high mountains of the pacific coast states into Canada.

Habitat Requirements and Natural History: Whitebark pine has very large seeds and regenerates primarily by means of seed caching (storing) in soil by Clark's nutcrackers, with squirrels and other animal caching playing a very minor role. Clark's nutcrackers are jay-like birds that have a specially adapted bill for extracting seeds from cones and a special pouch in its throat used for seed transport. Most seed is cached within a few miles, but they may carry seeds up to 14 miles.

Potential for Occurrence within the Project Area: Relatively pure stands of whitebark pine survive across treeline ecotones within the Upper North Fork forest vegetation Affected Environment, both as young seedling/saplings and older mature trees; however, the presence of dead standing and fallen whitebark pine across much of the spruce/subalpine fir-dominated high-elevation forests in the Upper North Fork forest vegetation Affected Environment indicates that this species has successfully established and survived across broader areas in the past than where it currently exists. In addition whitebark pine is impacted by blister rust as badly as western white pine. Blister has caused rapid mortality of whitebark pine over the last 30 to 60 years.

Whitebark pine is present in many units proposed for treatment. Refer to the silviculture report for the Upper North Fork Project, located in the project record, for more location mapping for whitebark pine across the project.

Environmental Consequences

No action

Taking no action may cause indirect effects to sensitive plants and their habitat because the project area could be at a higher risk of high severity wildfire. Forest conditions would continue in a dense condition until fire or other disturbance such as disease changes the forest conditions. For the Sensitive plant species that generally inhabit open places, there would not be much change from wildfire over time other than possibly an increase of available open ground habitats (until they revegetate over time). For forest-specific Sensitive plant species such as whitebark pine, a wildfire could eliminate entire occurrences of plants. Some increases on soil movement after a fire could also impact sensitive plant occurrences by eroding or smothering them.

Alternatives 1 and 2

Both alternatives were combined for effects analysis due to the similarity of effects between the alternatives. The main difference is not developing as many temp roads and skid trails in alternative 2.

Potential Effects for Forest Service Sensitive Plant Species Analyzed

Direct Effects:

Direct mortality to sensitive plant species (Lemhi penstemon, flexible alpine collomia, and whitebark pine) could occur from cutting and thinning of vegetation, mechanical soil disturbance, or from trampling of vegetation by people walking over the site.

Three known occurrences of Lemhi penstemon and two occurrences of flexible alpine collomia have been recommended for avoidance form direct effects such as fireline construction. In addition a limit on the season of prescribed fire in selected areas has been established to limit the effects on occurrences of Lemhi penstemon, and mimic a natural timing of fire.

Whitebark pine may be impacted directly by project implementation. Most susceptible would be seedlings and small trees that may be killed by prescribed fire and mechanical activities such as tractor skidding. In the long term, the viability of whitebark pine would be increasingly threatened by a combination of climate change, increased wildfire severity, frequency, and/or extent, damage and mortality caused by white pine blister rust, and encroachment by competing species. At the same time, over the course of several years or decades, those threats would be partially mitigated by the Upper North Fork project treatments to reduce stand density, create openings with full-sunlight, disproportionally reduce the abundance of subalpine fir and other competing species—all of which would create many more areas suitable for whitebark pine germination and growth than currently exist or would exist over the long run if no action was taken.

In the short term (10 years or less), the broadcast burning and allowed wildfire treatments would result in the mortality of whitebark pine trees, particularly in areas experiencing moderate or high-severity fire. The burn treatments are not expected to contribute to a loss of viability of the species because even after project implementation, and given existing damage from wildfire, insect and disease disturbances, whitebark pine presently remains widely-distributed among treeline areas across the northern Rocky Mountains. Although pine regeneration processes have been and are expected to be limited by invasive

diseases, and changing climate and wildfire regimes, in the short term whitebark pine regeneration processes continue to function well on the Salmon-Challis National Forest.

Indirect Effects:

Indirect effects could include the disruption of native seed banks through soil alterations, burning, increased erosion and sediment transport, and the colonization of non-native, invasive plant species. Soil compaction, erosion, and sedimentation resulting from Project activities, can indirectly impact understory and overstory species. Vegetation removal and erosion can alter the surface hydrology in an area and affect plant communities by reducing access to sheet flow during rain events.

Design features have been integrated into the proposed action to eliminate or minimize the potential adverse indirect impacts from weed and other unintended effects. A Forest approved botanist may additionally ascertain possible risks to Forest Service Sensitive species during project implementation, and if avoidance or other mitigation measures may be needed for plant occurrences. In addition design criteria to protect other resources also reduce the potential for effects to sensitive plants and their habitats.

Cumulative Effects

The cumulative effects spatial boundary considered in this analysis includes lands adjacent to and within the Congressional boundary of the Salmon-Challis National Forest. The temporal boundary is 10 years. Though impacts are likely to extend beyond this period of time, more than 10 years is beyond the scope of what can be meaningfully analyzed, with the exception of general discussion on impacts of climate change, population growth and pollution. See appendix C for a comprehensive list of past, present and foreseeable activities and events considered in this analysis.

Climate Change and Pollution

Models for climate change predict an increase in nonnative plant species invasions and habitat invisibility (Janetos et al. 2008). It is thought that climate change is likely to increase the ranges and abundances on invasive, nonnative species as they are not as limited by dispersal and pollination limitations as are native plants (Janetos et al. 2008). It is thought that initially the impacts of climate change are direct in the expansion of ranges and abundances, though this effect is incremental and generally only observable over several years. Longer term impacts would be indirect, impacting the various trophic relationships. Invasive plants may also be able to migrate more effectively than native plants, as they are not generally dependent on specific pollinator or biotic dispersal agents (Janetos et al. 2008).

The impacts of climate change on vegetation types found in the project area are still poorly understood, though simulations of fire regimes in chaparral have found that there is a potential for an increase in the duration of the fire season which could lead to changes in plant community composition (from Stephenson and Calcerone 1999).

The impacts of pollution are due to the deposition of nitrogen and ozone from the atmosphere. The impacts of nitrogen deposition include increased fertilization which can alter community composition, soil acidification and decrease mycorrhizal symbiosis (Stephenson and Calcerone 1999). Ozone has been found to reduce the vigor of certain tree species.

Determination Summary for Sensitive Species

Plants

Based on these conclusions, it is my determination that the Upper North Fork HFRA Ecosystem Restoration Project action alternatives **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability** for:

- Lemhi penstemon (*Penstemon lemhiensis*)
- Flexible alpine collomia (*Collomia debilis var. camporum*)
- Whitebark pine (*Pinus albicaulis*)

There is the potential for minor adverse impacts to individuals if present in treatment areas. The design criteria developed for Forest Service sensitive plants was developed to ensure that species are protected from adverse thresholds of impacts from the Upper North Fork Project that would lead to a trend for listing as threatened or endangered.

It is my determination **no effect** to the following Forest Service sensitive species is expected:

- Lost River milkvetch (*Astragalus amnis-amissi*)
- Lemhi milkvetch (*Astragalus aquilonius*)
- Mesic (meadow) milkvetch (*Astragalus diversifolius*)
- White Clouds milkvetch (*Astragalus vexilliflexus var. nubilus*)
- Maritime sedge (*Carex incurviformis*)
- Douglas' biscuitroot (*Cymopterus douglassii*)
- Rockcress draba (*Draba densifolia var. apiculata syn. Draba globosa*)
- Stanley whitlow-grass (*Draba trichocarpa*)
- Guardian buckwheat (*Eriogonum meledonum*)
- Welsh buckwheat (*Eriogonum capistratum var. welshii*)
- Challis crazyweed (*Oxytropis besseyi var. salmonensis*)
- Marsh's bluegrass (*Poa abbreviata ssp. marshii*)
- Wavy-leaf thelypody (*Thelypodium repandum*)
- Idaho pennycress (aka Stanley thlaspi) (*Thlaspi idahoensis var. aileeniae syn. Noccaea idahoensis var. aileeniae*)
- Sacajawea's bitterroot (*Lewisia sacajaweana*)
- Pink agoseris (*Agoseris lackschewitzii*)
- Salmon twin bladderpod (*Physaria didymocarpa var. lyrata*)
- Idaho range lichen (*Xanthoparmelia idahoensis*)

The no effect determination is due to a combination of no habitat present, the Upper North Fork Project is outside of the known distribution, or other factors detailed in each species' account.

A determination of no effect to sensitive plant species has been made for the no action alternative because no actions would be implemented.

Nonnative Invasive Species

This analysis characterizes the impacts of noxious weed invasion, the current extent of noxious weed infestations in the Upper North Fork project area, current weed management actions, and the potential effects of the Action Alternatives on continued noxious weed invasion. The impacts of noxious weeds have assumed crisis proportions throughout much of the United States, including national forest system

lands (USDA Forest Service 1998; ISDA 1999). Noxious weeds arrive in this country without the array of insect and disease organisms that control their density and distribution in their native countries (Asher et al. 2002). As a result, these species become unusually aggressive in their new environment; they are able to establish monocultures and crowd out native plants. At a landscape level, this translates into a cascading set of changes in complex ecological interactions and ecosystem processes. These changes include loss of plant and animal biodiversity, loss of soil stability, increased erosion, changes in water quality, alterations in hydrologic regimes and nutrient cycles and increased disturbance cycles (Sheley and Petroff 1999; Asher et al. 2002; Harrod 2001, Harrod and Reichard 2002, Chornesky et al. 2005).

Noxious weeds affect fish and wildlife species at local and range-wide levels. Plant community changes and watershed degradation resulting from weed infestations affect habitat carrying capacity and the number of individuals that the habitat can support declines (ISDA 1999). Unchecked noxious weed invasion eventually creates major changes in plant community structure and composition (Sheley and Petroff 1999), ultimately resulting in a loss of habitat for aquatic and terrestrial species (Asher et al. 2002).

The primary vectors of noxious weeds are motorized vehicles and roads, domestic livestock, wildlife species and waterways (ISDA 1999). Existing weed infestations provide a seed source that can be spread by these and other vectors.

Regulatory Framework

Several broad federal policies require the control of invasive plants. The Forest Service Pesticide Use Handbook (FSH 2109.14) provides agency guidance on planning, implementation, and reporting of projects that include herbicide use.

National Forest Noxious Weed Management Policy (FSM 1080-2083) requires District Rangers to prevent the introduction and establishment, and provide for the containment and suppression, of noxious weeds; and to cooperate with state agencies. The policy is consistent with the Federal Noxious Weed Action of 1974, as amended (7 USC 2801 et seq.).

Idaho's Noxious Weed Control Act (I. C.§ 22-2401 et seq.). Under this act it is unlawful for an individual to allow noxious weeds to propagate or go to seed on their land unless they are complying with an approved management plan. The law directs counties to develop weed control districts to plan and implement weed control efforts. County weed boards must make all reasonable efforts to develop and implement a noxious weed program covering all land within the district owned by the federal government. Idaho's noxious weed statutes and regulations require coordinated efforts among the state and federal agencies, and counties to control designated noxious weed populations.

Executive Order 13112, Invasive Species, February 3, 1999 directs federal agencies whose actions may affect the status of invasive species to prevent the introduction of invasive species; and detect and respond rapidly to, and control, populations of such species in a cost-effective and environmentally sound manner, as appropriations allow.

36 Code Of Federal Regulations (CFR) Sub A, Sec 222.8 directs that " ... The Chief of the Forest Service will cooperate with County or other local weed control districts in analyzing noxious farm weed problems and developing control programs in areas which the National Forests and National Grasslands are a part."

Federal Noxious Weed Act of 1974 (Sec 9) authorizes the Secretary to cooperate with other federal and state agencies or political subdivisions thereof, and individuals in carrying out measures to eradicate, suppress, control, or prevent the spread of noxious weeds.

Methodology for Analysis

Noxious weed inventory data information presented in this section is based on the USDA Forest Service Natural Resource Information System (NRIS) Terra database (USDA Forest Service Salmon-Challis National Forest 01/27/2012), following national forest system protocols.

The North Fork Ranger District is poorly inventoried for noxious weeds; as a result the NRIS Terra database lacks information on many existing uninventoried noxious weed infestations within the approximately 41,423 acre Upper North Fork project area. There are approximately 2,181 acres of inventoried noxious weeds within the project area based on the current forest weed inventory database (USDA Forest Service Salmon-Challis National Forest 01/27/2012), as shown in table 67 below. In addition, it is likely that a majority of the approximately 1,110 acres of private lands within the project area are infested with noxious weeds to varying extents and densities.

Field reconnaissance also indicates that Salmon-Challis National Forest lands within the project area contain far more noxious weed infestations than shown in the NRIS Terra database. In particular, spotted knapweed is prevalent throughout much of the Upper North Fork project area; its presence has been noted in varying densities along all roads and trails within the project area, together with the majority of former harvest units. Therefore, in order to estimate additional acreages of spotted knapweed infestation, the following methodology was used:

1. The most current Salmon-Challis National Forest existing roads and trails GIS layer was buffered by 20 feet on either side of the center line, and then erased where the resultant polygons overlapped with mapped infestations, in order to prevent an overestimated final acreage.

2. The most recent aerial imagery (NAIP 2011) was used to determine the density of regrowth in previously harvested timber units. Field reconnaissance shows that spotted knapweed does not persist over time in harvest units with dense lodgepole pine regeneration. However it maintains its presence in areas with sparser regeneration, particularly in open ponderosa pine and Douglas-fir habitats. Therefore, using a combination of aerial imagery and the current Salmon-Challis National Forest cover (dominant vegetation) layer, each former harvest unit was assigned one of the following values for knapweed presence: Yes, Maybe, No. Again, in order to prevent an overestimate of infested acres, any areas that overlapped inventory polygons were erased before calculating final acreages.

Table 67 below displays inventoried acreages for noxious weeds present in the project area, together with the additional estimated acreage of likely spotted knapweed infestation (former harvest units with an assigned value *Yes*). Although the density of spotted knapweed presence within this additional estimated acreage may vary considerably, from dense to very sparse; additional acreage may be conservatively estimated, as it is likely that at least some portion of the 1,373 acres assigned a Maybe value does contain knapweed.

Table 67. Inventoried acreage for noxious weeds within the Upper North Fork project area

Common Name	Scientific Name	Inventoried Acreage	Average Cover Density
Spotted Knapweed	*Centaurea maculosa*	2032.9	5%
Sulphur Cinquefoil	*Potentilla recta*	121.9	<1%
Hoary Alyssum	*Berteroa incana*	18.4	14%
Common St. Johnswort	*Hypericum perforatum*	5.0	<1%
Oxeye Daisy	*Chrysanthemum leucanthemum*	1.0	<1%

Common Name	Scientific Name	Inventoried Acreage	Average Cover Density
Houndstongue	*Cynoglossum officinale*	0.5	NA
Canada Thistle	*Cirsium arvense*	0.5	20%
Dalmatian Toadflax	*Linaria genistifolia ssp. dalmatica*	0.4	1%
Yellow Toadflax	*Linaria vulgaris*	0.1	NA
Musk Thistle	*Carduus nutans*	0.1	<1%
Diffuse Knapweed	*Centaurea diffusa*	0.1	<1%
		Total: 2180.9	
Common Name	**Scientific Name**	**Estimated Acreage**	
Potential Spotted Knapweed	*Centaurea maculosa*	5183.0	NA

Measurement Indicators

- Acres of existing inventoried weed infestation by plant cover density and distribution
- Percentage of increase in extent or density of weed infestations by new and existing species within the project area

Analysis of the effects of the proposed Upper North Fork project was based on the potential for increase in noxious weed acreage and cover density due to:

- Soil disturbance and loss of desirable and competitive vegetative cover resulting from logging operations and temporary road construction and culvert replacement.
- Opening of the canopy from logging leading to loss of shade and increase in acreage susceptible to weed invasion.
- Prescribed burning which could temporarily reduce ground cover and increase the acreage susceptible to weed invasion.
- Effects of the introduction of logging equipment on and off roads – a potential vector for the introduction of new weed species not currently found in the project area.

Spatial and Temporal Context for Effects Analysis

Spatial Bounds

The geographic scope for analysis of direct, indirect, and cumulative effects is the entire Upper North Fork project area, encompassing approximately 41,423 acres. This is an appropriate effects analysis area for determining potential effects of the proposed actions to weeds because it encompasses the entire area where potential disturbance or new seed establishment could occur.

Temporal Bounds

Temporal bounds include the past, present, and foreseeable actions described in the Cumulative Effects section. Negative short-term effects from soil disturbance would be apparent until the native ground vegetation regenerates. Weed effects would be reduced when weed treatments begin and would also be reduced as the forest canopy begins to close.

Affected Environment

Existing Condition

Overview of Project Area Noxious Weeds and Ecological Impacts

Weed infestations within the project area are widespread and pervasive, occurring along road and trail networks, former mining sites, past timber harvest units and private lands as well as riparian areas along streams. Current inventory data indicate that noxious weeds occur on approximately 5 percent (2,181 acres) of the approximately 40, 274 acres of Salmon-Challis National Forest lands within the project area. As discussed previously, inventoried acres constitute a minority of known infestations, and conservative calculations indicate spotted knapweed is likely present on an additional 13 percent of the area (5,183 acres). In addition, much of the private land within project area boundaries is also infested with noxious weeds to greater and lesser degrees.

The noxious weed species of greatest concern to the project area and addressed here are: spotted knapweed, sulphur cinquefoil, houndstongue, and rush skeletonweed. As shown in table 67 above, spotted knapweed is by far the most prevalent weed within the project area, followed by sulphur cinquefoil. Houndstongue currently has a low presence in the project area (0.5 inventoried acres), and as far as is currently known, rush skeletonweed is not present. However, both species are present within the North Fork drainage, and together with spotted knapweed and sulphur cinquefoil, have great potential to cause ecological harm and impact ecosystem functions (plant community diversity, soil fertility and stability, nutrient, fire, and hydrologic cycles, etc.). This section briefly characterizes these four species, and describes the history and extent of infestations in the project area and the ecological impacts of invasion. Additional information on other species present within the Upper North Fork project area can be found in Appendix 1 to the noxious weeds report, located in the project record.

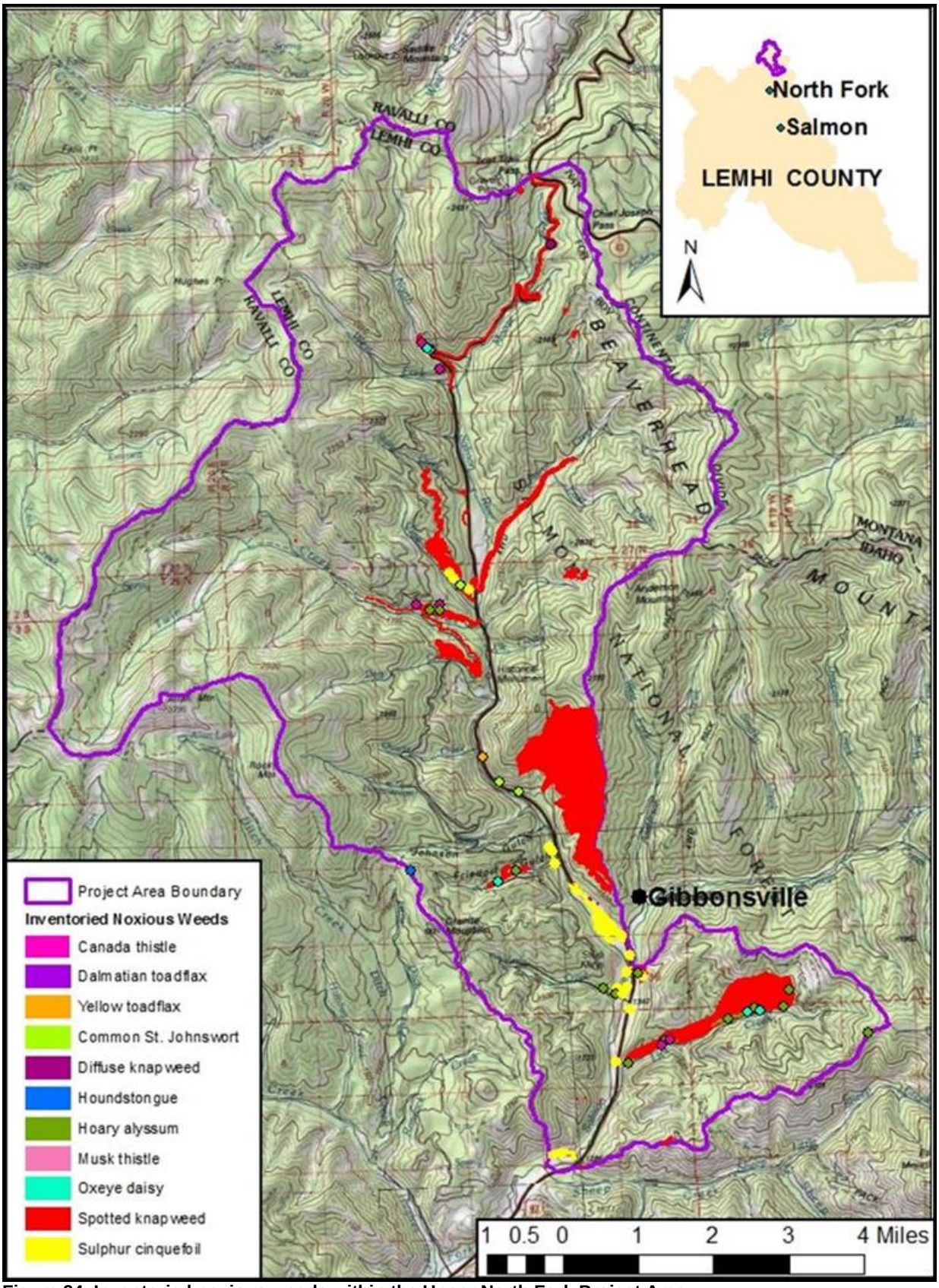


Figure 24. Inventoried noxious weeds within the Upper North Fork Project Area

Spotted Knapweed

Spotted knapweed is a perennial forb in the sunflower family native to Eastern Europe, and may have been introduced to North America as a seed impurity in alfalfa in the late 1800s. Spotted knapweed is a nonnative, deeply taprooted perennial forb that is a prolific seed producer. This perennial species can live up to 9 years and is capable of producing seeds each year (Boggs and Story 1987). Seeds are viable for a minimum of 7 years. Once established spotted knapweed can form monotypic stands and this species now dominates millions of acres of western rangelands. Spotted knapweed prefers rangelands, dry meadows, pastures, upland rocky areas, roadsides, and the sandy or gravelly floodplains of streams and rivers (Prather et al. 2002). Spotted knapweed establishes and dominates on dry, disturbed sites, especially along roads but is also found in riparian meadows and dry and mesic conifer communities. It also invades relatively undisturbed perennial native plant communities and is capable of establishing locally at elevations of more than 8,000 feet (Zouhar 2001). Spotted knapweed displays wide ecological amplitude, meaning that it can successfully grow and reproduce in many different plant communities in a wide altitudinal range, in many different soil types and in differing climatic regimes.

Spotted knapweed out-competes native plants by emerging early from winter dormancy to preempt nutrients, solar radiation and water. It also stunts and precludes native plant growth through the production of the toxin cnicin, which is present in the roots, stems and leaves (Bais et al. 2003, Fitter 2003). Cnicin's bitter taste also affects knapweed's palatability, causing a reduction in wildlife forage when knapweed displaces palatable native species. Spotted knapweed infestations contribute to increases in the amount of bare ground, loss of soil moisture capacity, soil instability and erosion as the species is taprooted as opposed to the fibrous and/or deep root systems of native grasses and many native forbs. These native species are effective in binding soil and retaining soil moisture (Ehrenfeld 2003). Soil erosion, in turn, often leads to reduced water quality, and loss of proper hydrologic cycling and fish habitat as sediment loads and turbidity increase (Lacey et al. 1989, DiTomaso 2000, Harrod 2001).

Spotted knapweed has been present in Lemhi County for decades; historic Lemhi County weed records document its presence in the North Fork drainage since the 1960s. A detailed discussion of knapweed's presence in the North Fork drainage can be found in the Hughes Creek Hazardous Fuels Reduction Project Noxious Weeds Resource Report (USDA Forest Service 2008). As noted previously, comprehensive inventory data for the project area are lacking, due to the widespread extent of infestation. Nevertheless, a combination of inventory data and calculated estimates (discussed in detail previously under Methodology) lead to an assumption that knapweed is present in varying densities over at least 18 percent of the project area.

Due to its prevalence spotted knapweed is essentially unmanaged on the North Fork Ranger District, including the project area. Limited resources mean that effective control using herbicides is impossible except in high priority areas that serve as sources or vectors to transfer noxious weed seeds from one place to another (e.g. major roads, campgrounds, etc.). As a result, the focus of spotted knapweed control on the North Fork Ranger District is implementation of a biological control program through the establishment of insectaries. The Lesser Knapweed Flower Weevil (*Larinus minutus*) is an effective biological control agent that has become well-established in Lemhi County and is spreading independently throughout large spotted knapweed infestations. Since 2004 the Salmon-Challis National Forest has also established insectaries of another effective spotted knapweed biological control agent (*Cyphocleonus achates*, Knapweed Root Weevil), including 26 within the project area boundaries. This insect lays eggs near the root crown of mature spotted knapweed plants and the developing larvae mine the roots, weakening or killing the plant. A combination of seedhead weevils and root miners is proving to be an effective control for spotted knapweed. However, establishing new insectaries is a lengthy process, taking years to build the biological control agent to population levels able to affect the target species. Moreover, the root miner is more sedentary than the seedhead weevil and is therefore slower to establish

and spread. The biological control program may take a decade or longer to impact knapweed populations within the project area.

Sulphur Cinquefoil

Sulphur cinquefoil is a perennial forb in the rose family native to eastern Eurasia (Zouhar 2003a). It was first recorded in Canada in the late 1800s, but little more is known about its introduction to the North American continent. Sulphur cinquefoil was first noted in Idaho in 1934. Its ecological amplitude is unknown, but despite shade-intolerance it appears in a number of different plant communities and soil types as long as there is an open canopy and adequate solar exposure. Sulphur cinquefoil is a very aggressive species that spreads extremely fast, forming dense stands. It is easily confused with the many native cinquefoils to which it is closely related and is known to hybridize with several native species, complicating identification and increasing concerns about the ecological impacts of the species.

Ecologically, sulphur cinquefoil impacts native plant communities through aggressive resource allocation. It begins to grow very early in the spring and has a second period of growth late into the fall once daytime temperatures drop and soil moisture increases. This results in displacement of native plants and reduces plant community diversity. It reduces graminoid production in rangelands, however, sulphur cinquefoil is not palatable to grazing animals such as cattle or elk, which appear to actively avoid selecting it as forage. Cattle have been observed to select spotted knapweed over sulphur cinquefoil in areas infested with both species where forage choices are limited.

Sulphur cinquefoil is a new invader in Lemhi County, with the first sites recorded in 1998. The NRIS Terra database (USDA Forest Service Salmon-Challis National Forest 01/17/2012) currently records 116 known infestations distributed across 422 acres, predominantly in the North Fork drainage. It was first detected on private land and has since spread onto National Forest system lands. Sulphur cinquefoil has been inventoried at 16 locations within the project area, covering approximately 122 acres primarily around Gibbonsville. It is an early detection/rapid response noxious weeds species for the Lemhi Cooperative Weed Management Area and herbicides are used to eradicate infestations wherever they are found. No biological control agents are available for sulphur cinquefoil, primarily because of concerns about insects shifting to native cinquefoils or to domestic strawberries, to which it is closely related.

Houndstongue

Houndstongue is a biennial forb in the borage family native to Eurasia and introduced to North America as a contaminant in agricultural seed (Zouhar 2002). Like many other noxious weeds, houndstongue is adaptable and tolerant of a wide array of ecological conditions. Although houndstongue is shade-tolerant, it also thrives in locations with full sun where adequate soil moisture is present. Houndstongue is a very aggressive species that spreads rapidly in riparian areas, roadside ditches, clearcuts in mixed conifer communities, and other mesic habitats, forming dense colonies. It spreads by barbed seeds, which are highly adapted to hitchhiking on wildlife, livestock, humans, equipment, and vehicles. This characteristic enables it to spread widely, particularly when transported by wildlife species to remote, difficult-to-access locations.

Houndstongue contains poisonous alkaloid compounds that cause liver damage when eaten, posing a threat to humans and domestic livestock, including horses and cattle (Zouhar 2002). This species rapidly forms dense monocultures in mesic habitats such as riparian areas or upland springs, displacing native forage species and also affecting wildlife species.

Houndstongue is found in much of North America, but is a new invader in Lemhi County. Although it is not known when houndstongue first arrived in Lemhi County, it is known to be spreading from major streams, such as the North Fork of the Salmon River, up drainage into dendritic headwaters. Current

inventory data (USDA Forest Service Salmon-Challis National Forest 01/17/2012) show 205 locations in Lemhi County covering approximately 422 acres; much of which is within the North Fork drainage. It is likely that the apparent minor presence (approximately 0.5 acres) of houndstongue within the project area is due to lack of resources for adequate inventory surveys, and many more acres are assumed to be infested. The Lemhi Cooperative Weed Management Area is attempting to define the extent of this species in the county and to draw containment lines where herbicides are used to slow the spread to the extent possible. Funding constraints and lack of effective biological control agents means this species is otherwise essentially unmanaged except in high priority areas.

Rush Skeletonweed

Rush skeletonweed is a perennial forb in the sunflower family native to Eurasia. This species prefers gravelly, well-drained soils on open southerly and westerly exposures. It is a deep tap-rooted species with the ability to spread vegetatively from nodes on the taproot as well as by seed production. Rush skeletonweed is a wind-disseminated species, which makes predicting where infestations may have established particularly difficult (Zouhar 2003b).

Rush skeletonweed is considered one of the most serious noxious weeds threatening native plant communities in southern and central Idaho, particularly on National Forest system lands. This species competes aggressively with native plant species for nutrients and soil moisture and forms dense monocultures. This leads to decreases in native plant community diversity and drastically reduces forage production for grazers like elk and cattle (Zouhar 2003b).

Rush skeletonweed was first found outside the Middle Fork of the Salmon River drainage in the vicinity of Poverty Flat and Owl Creek along the main Salmon River in 1999 and in lower Panther Creek soon thereafter. Currently 180 known infestations are distributed across 207 acres in Lemhi County (USDA Forest Service Salmon-Challis National Forest 01/17/2012). However, Lemhi County contains many thousands of acres that are vulnerable to rush skeletonweed establishment, making it very expensive and time consuming to survey for this species; most infestations in Lemhi County are found by chance. Undoubtedly many more acres are infested by rush skeletonweed in Lemhi County than depicted in the NRIS Terra database. The rate and pattern of spread suggested by tracking new infestations in the NRIS Terra database suggests that the species is rapidly moving eastward and will become firmly established throughout suitable habitats in Lemhi County as has happened in south Idaho counties. To date no rush skeletonweed has been found within the project area, but it is reasonable to assume that there may be infestations yet unlocated. The closest known site is less than 3 miles from the project area boundary, well within the distance that its wind-borne seeds have been known to spread.

Rush skeletonweed is difficult and very expensive to control, particularly in the steep and rugged topography of the Salmon River canyonlands. Two to three annual herbicide applications are typically required to control infestations of rush skeletonweed. The Salmon-Challis National Forest does not have the funding required to provide this level of control even on known infestations. Lack of effective biological control agents means this species is essentially unmanaged across the Salmon-Challis National Forest, with the exception of high priority areas. Partners in the Lemhi Cooperative Weed Management Area, including the Forest Service, are shifting control efforts to concentrate on the leading edge of rush skeletonweed expansion along the foothills of the Salmon River, particularly between Salmon and North Fork.

Desired Condition

The desired condition for weeds is to have no net increase in establishment and spread of nonnative invasive species. Forest Plan long-range goals and objectives state that noxious weeds are to be controlled using integrated weed management techniques to protect and enhance other resources and to comply with

Idaho state law. Weed infestations are to be treated to ensure the eradication of new infestations, prevent the spread of existing infestations, and gradually eliminate existing infestations (Forest Plan III-4). Per Forest Service policy, the functional activity proposing the project and creating conditions conducive to weed encroachment is to be responsible for funding noxious weed control in the project area (Forest Plan II-85).

Nationally, the Forest Service's National Strategy and Implementation Plan for Invasive Species Management (USDA Forest Service 2004) has a four-pronged approach, including (1) prevention, (2) early detection and eradication of new invaders, (3) control and management and (4) rehabilitation and restoration. The Forest Service's primary emphasis is protecting plant communities from noxious weeds by preventing the establishment and spread of noxious weeds into areas that are not infested. This is the most effective and cost-efficient means of weed management. Prevention helps to maintain healthy native plant communities, soil stability, watershed function, and habitat for fish and wildlife species.

As a second line of defense, the Forest Service promotes early detection of new invaders and a rapid, organized response to eradicate infestations of new invaders. However, once noxious weeds have established, as in the project area, a more long-term management strategy must be adopted, including the establishment of containment boundaries and an integrated weed management approach (e.g. shifting from an eradication strategy using herbicides to the use of biological control agents for long-term containment). When applied in an integrated approach, these program elements are successful in minimizing the spread of noxious weeds. Land productivity, wildlife habitat capability, watershed function, and water quality can be more easily maintained or improved without the ecological burden imposed by noxious weeds.

Ultimately, the desired condition for an area infested with noxious weeds is a return to a thriving plant community with the full complement of native species and sustained proper ecological function. Ideally, a plant community in proper functioning condition is resistant to reinvasion by noxious weeds. Attainment of this desired condition often requires intervention in the form of rehabilitation or restoration. These activities may include changing land use patterns, re-introducing native plant species, or protecting rehabilitated sites from further disturbance until fully recovered. Each element of this strategy is expensive in terms of cost and personnel. These are likely unattainable goals given the severity of the weed infestations on the North Fork Ranger District and the lack of resources needed to adequately address the situation.

Environmental Consequences

No Action Alternative

With no hazardous fuels reduction, no forest health restoration treatments, no prescribed burning activities, or other soil-disturbing activities, there would be no direct effects on noxious weeds. Weeds already present on public and private lands and being controlled would continue. Any disturbances caused by past forest management activities on public lands would also continue to recover to pre-disturbance conditions through natural processes.

The no-action alternative may cause indirect effects with weeds and increase habitat because the project area could be at a higher risk of high severity wildfire and remove protective soil and canopy cover. If a high severity wildfire occurred, it could have adverse impacts on lands currently unavailable to weeds due to high vegetative cover. Adverse effects of a wildfire would include creation of bare and erosive soils with no canopy cover, a habitat often preferred by many weed species. A common post fire effect on weeds include increases of existing weed species occupied acres and invasion by new weed species.

Alternative 1– Proposed Action

Noxious Weeds

Weed treatments would include standard prevention activities as defined in the USDA Forest Service guide to Noxious Weed Practices (USDA 2001) and programmatic treatments accomplished as part of the Forest's annual noxious weeds program management. Pretreatment using vehicle mounted spray equipment would be emphasized in areas where fuels reduction activities may occur. Fuels reduction activities should be coordinated to complement existing weed treatments, bio-control releases, and special grant-funded control actions. No additional types or amounts of weeds treatments are proposed as a part of this project.

Direct and Indirect Effects

The greatest potential for the establishment or spread of noxious weeds would result from activities that disturb the soil and open the canopy (Harrod 2001, Goodwin et al. 2002, Neary et al. 2002, Ferguson et al. 2003). Such activities decrease overhead shading, provide a flush of nutrients, reduce competition from native plants, disturb and expose the soil surface to increased solar radiation, all of which combine to create an ideal seedbed for noxious weeds (Asher et al. 2002).

The proposed action includes: thinning and harvesting timber, temporary road construction and road decommissioning, creating skid trails, establishing log landings, and conducting understory slashing and burning. All these activities have the potential to increase existing weed infestations as well as increase suitable habitat for new invaders to become established. Mechanical equipment used in logging, road construction, and prescribed fire could serve as vehicles for the introduction of new invaders into the project area and result in expansion of existing infestations.

Commercial harvest thinning (approximately 4,520 acres), precommercial thinning (approximately 1,270 acres), and shaded fuel break establishment (approximately 975 acres) under the Proposed Action alternative would encourage the establishment of denser, more robust weed infestations in the project area. This would occur because timber harvest and precommercial thinning decrease canopy closure and expose the soil surface to more sunlight, favoring noxious weed species, such as spotted knapweed, that prefer full sun (Parendes and Jones 2000, Ferguson et al. 2003). In addition, the soil disturbance generated by logging equipment creates favorable conditions for establishment and rapid spread of noxious weeds by providing fresh seed beds, increased nutrient levels from microbial activity and reduced competition from native plants (Ferguson et al. 2003).

The 4,520 proposed commercial harvest acreage is distributed across 125 units, of which all but 5 (covering approximately 200 acres) are considered by Project Resource Specialists (as detailed in the Unit Cards) to contain spotted knapweed. Sulphur cinquefoil is likely present in eighteen units (covering approximately 634 acres). Ground-based (tractor) harvest would occur in 75 units (encompassing approximately 2,320 acres – 52 percent of the proposed harvest area). These units would likely incur greater risk for noxious weed invasion and expansion, or increase in density, due to the combined effects of ground disturbance and canopy removal, compared to the remaining 48 percent of the harvest area proposed for skyline and helicopter harvest. Precommercial thinning is proposed for 53 units, all of which are identified in Unit Cards as likely to contain spotted knapweed, with 5 units likely containing sulphur cinquefoil. Likewise, all eleven proposed shaded fuel breaks likely contain knapweed, and one contains sulphur cinquefoil.

The extent and duration of potential negative effects due to increased susceptibility to noxious weed invasion depend on the degree of disturbance, proximity to seed sources, and resilience of the affected ecosystem. As discussed previously under "Existing Environment", approximately 5 percent of the Upper

North Fork project area is known to contain knapweed based on inventory data, and the conservative calculated estimate of coverage outside inventory areas is that an additional 13percent of the area contains knapweed to varying degrees of density. These figures lead to the conclusion that the vast majority of proposed harvest and fuel break areas would be within close proximity to potential seed sources and would likely undergo an increase in noxious weed acreage and density immediately following treatment. However persistence of noxious weeds may vary considerably based on vegetation covertype.

As described previously under “Methodology for Analysis”, spotted knapweed is ubiquitous in former harvest units within the Upper North Fork project area. However, its capacity to persist as regeneration takes place varies greatly depending on vegetation covertype. Knapweed is able to persist and expand over time in open dry conifer habitats, e.g., ponderosa pine and dry Douglas-fir, but is relatively shade-intolerant and substantially less competitive in densely regenerating lodgepole pine and spruce-fir habitats. This characteristic was used to determine which former harvest units were included in the estimated infested acreage totaling 13 percent of the project area. Recent experience with fuels treatments around Gibbonsville and in the Hughes Creek drainage indicate that even before regenerating conifers attain sufficient canopy cover to retard the establishment of knapweed, mesic sites that support denser shrub regeneration also remain relatively knapweed-free post treatment. Based on calculated acreages for covertypes within the approximately 6,764 acres proposed for commercial harvest, precommercial thinning, and shaded fuel break establishment; approximately 19 percent of this area (1,300 acres) would likely be less affected by knapweed establishment, with 81 percent of the area (5,500) more vulnerable to persistent knapweed populations.

Due to their shade-intolerance, sulphur cinquefoil and rush skeletonweed are also less likely to permanently establish in mesic and/or densely canopied covertypes. The likelihood of establishment would also be affected by proximity to potential seed sources for sulphur cinquefoil; however no such constraint exists on rush skeletonweed’s wind-borne seed dispersal system. Houndstongue is shade tolerant and likely the full extent of the proposed harvest areas would be vulnerable to houndstongue establishment, given a potential seed source. As discussed previously, there are few known infestations of houndstongue within the project area, but houndstongue also utilizes a seed dispersal mechanism capable of creating new populations far distant from previously known infestations.

Non-commercial fuels and meadow treatments would occur on approximately 1,736 acres, in 49 units (19 meadows, 30 non-commercial thinning units). Project data indicates that all non-commercial thinning units but only six of the meadow units contain knapweed. Proposed treatments in these units would likely lead to a reduction in canopy cover, but would result in substantially less ground disturbance than units where mechanized treatments are proposed. Risk of noxious weed invasion would be related to the extent of any ground-disturbing activities that may occur.

With the exception of the Lost Trail Ski Area, prescribed burning may occur throughout Salmon-Challis National Forest lands within the Upper North Fork project area. All thinning (commercial, pre-commercial and shaded fuelbreak) units (approximately 6,764 acres) would receive a follow-up prescribed burning treatment to include broad scale, low to high intensity underburning to reduce concentrations of natural surface fuels and activity generated slash. Burning could encourage weed growth through the release of nutrients into the soil (Ehrenfeld 2003). The combination of thinning and burning has been shown to result in more weed introduction and spread (Metlen and Fiedler 2006) than either thinning or burning alone (with the possible exception of severe burns). Burning slash piles has also been associated with high levels of weed establishment (Korb et al. 2004). Based on the literature review of the response of the four noxious weed species analyzed in this section, infestations of these species would respond favorably to prescribed fire treatments (Mankowski and Carroll 2000, Zouhar 2001, 2002 2003a, 2003b). Infestations would become more dense and set more seed as overstory cover is reduced. It

can reasonably be expected that the number and size of infestations of houndstongue, sulphur cinquefoil, and rush skeletonweed would increase, together with the density of existing widespread knapweed infestations.

Temporary road construction, road decommissioning, and increased levels of road maintenance and motor vehicle traffic associated with project implementation also heighten the risk of noxious weed establishment and spread (Parendes and Jones 2000; Gelbard and Belnap 2003). Road maintenance activities can spread noxious weeds by moving road surface material up and down a road system, creating fresh seedbeds for weed germination or removing competing vegetation (Ferguson et al. 2003). Approximately 26.1 miles of new temporary roads would be created, which equates to approximately an additional 95 acres of disturbance.

Road maintenance associated with the project would include surface grading and cleaning and repair of culverts and ditches. This would generate new soil disturbance and vegetation removal, grade through existing weed infestations, and spread soil contaminated with noxious weed seeds along the road system. To minimize disturbance to soil and vegetation on roadways, noxious weed prevention best management practices recommend high-blading to remove rocks and debris and retaining existing vegetation to the extent possible.

Approximately 66.8 miles, equating to approximately 244 acres, of existing roads are proposed for decommissioning. Although this process would involve temporary disturbance, revegetation promoting canopy closure is likely to reduce numbers of noxious weeds (Parendes and Jones 2000), a potential beneficial indirect effect of project implementation.

The degree of risk associated with proposed project activities can be reduced with mitigation, but cannot be eliminated completely. Adherence to the project design features detailed previously is vital to minimize the risk of noxious weed spread. Design features emphasize prevention of transmission of noxious weeds as the best and least expensive practice. Prevention measures include mandatory equipment washing and inspection, minimizing soil disturbance, and revegetating with appropriate seed mixes (see Appendix 1 of the noxious weeds report, located in the project record) when warranted.

In conclusion, implementation of the proposed action is likely to increase the overall presence and density of noxious weeds in the project area. The acreage infested by spotted knapweed may not substantially increase due to the high levels of current infestation. However, the density of spotted knapweed infestations in vulnerable covertypes would increase with soil disturbance and the increased solar exposure at ground level brought about by thinning activities and prescribed fire. This may however be offset by the potential beneficial effect that increased solar exposure would provide more ideal conditions for the establishment of knapweed root weevil insectaries. Fifteen such insectaries have been established within proposed treatment units. If these insectaries are protected from fire during prescribed burning, insects would be available to colonize areas of dense knapweed occurring several years post-burn. Even though biological control would not eliminate spotted knapweed, widespread establishment of this biological control agent in the project area could result in lower densities of spotted knapweed. This would promote proper functioning of ecological processes and benefit native plant communities and wildlife species that depend on native plant habitats.

The potential adverse effects of project implementation on the current level of noxious weed infestations in the project area do not however negate the need for selection of the proposed action to manage fuels. Risks can be mitigated with careful adherence to noxious weed prevention best management practices, and the risks of implementation must be weighed against the potential adverse effects from and likelihood of high mortality stand-replacing fire due to current fuel loadings.

Alternative 2–No New Temporary Road Construction

Direct and Indirect Effects

Effects of alternative 2 on noxious weeds would not differ significantly from alternative 1, and the majority of the analysis will not be repeated here. Proposed treatment units for non-commercial thinning for hazardous fuels reductions, meadow restoration activities, and prescribed fire activities would be identical to the Proposed Action, as would the effects described in detail previously. The greatest potential for the establishment or spread of noxious weeds would result from activities that disturb the soil and open the canopy (Harrod 2001, Goodwin et al. 2002, Neary et al. 2002, Ferguson et al. 2003). Such activities decrease overhead shading, provide a flush of nutrients, reduce competition from native plants, disturb and expose the soil surface to increased solar radiation, all of which combine to create an ideal seedbed for noxious weeds (Asher et al. 2002).

Effects for harvest activities leading to ground disturbance and canopy reduction would also be the same as those described in detail under the Proposed Action; however the extent of the area impacted would differ slightly. This alternative proposes to increase the area of shaded fuels breaks by approximately 7 percent, or 75 acres. Within the scope of the project as a whole, no substantial difference in effects would be discernible.

However, compared to alternative 1, this alternative would likely result in a minor reduction in ground-disturbing activities, and would therefore potentially have a slightly lower risk of noxious weed invasion. This alternative would increase helicopter harvest activities by approximately 58 percent (813 acres). Helicopter logging would be conducted on approximately 28 percent of the proposed harvest area, compared to 17 percent under alternative 1. Additionally, the lack of new road construction would result in the equivalent of approximately 52 acres less ground disturbance than under alternative 1. It is also likely that the reduction in ground-based harvesting would proportionally reduce the level of road traffic associated with the harvest activities.

As a result, although activities under this alternative would likely result in essentially similar negative effects on noxious weed populations within the Upper North Fork project area as described in detail under alternative 1, effects would likely be marginally lower, as approximately 2 percent less of the approximately 40,423 acre project area would be directly exposed to ground disturbing activities. However, given the current widespread and pervasive nature of noxious weed presence (particularly spotted knapweed) within the project area, it is impossible to predict with certainty that this alternative would result in lower weed populations than implementation of alternative 1. The factor most likely to minimize negative impacts associated with noxious weeds would be the stringent and consistent implementation of design features and best management practices described earlier in this section.

Cumulative Effects of Alternatives 1 and 2

Past and current activities in the project area that have collectively contributed to noxious weed spread and establishment include more than 7,000 acres of past timber harvest (1950s to present) and associated road construction and maintenance, mining activities including placer and hydraulic mining, domestic livestock grazing (no longer permitted in the project area), dispersed recreational use, off highway vehicle use and private land uses (see appendix c for a comprehensive list). Most of these activities served as both a source of noxious weed introductions and a vector for distributing noxious weeds. Noxious weed seeds may be or other vegetative propagules may be brought into an area on vehicles, heavy equipment, and in the hair, hooves, or intestinal tracts of domestic animals (Harrod 2001). Once noxious weeds are present, they are easily spread by other means.

It is not possible to quantify the acres of noxious weeds introduced into and spread by each of these activities separately. Exactly when and the mechanism by which each of the noxious weed species in the project area arrived is unknown. Furthermore, once a noxious weed species was introduced and established, it would have begun to spread by means of other indirect vectors (e.g. wind, water or wildlife species). The same is often true of current or reasonably foreseeable future activities. Careful application of noxious weed prevention best management practices reduce the risk of weed establishment and spread, but cannot completely eliminate it.

Present and future activities that are known or possible in the project area include firewood and other product gathering, mineral exploration, recreational activities including trail use, hunting, camping, and driving, road construction and maintenance, fuel reduction activities on private property, and wildland fire and fire suppression. Any ground disturbance associated with these activities may result in the creation of new habitat for noxious weeds. These activities could result in colonization by weed species not currently known in the area and expansion of established populations.

Global climate change is an additional potential future effect. Current science is insufficient to precisely determine a cause and effect relationship between climate change and the Proposed Action for the project area. A general conclusion, based on the preponderance of current literature, suggests that “most of the important elements of global change are likely to increase the prevalence of biological invaders” (Dukes and Mooney 1999). The National Forest landscape would become more vulnerable to the establishment of invasive plants infestations, actual acreage affected by invasive plants could increase, and control strategies may become more difficult.

Limited weed management activities have been conducted in the Upper North Fork project area since the 1960s, including hand, mechanical, and chemical treatments. Recent weed management actions include biological control, herbicide, and mechanical treatments on an annual basis. The Lemhi Cooperative Weed Management is established locally to coordinate an integrated management approach across jurisdictions, and implement weed awareness education programs.

In 2011 County/State road-side spraying accomplished approximately 12 net treatment acres within the project area. The Salmon-Challis National Forest priority treatments accomplished 5 net acres spread over 130 acres, and made four biocontrol releases. A reasonable foreseeable action is that future continued integrated management would occur, with emphasis on preventative measures and actions. Best management practices for control of noxious weeds are integral to standard operating procedures across Salmon-Challis National Forest Resource Areas. County road and State highway spraying would continue to occur on an annual basis, with Salmon-Challis National Forest treatments dependent on available funding. A number of private landowners within the project area are also actively engaged in weed control.

Recreation

Affected Environment

Existing Condition

The Upper North Fork project is located in Lemhi County, about 7 miles north of North Fork Idaho. The project area is bisected by the north-south running Highway 93, a designated Scenic Byway. The northwest, north and northeast boundaries of the project area abut the Idaho-Montana border as well as the Bitterroot and Beaverhead-Deerlodge National Forests.

As major metropolitan areas are a significant drive from the Forest, most of the non-winter recreation visitation in the project area is occasional use by local residents. The primary season of non-winter recreational use in this area is May through November, and occurs throughout the project area. Common non-winter recreation activities include hiking, hunting, fishing, camping and sightseeing. Winter recreation brings an influx of non-local recreationists from outlying communities to the Lost Trail Downhill Ski Area and the Chief Joseph Cross Country Ski Area. These recreationists come from areas as far away as Hamilton, Montana (75miles) and Missoula, Montana (120 miles). The primary season of winter recreation is December through March and occurs almost exclusively at the Lost Trail Downhill Ski Area and the Chief Joseph Cross Country Ski Area. Occasional use by local residents in the winter includes cross-country skiing and snowmobiling throughout the project area. Statistics from the Forest's 2010 National Visitor Use Monitoring survey give further insight into the types of recreational uses that occur on the Forest. The activities that the highest percentage of visitors reported participating in were; hiking, hunting, fishing, driving, relaxing, sightseeing and camping.

The project area contains a number of recreation resources. Developed sites include the Lost Trail Downhill Ski Area, the Chief Joseph Cross Country Ski Area and the Twin Creek Campground. Both the Lost Trail Downhill Ski Area and the Chief Joseph Cross Country Ski Area straddle the Idaho-Montana border and therefore the project area boundary. Both ski areas are highly developed with large investments in infrastructure, operations and maintenance. The ski areas are managed under special use permit by the Bitterroot and Beaverhead-Deerlodge National Forests. Twin Creek Campground is a moderately developed campground located just west of Highway 93 approximately 18 miles North of North Fork and completely encompassed in the project area. There are six National Forest System trails that pass through the project area. A portion of the Continental Divide National Scenic Trail runs along the Idaho-Montana border and the northeast boundary of the project area. The Continental Divide National Scenic Trail trail weaves in and out of the project area, back and forth between Idaho and Montana as it contours around terrain features and through saddles. The Continental Divide National Scenic Trail is open to full size vehicles along the majority of this segment as it is concurrent with Forest Road 081 (Anderson Mountain Road). Where the trail is concurrent with the Anderson Mountain Road and that road being adjacent to the Chief Joseph Cross Country Ski Area, it is a popular alternative Cross Country ski route for those visiting the Chief Joseph Ski Area. A short piece of the trail that passes through the Chief Joseph Cross Country Ski Area is closed to motorized use. A portion of the Divide National Recreation Trail runs along the Idaho-Montana border and the northwest boundary of the project area. The Divide Trail also weaves in and out of the project area, back and forth between Idaho and Montana as it contours around terrain features and through saddles. The Divide Trail is open to Motorized trail bikes along its entire length. The Twin Creek and The Twin Creek Ridge Trails begin near Twin Creek Campground, run generally northwest and intersect the Divide trail. Both of these trails fall entirely within the project area. The Twin Creek Trail is closed to motorized vehicles along its entire length. The Twin Creek Ridge Trail is open to motorized trail bikes along its entire length. The Pierce Creek Trail runs from where it intersects the Continental Divide National Scenic Trail along the northeast boundary of the project area southwest to a dead end at private property. The Pierce Creek Trail is entirely within the project area and is open to motorized trail bikes. The Powder Gulch Trail runs from the lower end of the Lick creek drainage, south over the ridge between Lick Creek and Sheep Creek and down into the Sheep Creek drainage. The portion of the trail from the bottom of Lick Creek, south to the ridge top is within the project area. The Powder Gulch trail is open to motorized trail bikes along its entire length.

The project area's developed recreation sites, the Lost Trail Downhill Ski Area, the Chief Joseph Cross Country Ski Area and the Twin Creek Campground, are located in areas classified as Roaded Natural and must be managed consistent with the description of the Roaded Natural opportunity class. The portion of the Continental Divide National Scenic Trail that is located in the project area (approximately 6.25 miles), the portion of the Powder Gulch Trail located in the project area (approximately 2.20 miles), the upper

end of the Pierce Creek Trail (approximately .63 miles), the lower end of the Twin Creek Ridge Trail (approximately 3.07 miles), the lower end of the Twin Creek Trail (approximately 1.53 miles) and the very top of the portion of the Divide Trail that is located in the project area (approximately .31 miles) are located in areas classified as roaded natural. The lower end of the portion of the Divide Trail that is located in the project area (approximately 7.71 miles), the lower end of the Pierce Creek Trail (approximately 1.23 miles), the upper end of the Twin Creek Ridge Trail (approximately 2.06 miles) and the upper end of the Twin Creek Trail (approximately 3.63 miles) are located in areas classified as semiprimitive motorized. These trails must be managed consistent with the description of the roaded natural and semiprimitive motorized opportunity classes.

There are no other developed recreation sites near or adjacent to the project area. There are other trails in the Upper North Fork drainage, both motorized and nonmotorized. The portion of the Scenic Byway, Highway 93 that is located in the project area is concurrent with the Lewis and Clark National Historic trail. There is no identified or constructed trail along this route though there are occasional pullouts along the highway with interpretive signs regarding the Lewis and Clark expedition. Highway 93 and Forest system roads within and adjacent to the project area are also a component of the recreation resource as they provide access for both developed and dispersed recreation activities.

The project area consists of approximately 41,423 acres, most of which is undeveloped General Forest Area. Dispersed recreation activities such as hunting and camping take place throughout the project area. Of this area, approximately 25,285 acres are classified as roaded natural, 12,203 acres as semiprimitive motorized and 3,916 acres as semiprimitive nonmotorized (figure 25).

Management Direction

Desired Condition

The Salmon Forest Plan sets out the following forest management goals that relates to managing recreational opportunities within the Upper North Fork project area (Forest Plan p.IV-1). These include:

> Increase emphasis on managing dispersed recreation use in areas providing semiprimitive and roaded natural recreation opportunities and maintain the generally high quality of these settings.
>
> Improve the condition of priority trails in designated wilderness, management areas featuring semi-primitive recreation opportunities and nationally designated trails and maintain other high use system trails in a usable condition.

Forest-wide Standards and Guidelines

The Salmon Forest Plan includes Forest-wide standards and guidelines for recreation opportunities, facilities, and trails management relevant to the Upper North Fork planning area (Forest Plan p. IV-13 thru IV-17; IV-66 thru IV68).

Management Area Direction

Management Area direction for each of the four management areas in the Upper North Fork project area is described summarily by emphasis statements for each of the management areas (Forest Plan Table IV E-1, p. IV-95):

> **1A** – Emphasis is on providing downhill skiing opportunity on existing sites.
>
> **2A** – Emphasis is on dispersed recreation activity.

3A-4A – Emphasis is on meeting anadromous fish habitat needs and providing for big game habitat needs on key big game winter range.

3A-5A – Emphasis is on aquatic habitat management for anadromous fish species and producing long term timber outputs through high investments in regeneration and thinning.

MAs in the project area are further broken down into management prescriptions. These prescriptions give general direction as related to various management activities. Direction by management area as it relates to recreation activities includes the following (Forest Plan p. IV-97a thru IV-120):

1A – Design and locate improvements on winter sport sites to provide safety to users and to harmonize with the natural environment. Cooperate with the private sector to provide appropriate recreation opportunities at the Lost Trail Ski Area.

2A – Emphasize semi-primitive motorized recreation opportunities. Provide opportunities for primitive road and trail use. Manage use to allow low to moderate contact with other groups and individuals. Facilities provided may include development level 1 and 2 campgrounds, trails suitable for motorized trailbike use, local roads with primitive surface and parking lots at trailheads.

3A-4A – Semiprimitive nonmotorized, semiprimitive motorized and roaded natural recreation opportunities can be provided.

3A-5A – Semiprimitive nonmotorized, semiprimitive motorized and roaded natural recreation opportunities can be provided; however the dominant experience will be roaded natural.

Recreation Opportunity Spectrum Direction

While the goal of the recreationist is to obtain satisfying experiences, the goal of the recreation resource manager becomes one of providing the opportunities for obtaining these experiences. By managing the natural resource settings, and the activities which occur within it, the manager is providing the opportunities for recreation experiences to take place. Therefore, for both the manager and the recreationist, recreation opportunities can be expressed in terms of three principal components: the activities, the setting, and the experience (USDA Forest Service 1982 p. 5).

For management and conceptual convenience possible mixes or combinations of activities, settings, and probable experience opportunities have been arranged along a spectrum, or continuum. This continuum is called the Recreation Opportunity Spectrum and is divided into six classes. The six classes, or portions along the continuum, and the accompanying class names have been selected and conventionalized because of their descriptiveness and utility in Land and Resource Management Planning and other management applications. Each class is defined in terms of its combination of activity, setting, and experience opportunities (USDA Forest Service 1982 p. 5).

The inventoried recreation opportunity spectrum classes for the project area are roaded natural, semiprimitive motorized and semiprimitive nonmotorized. The Forest Plan dictates that developed recreation sites and dispersed recreation in the project area management areas be managed consistently with their recreation opportunity spectrum class, as laid out in the Recreation Opportunity Spectrum Users Guide.

Roaded Natural areas are within a half-mile of “better than primitive roads”, and the setting may have modifications which range from being easily noticed to strongly dominant to observers within the area. A moderate to high frequency of contact with other recreationists is expected on roads, and a low to moderate contact frequency is expected on trails and off routes (USDA Forest Service 1982).

Semiprimitive Motorized areas are within a half-mile of "primitive roads or trails used by motor vehicles; but not closer than a half-mile from better than primitive roads", and the setting may have moderately dominant alterations. A low to moderate contact frequency is expected on roads, trails and off routes (USDA Forest Service 1982).

Semiprimitive Nonmotorized areas are at least a half-mile but not further than 3 miles from all "roads and trails with motorized use" and can include the existence of primitive roads and trails if usually closed to motorized use. The setting may have subtle modifications that may be noticed but not draw the attention of an observer. The Contact frequency would be 6-15 parties a day encountered on trails and 6 or less visible at campsites (USDA Forest Service 1982).

Regulatory Framework

Various Federal laws, Forest Service Handbook and Manual directives, the Salmon National Forest Land and Resource Management Plan (Forest Plan), the USDA Recreation Opportunity Users Guide and the 2009 Continental Divide National Scenic Trail Comprehensive Plan (Continental Divide National Scenic Trail Plan) and other management directives form the framework to which projects such as Upper North Fork must conform. The components of this regulatory framework and the direction they give to management of the recreation resource are outlined below.

Salmon National Forest Plan Direction

The Salmon National Forest Forest Plan directs the management of the Salmon National Forest. The Forest Plan contains direction for management of the recreation resource on the Forest; various components of the Forest Plan, such as Forest goals, standards, and guidelines, must be consulted when determining a project's compliance with the Forest's recreation management direction. The Forest Plan also establishes Management Areas that guide activities across the Forest. There are four management areas governing the Upper North Fork project area, 1A, 2A, 3A-4A and 3A-5A.

2009 Continental Divide National Scenic Trail Comprehensive Plan Direction

The 1985 Continental Divide National Scenic Trail Comprehensive Plan amendment, published in the Federal Register on October 5, 2009 (74 FR 51116), set forth direction to guide the development and management of the Continental Divide National Scenic Trail. The 2009 Continental Divide National Scenic Trail Comprehensive Plan herein provides consistency with the decision made in that amendment, and replaces the 1985 Continental Divide National Scenic Trail Comprehensive Plan (USDA Forest Service 2009).

Forest Service and Bureau of Land Management managers will classify the Continental Divide National Scenic Trail opportunities based on the existing or proposed recreation opportunity spectrum classes through which the trail passes. Both agencies will use recreation opportunity spectrum inventory and management processes to develop management prescriptions, which will provide the physical, biological, social, and managerial settings, deemed appropriate for the Continental Divide National Scenic Trailsegments within their jurisdiction (USDA Forest Service 2009).

Management Direction:

Roaded Natural: Trail segments in this ROS class pass through areas where the natural setting may have modifications that range from being easily noticed to strongly dominant to observers within the area (USDA Forest Service 2009).

Methodology

Information Sources

ArcMap geographic information system was used to analyze the proposed activities with respect to their potential impact on recreation use and facilities and dispersed recreation use. The recreation analysis considered direct and indirect effects to recreational opportunities within the project area boundary. Cumulative effects were considered within the project area boundary and the Upper North Fork River drainage.

Spatial and Temporal Context for Effects Analysis

The recreation analysis considered direct and indirect effects to recreational opportunities within the project area boundary. Cumulative effects were considered within the project area boundary and the Upper North Fork River drainage.

The recreation analysis considered direct and indirect effects to recreational opportunities within the project area boundary. Cumulative effects were considered within the project area boundary and the Upper North Fork River drainage. The spatial boundary for analyzing the cumulative effects to the recreation resource is limited to the Upper North Fork drainage. It was selected because it encompasses the full extent of the direct and indirect effects of the proposed action and alternatives.

The temporal boundaries are the next 10-15 years as the proposed treatments within the Upper North Fork Project Area are completed over the next 10-15 years. The cumulative effects will occur within this same time period as this project and similar vegetation management projects within the area have already been implemented.

Measurement Indicators

This analysis will address potential impacts to recreation opportunities and settings within the project area.

Measurement indices to determine the effects of a given alternative on the recreation resource is the loss or diminishment of a recreation opportunity. For the purpose of this analysis that means the loss of part or all of a recreation experience as defined by a particular areas' recreation opportunity spectrum class. This can include the loss of physical infrastructure such as a campground or trailheads as well as the loss of access to the infrastructure.

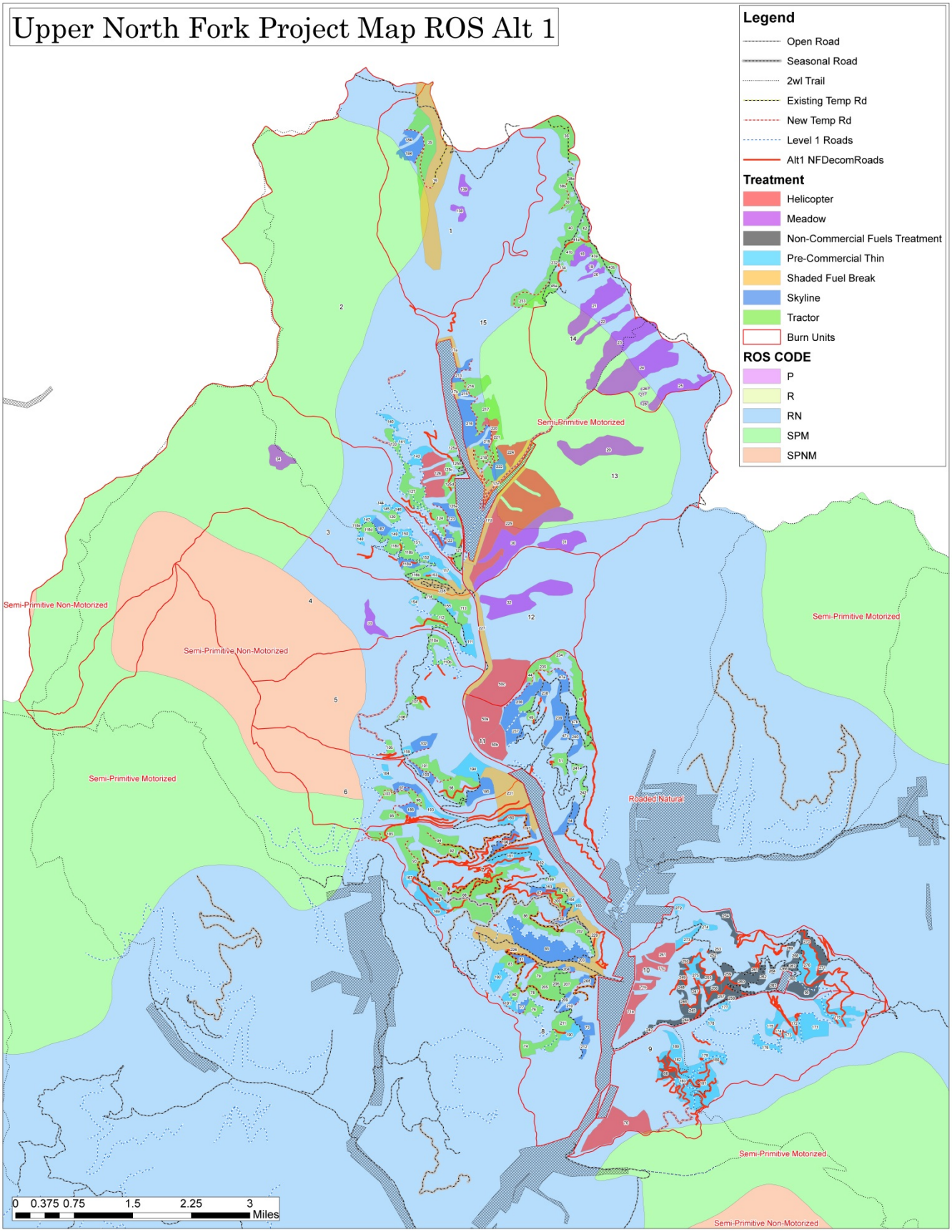


Figure 25. Recreation opportunity spectrum map, Upper North Fork Drainage (based on alternative 1)

Environmental Consequences

No Action Effects

The primary effects of the No Action alternative on the areas recreation resource is that the risk of the loss of part or all of a recreation experience as defined by a particular areas' recreation opportunity spectrum class, including the risk of the loss of physical infrastructure or access to physical infrastructure would **not** be improved. The risk of the loss of these experiences and opportunities would **not** improve as no action **does not reduce the risk to resource values, because we are not** reducing the accumulation of hazardous fuels that has the potential for high severity impacts.

Alternative 1 – Proposed Action

Direct and Indirect Effects

The primary effects of the proposed action on the Upper North Fork project area's recreation resources are potential short term (1-2 Years, Upper North Fork Treatment Schedule) direct and indirect impacts. The Lost Trail Downhill Ski Area and the Chief Joseph Cross Country Ski Area would not be impacted during their high use seasons as design criteria prevent project activities from taking place within or directly adjacent to either site during winter. Neither of these sites is a summer venue as such and effects to dispersed recreation which could still take place in the areas will be discussed later. Noise and other disruption from fuel break construction and subsequent pile burning within and surrounding Twin Creek Campground would be experienced by users in the area. The campground would most likely be closed for a period of time while activity takes place within the campground itself (fuel break unit 228). This would impact campground use in the short term while leaving a healthier, fire resistant and more attractive campground for the long term. Other disruption from tractor logging, skyline logging, and prescribed burning in the surrounding units as well as the adjacent haul routes would also have a short term impact on the recreation resource at the campground. The proposed actions in and adjacent to the Lost Trail Downhill Ski Area, Chief Joseph Cross Country Ski Area and Twin Creek campground including the short term disturbance would be consistent with a roaded natural recreation opportunity spectrum classification with moderate evidence of the sights and sounds of man, resource modification and utilization practices evident which range from being easily noticed to strongly dominant to observers within the area.

The portion of the Continental Divide National Scenic Trail that passes through the project area is adjacent to several meadow restoration units (units 18-25, sporadically for approximately 2 miles) and several tractor logging units (units 36, 38a, 38b, 39, 40, 42, 43a, 43b and 43c, consistently for approximately 2 miles). Hauling of the resultant products along approximately 2 miles of Forest Road 081 which is concurrent with the Continental Divide National Scenic Trail would take place as part of the tractor logging activities. The portion of the Powder Gulch Trail located in the project area is in and adjacent to several pre-commercial thinning units (units 179, 180, 181, 182, 183 and 189). The upper end of the Pierce Creek Trail (approximately 0.5 miles) is located in a meadow restoration unit (unit 23). The lower end of the Twin Creek Trail (approximately 1.5 miles) is not adjacent to any mechanical treatment units. The lower end of the Twin Creek Ridge Trail (approximately 2 miles) is located in and adjacent to several pre-commercial thinning units (units 147, 148, 149, 150, 151, 152, and 153), skyline logging units (units 118a and 187) and tractor logging units (units 116b, 118b, 118c and 118d).

Treatment of the meadow restoration units and pre-commercial thinning units would have little short term impact to users as they would require only access by hand crews to hand fell and hand pile encroaching conifers. Treatment of the skyline and tractor logging units would have short term impact due to disruption resulting from the actual logging, as well as the haul traffic. All treatments would create noise

that could be heard at varying levels across the project area. The proposed actions including the short term disturbance would be consistent with a roaded natural recreation opportunity spectrum classification with moderate evidence of the sights and sounds of man, resource modification and utilization practices evident which range from being easily noticed to strongly dominant to observers within the area.

The portion of the Continental Divide National Recreation Trail that passes through the project area is not adjacent or near to any mechanical treatment units. At the lower end of the Pierce Creek Trail approximately 0.5 miles is located adjacent to a meadow restoration unit (unit 23) and approximately 1 mile is not adjacent to any mechanical treatment units. The upper end of the Twin Creek Trail (approximately 4 miles) is not adjacent to any mechanical treatment units. The upper end of the Twin Creek Ridge Trail (approximately 3 miles) is not adjacent to any mechanical treatment units. Trail use in these areas would not be directly impacted from logging and hauling disturbance, however noise from implementation of the project could be heard from these trails as a distant disturbance. The proposed actions including the short term disturbance resulting from noise would be consistent with a semiprimitive motorized recreation opportunity spectrum classification with a predominantly natural or natural appearing environment, moderate probability of experiencing isolation from the sights and sounds of humans and a setting that may have moderately dominant alterations.

Road maintenance would occur on the haul routes which would benefit the recreational driver. Approximately 67 miles of roads would be decommissioned with this project. None of the roads slated for decommissioning are designated for motor vehicle use by any class of vehicle according to the 2011 Salmon-Challis Motor Vehicle Use Map, nor are they part of any designated nonmotorized trail system. Since all of the routes proposed for decommissioning are already closed, unmaintained or unclassified, and given the amount of roads and trails in the area available to dispersed recreational use, there is no effect of this decommissioning to recreationists.

Visitors may also choose to avoid the general project area during the proposed prescribed burning and underburning of units following thinning. Smoke in the air during the prescribed burns may impact the quality of the recreation experience adjacent to the project area by temporarily reducing air quality and visibility. Coordination with the Montana/Idaho Airshed Group would minimize this impact (see further discussion in the air quality report in the project file).

All of the treatments proposed would have some short term direct and indirect effects on dispersed recreation activities in the project area such as hunting and camping. During active burning, logging and hauling trails and roads could be temporarily closed, impacting access to dispersed recreation areas. All treatments would create some level of noise and disruption that would be heard at varying levels across the project area. The proposed action including the short term disturbance created by temporarily closed access routes, noise, smoke and other generally increased activity across the project area would be consistent with the various recreation opportunity spectrum classifications throughout the project area.

Alternative 2 – No New Temporary Road Construction

Direct and Indirect Effects

The primary effect of alternative 2 on the Upper North Fork project area's recreation resources are the same potential short term direct and indirect impacts as the proposed action. More or less temporary road construction followed by obliteration would have no effect on recreationists as none of the roads in either alternative are currently or would ever be open to recreationists, and all roads built would be obliterated. In addition to these effects however, are the effects from two activities proposed in alternative 2 that are not contained in alternative 1. In alternative 2 the Hammerean Loop Road, National Forest System Road 449, would no longer be a loop. The road would be closed at the existing rock slide and turnarounds

established. Additionally, National Forest System Road 60078A would be seasonally closed for elk security from Sept 30th through May 21st. The Hammerean loop road is popular with recreational drivers, hunters, sightseers and other recreationists. Closing this route would have a detrimental effect on the recreational experience for mostly local populations who currently enjoy using this route. From Sept 30th through May 21st National Forest System Road 60078A is primarily used for hunting. Closure of this route to motorized vehicles would have a detrimental effect to the recreation experience of those who prefer to hunt from motorized vehicles. The closure would improve the recreational experience of those who prefer to hunt on foot.

As with in alternative 1, all of the treatments proposed in alternative 2 would have some short term direct and indirect effects on dispersed recreation activities in the project area such as hunting and camping. During active burning, logging and hauling trails and roads could be temporarily closed, impacting access to dispersed recreation areas. All treatments would create some level of noise and disruption that would be heard at varying levels across the project area. Actions proposed in this alternative including the short term disturbance created by temporarily closed access routes, noise, smoke and other generally increased activity across the project area would be consistent with the various recreation opportunity spectrum classifications throughout the project area. One action proposed under this alternative, the permanent closure of a small section of the Hammerean Loop Road, would have a direct and lasting effect on recreational opportunities. As mentioned earlier in the “Measurement Indicators” section, “Measurement Indices to determine the effects of a given alternative on the recreation resource is the loss or diminishment of a recreation opportunity… This can include the loss of physical infrastructure such as a campground or trailheads as well as the loss of access to the infrastructure.”

Cumulative Effects Common to Both Alternatives

All of the past present and reasonably foreseeable future actions within the project area (appendix C to the EIS) have been reviewed for potential cumulative effects when the direct or indirect potential effects of the alternatives are added to them.

Since there would be no direct or indirect effect to the recreational opportunity spectrum classes, there would be no cumulative effects to the recreational opportunity classes within the project area (with the noted exception of the closure of the Hammerean Loop Road).

A recent action in the project area that may contribute to the effect of the Upper North Fork project on the recreation resource is the completion of the Salmon-Challis National Forest Travel Plan. The Travel Plan was approved on September 10, 2009, providing motorized travel management direction across the entire forest. The plan prohibits motorized travel off designated National Forest Transportation System roads and trails except as authorized in special use permits or contracts and limits motor vehicle use off of designated routes for the purpose of dispersed camping to 300 feet from the centerline of the route. Annual publication of a Motor Vehicle Use Map completes the designation process by identifying the roads and trails designated for public motorized use. Since motorized use is banned across the Forest anywhere except on designated routes, the design criteria proposed in the Upper North Fork project to deter motorized use on temporary roads, skid trails and firelines may be more effective. In combination with the Forest Travel Plan which reduced the miles of roads open to motorized use by 250 miles, the closure of the Hammerean Loop Road would have a detrimental effect to the experience of recreational drivers, hunters, sightseers and other recreationists.

Ongoing management activities that may occur at the same time as the implementation of the Upper North Fork project, such as routine road or campground maintenance, could cumulatively add to the impacts on dispersed recreation opportunities within and adjacent to the project area.

Compliance with the Forest Plan and Other Regulatory Direction

Alternatives 1 and 2 would be consistent with the Forest Plan regarding recreation management. The Forest Plan requires that we "Provide a broad spectrum of dispersed recreation opportunities in accordance with the established recreation opportunity spectrum classifications for the management area." All of the proposed activities would be consistent with the various recreation opportunity spectrum classifications throughout the area, and in general meet Forest Plan objectives for recreation in the project area.

Irreversible and Irretrievable Commitments of Resources

None.

Roadless and Unroaded Areas

This section analyzes the effects of the proposed action and alternative action alternatives on the Idaho Roadless Areas and contiguous unroaded areas lands (herein after referred to as "unroaded lands") within the Upper North Fork HFRA Ecosystem Restoration Project area. There are several occurrences of unroaded areas lands within the project area contiguous to Idaho Roadless Areas that will be considered in the analysis with respect to project effects on their "wilderness attributes" as attributed to the contiguous adjacent roadless area.

In addition, this analysis evaluates whether or not the alternatives are consistent with the Idaho Roadless Rule.

Table 68. Idaho Roadless Area and roadless theme management classification allocation within the project area

Idaho Roadless Area	Roadless Theme Management Classification	Total Roadless Area Acreage	Roadless Acreage within Project	Acreage identified within CPZ
Allan Mountain #946	Backcountry Restoration	44,350	14,940	3,944
	Forest Plan Special Area - Allan Mountain RNA	1,719	492	0
	Forest Plan Special Area- Lost Trail Pass Ski Area	409	409	409
Anderson Mountain #942	Backcountry Restoration	18,506	6,556	1,376
West Big Hole #943	Backcountry Restoration	51,403	204	0
	General Forest	9,574	0	0
	Primitive	20,526	0	0
	Special Area	2,902	0	0

Table 69. Crosswalk between wilderness attributes and roadless area characteristics

	Wilderness Attributes	Roadless Area Characteristics
Natural	ecological systems are substantially free from the effects of modern civilization and generally appear to have been affected primarily by forces of nature	High quality or undisturbed soil, water, and air; Sources of public drinking water: Diversity of plant and animal communities; Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; Reference landscapes
Undeveloped	degree to which the area is without permanent improvements or human habitation	Natural appearing landscapes with high scenic quality
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	**Solitude**: opportunity to experience isolation from the sights, sounds, and presence of others from the developments and evidence of humans **Primitive and unconfined recreation**: opportunity to experience isolation from the evidence of humans, to feel a part of nature, to have a vastness of scale, and a degree of challenge and risk while using outdoor skills.	Primitive, semi-primitive nonmotorized and semi-primitive motorized classes of dispersed recreation
Special Features and Values	capability of the area to provide other values such as those with geologic, scientific, educational, scenic, historic, or cultural significance	Traditional cultural properties and sacred sites; and other locally identified unique characteristics.
Manageability	the ability of the Forest Service to manage an area to meet size criteria and the elements of wilderness	No criteria

Affected Environment

The project area is located in the upper North Fork Salmon River drainage between Gibbonsville, Idaho and the Lost Trail Ski Area on the Idaho/Montana border. The project area encompasses approximately 41,000 acres on the east and west sides of the State Highway 93 scenic byway corridor. Within the boundaries of the project area, the Idaho Roadless Rule designated three areas as Idaho Roadless Areas (Allan Mountain #946, Anderson Mountain #942 and West Big Hole #942) and classified these areas into five management classifications (36 CFR 294.22) (Table 68). Therefore, this analysis focuses on Idaho Roadless Areas and unroaded lands within the Upper North Fork HFRA Ecosystem Restoration Project boundary. Approximately 45 percent of National Forest System lands with the project area are not designated as Idaho Roadless Areas.

The primary management classifications within the project area are Backcountry/Restoration and Forest Plan Special Areas. The Idaho Roadless Rule does not apply to Forest Plan Special Areas (36 CFR 294.28(f); and their management is guided by forest plan direction.

The Backcountry/Restoration theme management classification identifies specific conditioned permissions for road construction, reconstruction and timber cutting, sale, or removal. One of the

condition permissions applies to community protection zones. Based on the direction in the Idaho Roadless Rule an assessment was conducted to determine whether or not Moose Creek Estates and Lost Trail Ski Area qualify as a community under the Healthy Forest Restoration Act; and if so whether or not those communities were at-risk. Moose Creek Estates (a private land inholding undergoing subdivision development) and Lost Trail Ski Area (a private downhill ski facility on National Forest lands under Special Use Permit) are immediately adjacent to Idaho Roadless Areas. Both the Estates and Ski Area were assessed to be communities, because they have multiple structures, shared road access and shared power service They were also determined to be “at-risk” because the area is conducive to a large fire event and there is a significant risk to life and property if this event were to occur.

Based on the criteria in the Idaho Roadless Rule, the Forest then delineated a community protection zone boundary around Moose Creek estates and the Lost Trail Ski area. Since this was the first project of its kind under the Idaho Roadless Rule, the Governor’s Idaho Roadless Commission reviewed the mapping and after some adjustments determined the mapping was done appropriately (see Commission meeting notes of September 28, 29, 2010 and May 4, 2011). This community protection zone delineation was then pertinent to certain types of management activities that are permissible under the Idaho Roadless Rule. See figure 26 for project area and features related to Idaho roadless areas and community protection zones.

Table 68 summarizes Idaho roadless area acreages by roadless theme and community protection zone delineation with the Idaho roadless areas and project area.

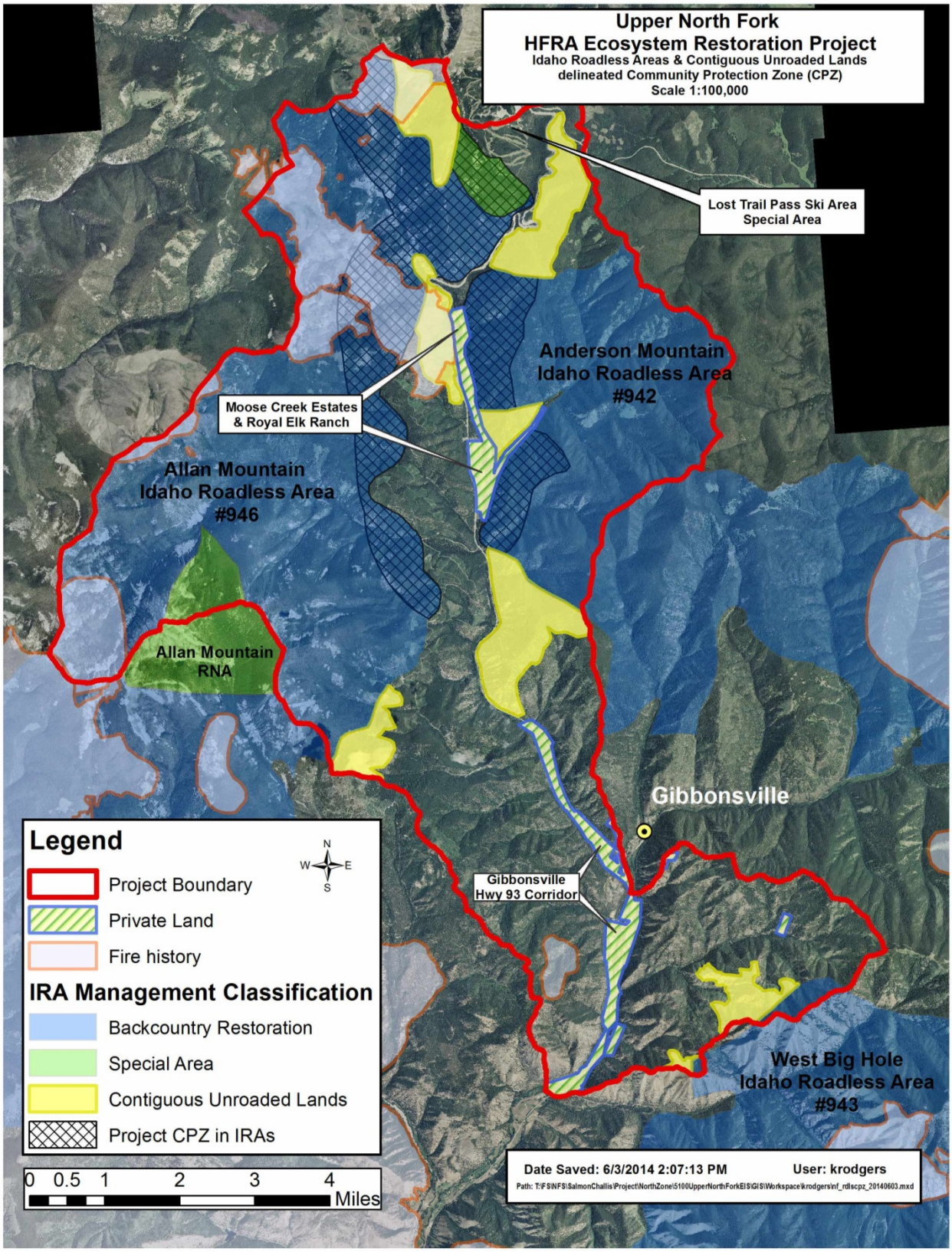


Figure 26. Upper North Fork HFRA Ecosystem Restoration Project Idaho roadless areas and community protection zones

Existing Condition

Allan Mountain #946 Idaho Roadless Area

The Allan Mountain #946 Idaho Roadless Area is 46,500 acres in size. Approximately 15,841 of those acres are included in the Upper North Fork HFRA Ecosystem Restoration project area boundary.

The project area portion of the Allan Mountain Idaho Roadless Area is in Forest Plan Management Area Prescriptions 1A-emphasis on providing downhill skiing opportunity on the Lost Trail Pass Ski Area, 2A in higher elevation areas on the western side - emphasis on dispersed recreation activities including semi-primitive motorized recreation, no timber harvest planned; 3A-5A in areas closer to the eastern boundary with emphasis on aquatic habitat management for anadromous fish species and producing long-term timber outputs through high investment in regeneration and thinning. The Allan Mountain Roadless Area was designated non-wilderness in the Salmon Forest Plan in 1988.

Natural: Elevations range from about 5,400 feet to 9,154 feet at Allan Mountain in the project area. Topography is steep and generally rocky, with shallow, sandy loam soils. The area is mostly forested except for bare peaks in the Allan Mountain area and higher elevation terrain along ridgetops and the Montana-Idaho border. Long term ecological processes are undisturbed in most of this Idaho Roadless Area, so natural integrity has been maintained and ecological processes allowed to follow their natural course. Scattered occurrences of non-native noxious weed species can be found along trail corridors and near the eastern Idaho Roadless Area perimeter. Allan Mountain Research Natural Area was designated within this Idaho Roadless Area (on the southern boundary of the project area) to protect limited stands and the southern-most occurrence of subalpine larch.

Undeveloped: The Idaho roadless area is bordered on the north by the Lost Trail Pass Ski Area, on the east by U.S. Highway 93 and National Forest lands with extensive road networks and timber harvested areas from the last three decades, on the south by the Allan Mountain Research Natural Area and additional portions of this Idaho Roadless Area; on the west by Montana and additional roadless area. The timber management and roading activities adjacent to the east side of the Idaho roadless area are located on the lower slopes of the North Fork Salmon River drainage where topography limits their visibility from the Idaho Roadless Area interior.

Current use is light, consisting of big game hunting, and including hiking, backpacking, horseback riding, fishing, camping, and ski touring. Attractions include trails and campsites along the major streams, ridge divides and lakes, such as Allan Mountain, and provide varied subalpine scenery. Use is concentrated in these trail-accessible areas, and the mountaintop terrain near Lost Trail Pass Ski Area where cross-country skiing is readily accessible from ski lift termini. The Allan Mountain Idaho Roadless Area is well-suited to primitive and semi-primitive types of recreation. The existing trail system is well-maintained and suitable for foot, horse, and motorcycle travel. No domestic livestock grazing occurs within the project area portion of the Idaho roadless area.

Timber harvesting in the form of small clearcut and overstory removal units on 140 acres occurred in the 1970s and 1980s within the Allan Mountain Idaho Roadless Area near its southeast border. The associated 1.6 miles of road accessing these units are currently classified as closed system road under the 2009 Travel Management Plan. Reforestation and regrowth in these harvest units have moderated their unnatural appearance. Terrain features mask their view from within the Allan Mountain Idaho Roadless Area for the most part. The boundary of the Lost Trail Pass Ski Area overlaps a small acreage of the Idaho roadless area on the northern end of the project area. None of the downhill ski runs, access roads or lift structures are sited in the Idaho roadless area and forest vegetation and terrain disguise their presence from within. These ski hill features are readily visible, though, from Highway 93. The Bitterroot National

Forest, the lead management unit for administration of the ski area special use permit, is currently implementing a project to remove and salvage hazard and insect or disease infested trees within the boundaries of the ski area special use permit area.

Wildfires in 2000 and 2003 burned 2,837 acres of forested terrain within the Allan Mountain Idaho Roadless Area primarily in the northern portion of project area resulting in mortality in the conifer tree overstory of up to 75 percent. These effects are visually evident from U.S. Highway 93 for several miles south of the Idaho/Montana State line. Insect and disease infestations in most conifer trees this area in the last five to ten years, not untypical of conditions throughout the northern Rocky Mountains, has created an ever-expanding and varying mosaic of red-needled, gray skeleton mixture within forest stands. In summary, forms of human presence, use, activity and occupation are evident along the Idaho roadless area perimeter on the north and east sides representing a degraded condition. The west and south boundaries and associated interior portions of the IRA are undeveloped and in currently stable condition.

Opportunity for Solitude or Primitive and Unconfined Recreation: Solitude opportunities are excellent in the southern and western portion of the Idaho roadless area in the vicinity of Allan Mountain and the divide ridge between Idaho and Montana. Here the mountainous region and steep drainages allow for escape from the timber harvest units and roads on adjacent lands to the east nearer to the North Fork drainage bottom. This opportunity decreases in the northern portion, due to its narrower configuration, proximity to U.S. Highway 93 and Lost Trail Pass Ski area and the greater opportunity to view man's activities because more open forested stands resulted from the 2000 to 2003 wildfires.

Special Features: The 1,700 acre Allan Mountain Research Natural Area is located in the Allan Mountain Idaho Roadless Area along the southern boundary of the project area. As mentioned previously, the botanical values tied to the occurrence of subalpine larch stands was the reason for the research natural area designation. This is a currently stable factor in the character of this Idaho roadless area. The present deteriorated health of whitebark pine stands throughout its range in much of the Central Idaho and the Northern Rockies represents a degraded condition for this ecologically important component of native vegetation in the project area.

Manageability: Wilderness boundaries could be identified for a smaller portion of the Idaho roadless area around Allan Mountain. Most of the current boundary is not on readily identifiable topographic features, but is defined by the upper limits of development in individual drainages. There are opportunities to move boundaries to topographic features to enhance wilderness attributes. This represents and limiting but stable situation for future management considerations within the project area. In contrast large wildfires have impaired conditions on the landscape over the last decade in the larger Allan Mountain roadless area when including other portions within Idaho and Montana.

Anderson Mountain #942 Idaho Roadless Area

The Anderson Mountain #942 Idaho Roadless Area is 18,500 acres in size. Approximately 6,556 of those acres are included in the Upper North Fork HFRA Ecosystem Restoration project area boundary.

The project area portion of the Anderson Mountain Idaho Roadless Area is in Forest Plan Management Area Prescriptions 2A in higher elevation areas along the Continental Divide and border with Montana - emphasis on dispersed recreation activities including semi-primitive motorized recreation, no timber harvest planned; 3A-5A in areas east of Moose Creek Estates and Highway 93 corridor with emphasis on aquatic habitat management for anadromous fish species and producing long-term timber outputs through high investment in regeneration and thinning. The Anderson Mountain roadless area was designated as non-wilderness in the Salmon Forest Plan in 1988.

Natural: The Anderson Mountain Roadless Area in its entirety is 49,300 acres with approximately two-thirds in Montana and one-third (Anderson Mountain #942 Idaho Roadless Area) in Idaho. The Idaho portion is approximately 30 air miles north of Salmon, Idaho and located to the east of U.S. Highway 93. The area is bounded on the east by the Continental Divide, which is the Idaho-Montana state boundary; on the south by a road along Dahlonega Creek (079) and by a road along Threemile Creek; on the west by the ridge between Anderson Creek and Crone Gulch, by the ridge between Crone Gulch and Pierce Creek, and U.S. Highway 93. Elevations range from about 5,000 feet to over 8,000 feet at Anderson Mountain in the project area. Slopes are between 30 and 70 percent throughout most of the area and sandy loam to loamy sand textured soils formed from quartzite bedrock. Much of the area is timbered with Douglas-fir, with ponderosa pine occurring on the hotter/drier sites and lodgepole pine and subalpine fir occurring at the higher elevations. Engelmann spruce is found in creek bottoms and on wet sites. Open, grassy, dry-land meadows are scattered throughout the higher elevations. Scattered occurrences of non-native noxious weed species can be found along trail and road corridors and near the southwestern Anderson Mountain Idaho Roadless Area perimeter. The IRA is essentially natural appearing. Human influence on the area's natural integrity has been very low.

Undeveloped: The Anderson Mountain Idaho Roadless Area within the project area is bordered on the west by Highway 93, Moose Creek Estates and Royal Elk Ranch which are private lands with limited housing development along the North Fork and Pierce Creek drainage bottoms. Moose Creek Estates has recently conducted extensive logging and vegetative treatments on their property to reduce hazardous natural fuels and gain status as an Idaho fire-wise community. On the east the area is adjoined by the Anderson Mountain Road #60081 which is also the route of the Continental Divide National Scenic Trail, and additional portions of this Idaho roadless area on the Montana side of the state line. Vegetation and topography limits the visibility of these border developments from the Anderson Mountain Idaho Roadless Area interior areas.

Current recreational uses include backpacking, trail bike riding, horseback riding, cross country skiing and hunting. Use was estimated at approximately 1,200 recreation visitor days in 1982 has been estimated as light. Recreation use associated with the Continental Divide National Scenic Trail is expected to increase as implementation of the trail proceeds. Hunting use would likely increase as improvements to the trail occur (none are planned in the foreseeable future in the project area) as access to and through the Anderson Mountain Idaho Roadless Area improves. Pierce Creek trail #6121, formerly open to motorcycle use yearlong, bisected the Idaho roadless area area, but was recently closed to motorized use because it lackedopen to motorcycle use yearlong, currently bisects the Idaho roadless area, but currently lacks design features/clearing to accommodate this designated use. No domestic livestock grazing occurs within the project area portion of the Anderson Mountain Idaho Roadless Area.

Timber harvesting has not occurred in the Anderson Mountain Idaho Roadless Area within the project area. Limited personal use fuelwood gathering has occurred along the Anderson Mountain Road #60081. No large wildfires have occurred within the area in recent history. Insect and disease infestations in most conifer trees this area in the last five to ten years, not untypical of conditions throughout the northern Rocky Mountains, have created an ever-expanding and varying mosaic of red-needled, gray skeleton mixture within forest stands.

In summary, forms of human presence, use, activity and occupation are evident along the Anderson Mountain Idaho Roadless Area perimeter on essentially all sides representing a degraded condition. The interior portions of this Idaho roadless area are undeveloped and in currently stable condition.

Opportunity for Solitude or Primitive and Unconfined Recreation: The area provides only moderate opportunities for solitude. The vegetative screening is dense, but the topographic screening is moderate. The distance from the perimeter to the area core rates as moderate and there are some permanent off-site

intrusions. The size of the Anderson Mountain Idaho Roadless Area rates as low potential, contributing to the overall rating for solitude as moderate. The opportunity for primitive recreation is high due to vegetation, diversity, and lack of recreation facilities. Opportunities would include hiking, hunting, camping, cross-country skiing and horseback riding. The opportunity for challenging experiences or encountering serious hazards is rare.

Special Features: The scenery in this Idaho roadless area is considered common for the Salmon portion of the Salmon-Challis National Forest. The Continental Divide National Scenic Trail corridor passes through this Idaho roadless area. Values associated with this trail occurrence are currently in stable condition. As mentioned previously, the present deteriorated health of whitebark pine stands throughout its range in much of the Central Idaho and the Northern Rockies represents a degraded condition for this ecologically important component of native vegetation in the project area.

Manageability: Logical and manageable boundaries could be developed for this area; minor boundary changes would be necessary to eliminate an intrusion on the southwest corner (outside the project area). Size is not a factor with this area. A stable condition exists for this attribute under the current situation.

West Big Hole #943 Idaho Roadless Area

The West Big Hole #943 Idaho Roadless Area is 84,440 acres in size. Approximately 201 of those acres are included in the Upper North Fork HFRA Ecosystem Restoration project area boundary.

The project area portion of the West Big Hole roadless area is in Forest Plan Management Area Prescriptions 3A-5A in the vicinity of Lick Creek on the southeast project boundary. Management emphasis is on aquatic habitat management for anadromous fish species and producing long-term timber outputs through high investment in regeneration and thinning. The West Big Hole roadless area was designated as non-wilderness in the Salmon Forest Plan in 1988.

Natural: The West Big Hole Roadless Area in its entirety is 217,300 acres with less than two-thirds in Montana and more than one-third (West Big Hole #943 Idaho Roadless Area) in Idaho. The Idaho portion is approximately 10 air miles northeast of Salmon, Idaho. The entire area is bounded on the east by the Continental Divide. The area is divided into two parts where the Forest boundary is separated by lands administered by the Bureau of Land Management. The northern segment of the West Big Hole Idaho Roadless Area at its northern boundary, east of Highway 93, is within the project area along a ridge between Little Sheep Creek and Lick Creek. Elevation at this 201 acre Idaho roadless area segment is approximately 6,800 feet. Douglas-fir, lodgepole pine, and subalpine fir are the predominant vegetation in the area. The West Big Hole Idaho Roadless Area is essentially natural appearing as well as the portion within the project area. However the project area segment has incurred a high level of human influence on its natural integrity.

Undeveloped: The West Big Hole Idaho Roadless Area is bordered on the north by the Lick Creek drainage and National Forest administered lands with extensive road networks and timber harvested areas from the last three decades and on the south by the northern segment of the West Big Hole Idaho roadless area. One intrusion of 0.10 mile of non-system road are known in the Idaho roadless area where it encompasses the project area. Timber management and roading activities adjacent to the north are readily visibility from the Idaho roadless area boundary. No domestic livestock grazing occurs within the project area portion of the West Big Hole Idaho Roadless Area. The degree and extent of development and past activity adjacent to the Idaho roadless area portion of the project area imparts a degraded condition to this attribute.

Opportunity for Solitude or Primitive and Unconfined Recreation: This small area of the West Big Hole Idaho Roadless Area does not provide much opportunity for solitude based on size, proximity to

perimeter, and lack of topographic and vegetative screening from adjoining development. This is in contrast to the Idaho roadless area as a whole which provides very high opportunity for primitive recreation due to its overall remoteness and a high degree of diversity and minimal developed recreation facilities. The West Big Hole Idaho Roadless Area offers many opportunities for challenging experiences due primarily to terrain features, with the exception of the small portion within the project area.

Special Features: The project area portion of the West Big Hole Idaho Roadless Area rates common for scenery because of its small size and perimeter location. The West Big Hole Idaho Roadless Area overall has a number of special features including: the Continental Divide National Scenic Trail Corridor, outstanding scenery, two research natural areas and about 2,000 acres of the Salmon River Wild and Scenic River corridor. In summary the project area portion of the West Big Hole Idaho Roadless Area provides no contribution to the presence or condition of the special features and values attribute.

Manageability: Overall for the West Big Hole Idaho Roadless Area logical and manageable boundaries could be developed for the area. Boundary changes would be necessary, as the existing Idaho roadless area has been virtually cut in two by a timber related intrusion. Size is not a factor with this Idaho roadless area. Exclusion of the small portion of the project area within this Idaho roadless area would be a rational part of a boundary revision. In summary the portion of the project area within this Idaho roadless area detracts from and degrades its overall manageability.

Other Unroaded Areas Contiguous to the Idaho Roadless Areas

In addition to the three Idaho roadless areas identified above, there are other unroaded lands contiguous to the Idaho roadless areas within the project area that may be affected by this proposal. In the simplest terms, unroaded lands are defined as any piece of land that is not currently roaded (i.e. the area located between roads). For this analysis, the unroaded lands considered are those contiguous to the existing Idaho roadless areas. They are analyzed to evaluate their “wilderness characteristics” as attributed to the contiguous adjacent “inventoried roadless areas”.

A number of shaded fuel breaks, fuels reduction thinning, meadow restoration, prescribed burning units and several short temporary road segments are proposed on unroaded lands in eight locations within the project area. These unroaded areas are described as follows in relation to their contiguous Idaho roadless areas:

Allan Mountain Idaho Roadless Area

- Narrow strip, about 342 acres, of east facing mountain slopes east of the Allan Mountain Research Natural Area and south of Hammerean Creek between the Idaho roadless area boundary and an existing closed system road.
- Narrow strip, about 407 acres, of mountain slopes west of Moose Creek Estates and located between the Idaho roadless area boundary and Highway 93.
- Narrow strip, about 529 acres, of mountain ridgetop and west facing slopes west of the Lost Trail Pass Ski Area and located between the Idaho roadless area boundary and existing open system roads.

Anderson Mountain Idaho Roadless Area

- Narrow strip, about 688 acres, of north and west facing mountain slopes northeast of Moose Creek Estates located north of the Idaho roadless area boundary between Highway 93, Highway 43 and existing open system roads on the Continental Divide to the east.
- Small wedge, about 180 acres, of south facing, moderately steep slope between Moose Creek Estates along the North Fork and private lands on Pierce Creek.

- Narrow strip, about 936 acres, of west and north facing steep, mountain slopes south Elk Creek, east of the North Fork and located between Highway 93, the Idaho roadless area boundary and existing open system roads in upper Crone Gulch drainage.

West Big Hole Idaho Roadless Area

- Two small patches of terrain totaling 362 acres on north facing mountain slope south of Lick Creek and located between the Idaho roadless area boundary on a ridgetop and existing closed system roads to the north.

The existing condition of these areas relative to the wilderness characteristics are described below:

Natural: In general, these eight unroaded land segments consist of moderate to steep mountain topography that has a relatively continuous canopy of coniferous forest. Douglas-fir, lodgepole, subalpine fir and limited whitebark pine predominate due to the higher elevation location of these areas. Portions of the unroaded lands west, northwest of Moose Creek Estates and west of Lost Trail Pass Ski Area were burned by wildfires in 2000 and 2003. In these burn locations the forest overstory remains as standing dead trees. Several of these unroaded land segments coincide with the location of Forest Plan designated old growth timber stands. In some areas there are open, dry meadows/slopes dominated by grass and small shrub habitats. Overall, these unroaded lands individually and collectively are natural appearing.

Undeveloped: There are private lands along the bottom of the North Fork (Moose Creek Estates and Royal Elk Ranch), Highway 93 and Highway 43 corridors, downhill ski facilities at Lost Trail Pass Ski Area and forest access roads with previously harvested timber units all which border the unroaded forest lands in the area. Most of these private lands have only limited residential development at present. However, these developments, State highways, ski area and managed forest lands in close proximity detract from the undeveloped character of the area. Additionally, the Lost Trail Pass Ski Area and Chief Joseph Winter Sports area along Highway 43 are impacted by cross-country groomed and back country Nordic skiing and limited snow machine use during the winter season. Yearlong traffic on Highway 93, a major state route, has the greatest influence with sight and sound of its use being evident from most of the unroaded lands with the exception of the most distant spots having topographic features of separation. Proximity of open forest system roads and readily visible past harvest units contributes to the developed feel and degraded condition of this attribute for these areas.

Opportunities for Solitude or Primitive and Unconfined Recreation: Primitive recreation and a feeling of solitude are difficult to experience in these areas because they are compromised by the proximity of traffic and activity along Highway 93 and Highway 43 and other open forest system roads which facilitate forest management activities, recreation and hunting uses.

Special Features: There are no known or noted special features in these other unroaded lands contiguous to the three Idaho roadless areas within the project area.

Manageability: These eight segments of unroaded lands are for the most part unmanageable by themselves or as additions to their associated adjacent Idaho roadless areas. They were likely excluded from the original delineation of roadless area borders because they do not provide logical boundaries for description, mapping and management of potential classified areas (wilderness). The parcels typically lack special features or characteristics and extend to the edge or proximity of development, vegetation alteration and/or frequent human activity.

Management Direction

Desired Condition

The 1988 Salmon National Forest Land and Resource Management Plan, (Forest Plan) does not address or describe the desired condition for roadless and unroaded areas. Instead, it discloses that "None of the existing inventoried roadless areas will be designated as wilderness" (Forest Plan, IV-88). The project area was assigned Management Area designations and prescriptions consistent with other similar areas throughout the Forest (See Regulatory Framework below).

The 2008 Idaho Roadless Rule (USDA Forest Service. 2008 36 CFR 294) established new management direction and designated a system of lands called Idaho Roadless Areas. The Idaho Roadless Rule created five management area themes (classifications) for individual roadless areas: wild land recreation; primitive; special areas of historic and tribal significance; backcountry/restoration; and general forest, rangeland, and grassland. The classifications span a continuum that includes at one end a restrictive approach emphasizing passive management and natural restoration approaches, and on the other end, active management designed to sustain forest, rangeland, and grassland management. This continuum accounts for stewardship of the uniqueness of each individual roadless area's landscape and the quality of roadless characteristics in that area. As presented earlier in the description of the project environment, the primary management classifications within the project area are backcountry/restoration and Forest Plan Special Areas.

Roadless characteristics as displayed in table 69 include: high quality soil, water (including drinking water), air; plant and animal diversity; habitat for sensitive species; reference landscapes and high scenic quality; primitive and semi-primitive recreation; cultural resources; and other locally identified unique characteristics.

While the Idaho Roadless Rule does not prescribe desired condition for each Idaho roadless area, it does provide management direction based on individual roadless characteristics for lands (1) containing outstanding or unique features, where there is minimal or no evidence of human use; (2) containing culturally significant areas; (3) containing general roadless characteristics, where human uses may or may not be more apparent; and (4) displaying high levels of human use, while:

- Protecting communities, homes, and property from the risk of severe wildfire or other risks existing on adjacent Federal lands;
- Protecting forests from the negative effects of severe wildfire and insect and disease outbreaks; or
- Protecting access to property, by ensuring that States, Tribes, and citizens owning property within roadless areas have access to that property as required by existing laws.

Regulatory Framework

Salmon National Forest Land and Resource Management Plan

The Forest Plan did not prescribe any management emphasis or standards and guidelines for managing inventoried roadless and unroaded areas as a specific resource as mentioned above. The project area is covered by the following management area prescriptions typical of other similar areas on the forest:

- 1A-emphasis on providing downhill skiing opportunity on the Lost Trail Pass Ski Area (Forest Plan, IV-97 to 97a);

- 2A in higher elevation areas along the Continental Divide and boarder with Montana - emphasis on dispersed recreation activities including semi-primitive motorized recreation, no timber harvest planned Forest Plan, IV-98 to 100;
- 3A- 4A in the lower elevations of the Highway 93 corridor from the southern end of the project boundary northward to about Elk Creek – emphasis on meeting anadromous fish habitat needs and providing for big game habitat needs on key big game winter range (Forest Plan, IV- 107 to 109 and IV-110 to 112);
- 3A-5A in areas east of Moose Creek Estates and both sides of the Highway 93 corridor with emphasis on aquatic habitat management for anadromous fish species and producing long-term timber outputs through high investment in regeneration and thinning (Forest Plan, IV-107 to 109 and IV-116 to 121).
- 6A- emphasis is on protection and interpretation of areas of unusual scenic, archeological, historical, geological, botanical, ecological, paleontological or other special characteristic (i.e., Allan Mountain Research Natural Area established by Forest Plan Amendment #5, April 25, 1996) (Forest Plan, IV-76 and IV-150).

This absence of direction and acknowledgement of inventoried roadless areas as a resource throughout the National Forest System resulted in the development of the Department of Agriculture policy of the 2001 Roadless Rule. The 2001 Roadless Rule (66 FR 3244, Jan. 12, 2001) proposed to ensure that inventoried roadless areas sustain their values for this generation and for future generations. By sustaining these values, a continuous flow of benefits associated with healthy watersheds and ecosystems was expected. The Forest Service identified timber cutting and road construction or reconstruction as having the greatest likelihood of altering and fragmenting landscapes and the greatest likelihood of resulting in an immediate, long-term loss of roadless area values and characteristics. Therefore, the 2001 Rule prohibited these activities with certain exceptions in each roadless area.

Idaho Roadless Rule

In 2006 the State of Idaho submitted a petition to the Secretary of Agriculture to establish new management for Idaho's inventoried roadless areas on National Forest System lands. The result of that petition and effort was the 2008 Idaho Roadless Rule (USDA Forest Service. 2008. 36 CFR 294) which superseded the 2001 Roadless Rule in the State of Idaho, established new management direction and designated a system of lands called Idaho Roadless Areas. The relevant portions of the Idaho Roadless Rule that apply to activities proposed for the Upper North Fork HFRA Ecosystem Restoration project are highlighted below:

§ 294.24 Timber cutting, sale, or removal in Idaho Roadless Areas

(c) Backcountry/Restoration.

(1) The cutting, sale, or removal of timber is permissible in Idaho roadless areas designated as backcountry/restoration only:

(i) To reduce hazardous fuel conditions within the community protection zone if in the responsible official's judgment the project generally retains large trees as appropriate for the forest type and is consistent with land management plan components as provided for in § 294.28(d);

(ii) To reduce hazardous fuel conditions outside the community protection zone where there is significant risk that a wildland fire disturbance event could adversely affect an at-risk community or municipal water supply system. A significant risk exists where the history of fire occurrence, and fire hazard and risk, indicate a serious likelihood that a wildland fire disturbance event would present a high risk of threat to an at-risk community or municipal water supply system;

(iii) To improve threatened, endangered, proposed, or sensitive species habitat;

(iv) To maintain or restore the characteristics of ecosystem composition, structure, and processes;

(v) To reduce the risk of uncharacteristic wildland fire effects;

(vii) Where incidental to the implementation of a management activity not otherwise prohibited by this subpart;

This subsection is important to proposed fuels reduction thinning, fuel breaks, meadow, aspen and whitebark pine restoration and tree cutting incidental to prescribed fire use.

§ 294.23 Road construction and reconstruction in Idaho Roadless Areas

(b) Backcountry/restoration.

(2) A responsible official may authorize temporary road construction or road reconstruction for community protection zone activities pursuant to § 294.24(c)(1)(i) if in the official's judgment the community protection objectives cannot be reasonably accomplished without a temporary road.

(3) The Regional Forester may approve temporary road construction or road reconstruction to reduce hazardous fuel conditions outside a community protection zone where in the Regional Forester's judgment the circumstances set out below exist. Temporary road construction or road reconstruction to reduce hazardous fuel conditions under this provision will be dependent on forest type and is expected to be infrequent.

(i) There is a significant risk that a wildland fire disturbance event could adversely affect an at-risk community or municipal water supply system pursuant to § 294.24(c)(1)(ii). A significant risk exists where the history of fire occurrence, and fire hazard and risk, indicate a serious likelihood that a wildland fire disturbance event would present a high risk of threat to an at-risk community or municipal water supply system.

(ii) The activity cannot be reasonably accomplished without a temporary road.

(iii) The activity will maintain or improve one or more roadless characteristics over the long-term.

This subsection is important to proposed temporary road construction.

§ 294.28 Scope and applicability.

(d) The provisions set forth in this subpart shall take precedence over any inconsistent land management plan component. Land management plan components that are not inconsistent with this subpart will continue to provide guidance for projects and activities within Idaho roadless area; as shall those related to protection of threatened and endangered species.

(f) This subpart shall not apply to Forest Plan Special Areas within Idaho roadless area.

This subsection is important to proposed prescribed burning and wildland fire use, as well as activities in Lost Trail Pass Ski Area and the Allan Mountain Research Natural Area.

Methodology for Analysis and Measurement Indicators

This analysis focuses on the potential effects of project activities on wilderness attributes as defined in Forest Service Handbook (FSH) 1909.12 (72.1) by comparing the alternatives to the existing baseline. It is recognized that expanses of unroaded lands, whether officially "inventoried" or not, provide other

resource values as well. In addition to wilderness attributes, the Idaho roadless area and unroaded lands may contain roadless area characteristics. Table 69 shows the crosswalk between the wilderness attributes identified in Forest Service Handbook 1909.12 and the 1964 Wilderness Act; and the roadless area characteristics. Potential project effects to natural resource elements not restricted to roadless and unroaded lands are evaluated in other specialist reports prepared for the analysis of the Upper North Fork HFRA Ecosystem Restoration Project, all of which are located in the project record. The wilderness attributes listed below and as displayed in the crosswalk, (table 69), are the sole evaluation criterion used in this analysis for disclosure of effects to roadless area characteristics in the project area.

One issue was identified relating to roadless resources in the project area through scoping and collaborative group/community involvement.

> **Issue statement**: The proposed action would involve cutting and removal of timber along with new temporary road building in Idaho roadless areas adjacent to community protection zones and tree cutting/thinning outside the community protection zones which may impact the roadless characteristics and wilderness attributes of these areas.

Measurement indicators selected were:

- Miles of new temporary road constructed within Idaho roadless areas
- Acres harvested (cutting) outside community protection zones within Idaho roadless areas

The Forest Service Handbook 1909.12 (72) identifies attributes used to classify the capability of an unroaded area for potential future wilderness designation. The Upper North Fork HFRA Ecosystem Restoration Project uses these attributes as evaluation indicators. The indicators measure effects of the project upon roadless and unroaded lands within the project area. Because there are no established thresholds that apply to these criteria, they are evaluated along a continuum to determine the amount of change and potential affects upon the following list of wilderness attributes.

- Natural – The extent to which long-term ecological processes are intact and operating.
- Undeveloped – The degree to which the impacts documented in natural integrity are apparent to most visitors.
- Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation – Solitude is a personal, subjective value defined as the isolation from sights, sounds and presence of others, and from developments and evidence of humans. Primitive recreation is characterized by meeting nature on its own terms, without comfort and convenience of facilities.
- Special Features – Unique ecological, geographical, scenic and historical features of an area.
- Manageability – The ability to manage an area for wilderness consideration and maintain wilderness attributes.

Information Sources

Guiding documents and protocols used for this analysis included:

- “A Protocol for Identifying and Evaluation Areas for Potential Wilderness”. Intermountain Region Planning Desk Guide. Updated 10/28/2004.
- Wilderness Attributes and Roadless Characteristics Worksheets. Version 4.10.19.11 rwelch.
- “R4 suggestions for analyzing the effects to wilderness potential from project activities within all areas identified for wilderness potential”. Randy Welch, R4 white paper, 7/3/2008; Updated 10/19/2011, Joan Dickerson.

- "Our Approach to Roadless Area Analysis and Analysis of Unroaded Lands Contiguous to Roadless Areas. Region 1 white paper. Draft 12/02/2010.

Spatial and Temporal Context for Effects Analysis

As required in 36 CFR 220.4(f) the analysis considers the present effects of past activities. These effects are reflected in the existing condition and generally include the effects of past road building and vegetation management within the roadless area expanse in the project area. The spatial boundaries for analyzing the cumulative effects to the roadless resource are the inventoried roadless and adjacent unroaded areas on National Forest system lands within the Upper North Fork HFRA Ecosystem Restoration Project boundaries. These areas are appropriate for this analysis because of the location and extent of proposed project activities and their subsequent direct and indirect effects.

In addition, the analysis considers the temporal effects of the activities – that is how long would the effects of the action alternative last. In general, temporal effects may be short-term (1 to 5 years); or long term (20 years or more). The temporal effects are used to determine what, if any, reasonably foreseeable activities overlap with the activities, the project (geographic) area, and could cause cumulative effects. Long term effects were defined as 20 years or more because this is the approximate time period for substantial recovery and reestablishment of vegetation following treatments in forest environments typical of the project area. See appendix C for a comprehensive list of past, present and foreseeable activities and events considered in this analysis.

Environmental Consequences

No Action

Direct and Indirect Effects

Taking no action would maintain the existing wilderness characteristics of Idaho Roadless Areas and unroaded lands in the Upper North Fork HFRA Ecosystem Restoration Project area. Any changes to the wilderness characteristics would be due to natural occurrence and would likely be the result of insect, disease or wildfire activity. At a landscape scale, stand replacing fire in up to 50 percent of forested and riparian ecosystems during summer drought and extreme weather conditions is a plausible event as a consequence of not implementing hazardous fuels reduction activities. The credibility of this type of occurrence is also based on recent scientific research that has shown trends towards increased large fire frequency, longer wildfire durations and longer wildfire seasons since the mid-1980s. Recent weather and climate patterns also indicate an increase in spring and summer temperatures and an earlier spring snowmelt. Assumptions are that both climate change and previous land-use effects have contributed to this situation. "No treatment" or "passive management" could perpetuate the potential for high severity fire.

The No Action alternative is consistent with direction established for inventoried roadless areas in the Forest Plan and most of the Idaho Roadless Rule objectives of conserving roadless area characteristics. The result of a large wildland fire, although a natural component of roadless areas, would not meet desired conditions for the natural and human related resources and values associated with these landscapes. This type of incident could result in loss of biological diversity and have adverse impacts to vital community interests and infrastructure within and beyond identified community protection zones.

Effects to Natural: Natural integrity is the extent to which long-term ecological processes are intact and operating. Impacts to natural integrity are measured by the presence and magnitude of human induced change to an area. Fire suppression has resulted in unnatural buildup of fuels, conifer encroachment into meadows and forest openings, and timber stands that are denser than they might be if fire had played an active role over the last 75 to 100 years. This has resulted in a changed vegetative composition that is

different from landscapes in which fire was allowed to play a natural role. Although Forest visitors may not initially recognize these changes, the long-term ecological processes may be affected to the point they become quite evident (i.e. large-scale insect/disease infestation, poor health of heavily stocked stands, change in species composition, large scale stand-replacing fires of which several instances are already apparent). Under the No Action alternative these ecological processes and conditions would continue which would represent a degrading situation.

Additionally, for the past several years most of Central Idaho and the Northern Rockies have been under drought conditions. These drought conditions have stressed trees making them vulnerable to the impacts of insect and disease. This is exemplified within the project area with recent mortality of ponderosa pine, lodgepole pine and whitebark pine trees as a result of mountain pine beetle (also blister rust in whitebark pine), and the result of budworm attacks on Douglas-fir. Noticeable tree mortality would continue to have a dynamic effect on the natural appearance in all of the unroaded lands in the Upper North Fork HFRA Ecosystem Restoration Project area. Insects and diseases would continue to kill trees in the area leaving the vegetation on these landscapes susceptible and prime for wildland fire events. These effects are expected to happen to a certain degree across most forested lands in Central Idaho/Northern Rockies and would continue to affect unroaded acreage in the Upper North Fork HFRA Ecosystem Restoration Project area.

The occurrence of a landscape scale, stand-replacing wildland fire during summer drought and extreme weather conditions within the project area would likely result in a marked change in the natural appearance of roadless and unroaded settings. Although wildland fires are an ordinary occurrence in these forested sites the extent and longevity of impacts from such an event could change the appearance and characteristics of the landscape for generations into the future. Examples of such changes are readily visible on the Bitterroot National Forest to the north of the project area in the Sula and East Fork Bitterroot River areas as the result of wildfires since 2000. Another example on the Salmon-Challis National Forest in the North Fork drainage to the south of the project area is the Mustang Complex wildfire of 2012 on the west side of Highway 93. A large wildland fire in the project area would likely burn within the North Fork drainage from divide to divide or at least across the expanse between drainage bottom and ridgeline. Both scenarios would create a burn scar readily noticeable from Highway 93, a Scenic Byway, which bisects the entire project area. This would be a sharp contrast to the mosaic of dead trees across the landscape that are expected from the current insect and disease epidemic in the area which may cause 50 percent mortality or more in the overstory.

Effects to Undeveloped: The undeveloped wilderness characteristic measures the degree to which the area is without permanent improvements or human habitation. It is a measure of importance of visitor's perceptions of human impacts to an area. Even though some of the long term ecological processes of an area may have been interrupted, the roadless and unroaded lands within the Upper North Fork HFRA Ecosystem Restoration Project area, on the whole, appear to be affected only by forces of nature. There are several system recreation trials, minor intrusions of short road segments and small timber harvest units in one area, evidence of past fire suppression actions such as remnants of handline, dozer line and fuel breaks, limited sign of prospecting scattered through lands without roads; however, the interior of much of the Idaho roadless area have remained relatively untouched and human activity is not obvious to the casual forest user, or is disappearing due to natural processes.

The occurrence of a landscape-scale wildland fire and resulting suppression activities would produce additional evidence of human impacts. Handline, dozer line and fuel breaks and sign of suppression repair and burned area emergency rehabilitation would be present in the fire expanse to some degree depending on the duration, effort and extent of activities in management of the incident. Traces of this human intervention would persist for several decades in some instances.

Effects to Opportunities for Solitude or Primitive and Unconfined Recreation: Solitude is a personal, subjective value defined as isolation from the sights, sounds, physical presence of others, and human development. It can also be defined as a perceived condition of being secluded, inaccessible, and out of view. A primitive recreation experience includes opportunities for isolation from evidence of man, a vastness of scale, feeling a part of the natural environment, having a high degree of challenge and risk, and using outdoor skills characterized by meeting nature on its own terms without comfort or facility convenience. Opportunities for solitude and sense of remoteness are primarily affected by actions that increase human presence in an area, such as road development, development of recreation sites, and changes in types of uses such as allowing motorized vehicular use in an area that was previously non-motorized. Sights of human civilization can also affect remoteness or opportunities for solitude and primitive and unconfined recreational experiences.

As described above in the existing condition, the opportunities for solitude or primitive and unconfined recreation in roadless and unroaded lands vary across the Upper North Fork HFRA Ecosystem Restoration Project area. The West Big Hole Idaho Roadless Area has a more limited sense of isolation or remoteness due to its small size and the close proximity of forest roads and timber management units close to the boundaries of this Idaho roadless area. Allan Mountain and Anderson Mountain Idaho roadless areas, on the other hand, are larger and have more of an opportunity for solitude and/or a feeling of remoteness, particularly within their interiors. The no action alternative would continue the existing opportunities for solitude, remoteness and primitive recreation experience in the Idaho roadless areas and contiguous unroaded lands of the project area with the exception of the occurrence of a landscape-scale wildland fire event.

In the case of incidence of a large wildfire and resulting potential opening of the forest canopy caused by high fire severity, the opportunities for solitude and sense of remoteness would likely diminish. Sight of human activity such as Highway 93 and associated development along the highway corridor and fire suppression features would be possible from interior portions of the Idaho roadless areas with the removal of vegetation screening produced by fire mortality. While the natural environment feeling and degree of challenge and risk could potentially remain in a post fire landscape, the quality of a primitive recreation experience would likely change from the existing condition.

Effects to Special Features: Identified special features in the Idaho roadless areas of the Upper North Fork HFRA Ecosystem Restoration Project area that would potentially be affected by the occurrence of a landscape-scale wildland fire event are the Allan Mountain Research Natural Area, Lost Trail Pass Ski Area and the Continental Divide National Scenic Trail. In the case of the research natural area the botanical values tied to the occurrence of subalpine larch stands could be impacted by a high-severity fire. The Lost Trail Pass Ski Area, with only a small acreage of permit area within the Allan Mountain Idaho Roadless Area, could nonetheless sustain damage or loss of ski area facilities and snowfall capture characteristics in the event of large scale wildland fire. Likely suppression actions to protect the ski area from an approaching fire would also result in visual and recreation use impacts even if effective in stopping fire spread into the permit area. The Continental Divide National Scenic Trail coincides with the alignment of the Anderson Mountain Road #60081 along the eastern boundary of the project area and the Anderson Mountain Idaho Roadless Area. This trail/road corridor is also the state line border and major topographic divide which presents a strategic location for fire suppression actions to control a wildland fire occurring in this vicinity. Control lines constructed by dozer and broad width shaded fuel breaks are likely features to be created in such areas which would greatly change the recreation experience of Continental Divide National Scenic Trail users traveling this area after the fire.

Effects to Manageability: No Idaho roadless area boundaries would be reduced or altered. Opportunities to expand the IRA boundaries to include adjacent unroaded lands are limited due to the existing network

of system roads, Highways 93 and 43 and private land ownership currently bordering the Idaho roadless areas.

Cumulative Effects of No Action:

The effects of past actions were considered in the existing condition. Reasonably foreseeable actions include the Lost Trail Pass Sanitation Salvage Project which would salvage hazard trees and sanitation of forest stands with heavy insect infestation within the Lost Trail Pass Ski Area special use permit area; firewood cutting primarily adjacent to the Anderson Mountain Road. The 2009 Travel Plan made no appreciable change to motorized routes in the project area, thus no change to opportunities for solitude and primitive recreation. Salvage and firewood activities would have little additional effect to roadless/wilderness characteristics because they would occur adjacent to a heavily used recreation area and an open system roads.

The primary cumulative effect of no action would be the increased risk and likelihood of a landscape scale, stand-replacing wildland fire occurrence at some location in the Upper North Fork HFRA Ecosystem Restoration Project area with the resulting impacts to roadless and unroaded resources mentioned above.

Table 70. Alternative 1 – Proposed action summary of proposed treatments-Idaho roadless areas and unroaded lands

Idaho Roadless Area	Idaho Roadless Rule Exception	Rx Burn	Pre-commercial Thin	Fuel Breaks	Non-commercial Fuel Treatment	Commercial Thinning	Meadow Restoration	Temporary Road Construction	Road Decommissioning
		acres						miles	
Allan Mountain #946	294.24(c)(1)(i) 7 (ii) CPZ timber	0	2	99	0	0	0	0	0
	294.24(c)(1)(iii) & (iv) Ecosystem restoration	0	0	0	0	0	81	0	0
	294.23(b)(2) & (3) CPZ roads	0	0	0	0	0	0	0	0
	294.24(c)(vii)[a] Incidental to	14,992	0	0	0	0	0	0	2.3
	294.28(f) FPSA – ski area[b]	409	0	23	0	0	34	0.1	0
	Unroaded lands	1,559	0	133	0	164	0	2.0	0.2
Anderson Mountain #942	294.24(c)(1) (i) & (ii) CPZ timber	0	0	70	0	583	0	0	0
	294.24(c)(1)(iii) & (iv) Ecosystem restoration	0	0	0	0	2	1,075	0	0
	294.23(b)(2) & (3) CPZ roads	0	0	0	0	0	0	2.1	0
	294.24(c)(vii)[a] Incidental to	6,556	0	0	0	0	0	0	0.6
	Unroaded lands	1,803	0	96	0	788	48	4.8	0
West Big Hole #943	294.24(c)(vii)[a] Incidental to	204	0	0	0	0	0	0	0.1
	Unroaded lands	361	4	0	0	0	0	0	0
Total	**in IRAs**	**22,161**	**2**	**192**	**0**	**585**	**1,190**	**2.2**	**3**
Total	**Unroaded lands**	**3,723**	**4**	**229**	**0**	**952**	**48**	**6.8**	**0.2**

a - The Idaho Roadless Rule does not apply to prescribed burning except to the degree that cutting trees for firelines is considered incidental to a management activity not otherwise prohibited (73 FR 201 [61463]).

b - The Idaho Roadless Rule restrictions do not apply to Forest Plan Special Areas (73 FR 201 [61489]), but activities occurring in the Lost Trail Ski area within an IRA are reflected in this table.

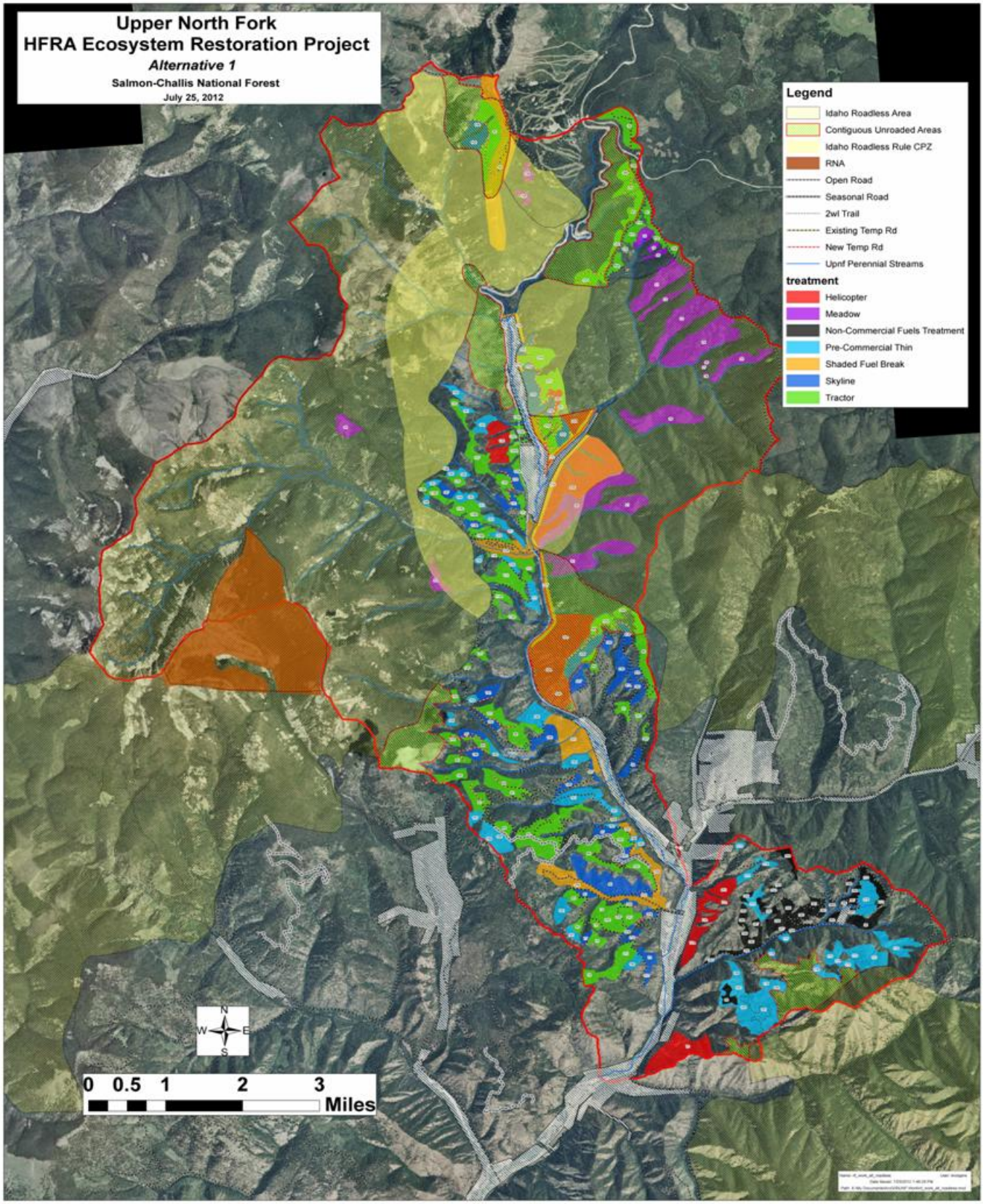


Figure 27. Alternative 1 – proposed action

Alternative 1 – Proposed Action

Proposed Activities in Idaho Roadless Areas and Unroaded Lands

Table 70 below presents a graphical summary of Alternative 1 - Proposed Action hazardous fuels reduction and ecosystem restoration treatment areas and associated activities in the project area within Idaho roadless areas and unroaded lands. See figure 27 for more details and special features of this alternative. Timber cutting, sale and removal associated with mechanical treatments (commercial thinning, fuel break and precommercial thinning), meadow restoration, and fireline construction in the Idaho roadless areas are to the Idaho Roadless Rule(§ 294.24(c)(1)(i-v)). Timber cutting, sale and removal in the Forest Plan Special Area (Ski area) are not (§ 294.28(f)). Temporary road construction within Idaho roadless areas is also subject to the Idaho Roadless Rule (§ 294.23(b)(2)), but road decommissioning is not. The Idaho Roadless Rule does not prohibit or restrict prescribed fire or wildland fire use (§ 294.28(f)), except to the degree that cutting trees for firelines is considered incidental to a management activity not otherwise prohibited (§ 294.24(c)(1)(iii)). Table 70 outlines which permission applies to each type of activity. In addition the Idaho Roadless Rule does not apply to unroaded lands not designated as Idaho roadless areas.

Direct and Indirect Effects on Allan Mountain Idaho Roadless Area #946

The Upper North Fork HFRA Ecosystem Restoration Project would conduct limited vegetative treatments and extensive prescribed burning within the Allan Mountain Idaho Roadless Area and unroaded lands that would produce direct and indirect effect to their wilderness characteristics. Shaded Fuel Break 16, adjacent to Lost Trail Pass Ski area, is partially in the Allan Mountain Idaho Roadless Area (122 acres centered on a dozer line and associated cleared strip from fire suppression actions in 2000); Meadow Restoration Units 33, 34, 138, 139 (115 acres) and additional areas of undelineated meadow, whitebark pine and aspen stand occurrences are also within the Idaho roadless area; 2.2 miles of closed and non-system roads are slated for decommissioning in the Allan Mountain Idaho Roadless Area. In unroaded lands there are commercial thinning units 35 and 184 (164 acres) and associated temporary roads (2.0 miles) and non-system roads to be decommissioned totaling (0.2 miles).

Effects to Natural: Effect to the natural integrity of the area would primarily be limited to perimeter areas where thinning, fuel break and road decommission are located, with the interior/core of the Allan Mountain Idaho Roadless Area having minimal impacts.

The shaded fuel break and thinning units would initially create noticeable stumps, slash and a degree of opening in the overstory canopy. The vegetation would appear patchy to somewhat uniform following initial harvest, but with mostly green trees remaining. Thinning units would recover quickly as young trees and shrubs replace existing vegetation, but the shaded fuel break would retain its open understory with anticipated maintenance treatments. Mechanical treatments, prescribed burning and management of wildland fire events in forest stands is expected to alter vegetation species composition, density, and structural classes to conditions closer to historic circumstances. Tree vigor improvement from thinning and burning would serve to reduce susceptibility to insect and disease disturbances, drought effects and exhibit their normal fire adaptability and resilience. Overall, ecosystem function and forest health are both expected to improve with treatments.

Restoration treatments in mountain meadows, whitebark pine and aspen stands would initially create tree stumps and slash that would rapidly diminish following pile and broadcast burning. Application of prescribed broadcast burning and management of wildland fire events on the overall project area would be expected to re-establish a more natural appearance to the Allan Mountain Idaho Roadless Area and unroaded lands.

Decommissioned temporary, closed system and non-system roads would take a short to moderate time length to naturalize in appearance depending on the amount of ground disturbance involved in rehabilitation activity. These routes are near to the Idaho roadless area perimeter and not visible from the interior of the Idaho roadless area.

Effects to Undeveloped: Shaded fuel break 16, partially located within the roadless area boundary, would be visible from locations within the Allan Mountain Idaho Roadless Area itself and from short segments of Highway 93. The fuel break feature would affect the perceived "undeveloped" characteristic of this part of the Idaho roadless area. These affects are created by the stumps and slash piles associated with this hand treatment. Thinning Units 35 and 184 and associated temporary roads are adjacent to this fuel break on unroaded lands which expands the amount of area perceived as "developed". The thinning units, however, are topographically screened from the Idaho roadless area interior and Highway 93. The effects would be diminished in the future (3-5 years) with the growth of new vegetation. These treatments would initially appear unnatural to recreation users. These effects are temporary and would diminish once thinned timber is removed and slash from the units burned.

Restoration treatments in mountain meadows, whitebark pine and aspen stands and application of prescribed broadcast burning and management of wildland fire events on the overall project area would be expected to maintain the undeveloped character of the Allan Mountain Idaho Roadless Area and unroaded lands.

Other decommissioned roads are close to the Allan Mountain Idaho Roadless Area perimeter near to other open system roads and the Highway 93 corridor so would not change the existing developed feel of their respective areas.

Effects to Opportunities for Solitude or Primitive and Unconfined Recreation: Thinning and shaded fuel break treatment activities west of Lost Trail Pass Ski area would have minimal effect on the current opportunities for solitude within the Allan Mountain Idaho Roadless Area and unroaded lands because these activities are occurring at the northern extent of the project area close to the Ski area and busy Highway 93 corridor. As mentioned in the Affected Environment section, solitude opportunities are excellent in the southern and western portion of the Idaho roadless area in the vicinity of Allan Mountain and the divide ridge between Idaho and Montana. Alternative 1 – Proposed Action activities are not expected to change these prospects because actions would primarily occur outside the Idaho roadless area and unroaded lands in previous timber harvest units and roads on adjacent lands to the east nearer to the North Fork drainage bottom. The opportunity for solitude and primitive recreation has already been diminished at the eastern and northern perimeters.

Implementation of restoration treatments, prescribed burns, management of wildland fire events and helicopter logging of thinning units along the North Fork drainage corridor would have short term effects on solitude. The sounds of aircraft and chainsaws used for the treatments and the sights of felled trees, slash piles and hand constructed fire lines would affect the ability of recreational users in the Idaho roadless area to feel as if they are alone and away from civilization. Areas were prescribed burn implementation and/or active management of a wildland fire event was occurring would likely be restricted from public entrance. These effects are temporary as they would only occur while restoration, prescribed burning and wildland fire events were underway. The potential to see other users would diminish as the forest recovers from the treatments and grass, shrubs and other vegetation begin to grow.

Effects to Special Features: Identified special features in this Idaho roadless area, the Allan Mountain Research Natural Area and Lost Trail Pass Ski Area would benefit from the fuels reduction thinning and landscape prescribed burning that are activities included in this alternative by reducing the risk of a high severity wildland fire event. In the case of the research natural area the botanical values tied to the

occurrence of subalpine larch stands would be maintained by potentially avoiding the impacts from a high-severity fire with lethal mortality to existing trees. The Lost Trail Pass Ski Area, with only a small acreage of permit area within the Idaho roadless area, would potentially avoid damage or loss of ski area facilities and snowfall capture characteristics in the event of large scale wildland fire. Suppression actions to protect the ski area from approaching fires in the future would likely result in reduced visual and recreation use impacts because of the benefits gained from fuel reduction thinning and prescribed burn implementation. Beneficial effects to whitebark pine communities, an ecologically important component of native vegetation, would also be anticipated to occur.

Effects to Manageability: No Idaho roadless area boundaries would be reduced or altered. Project activities under this alternative would not be expected to change the current condition of manageability of this Idaho roadless area.

Cumulative effects to Allan Mountain Idaho Roadless Area and unroaded lands

There is little visual or audio disturbance in the southern and western parts of the Idaho roadless area interior and from adjacent development due to the topography in the area. Additionally, due to the emphasis on keeping part of the area a reference landscape (research natural area), there has been no development and only limited effect from trail use and maintenance, recreation and outfitter guide use at Allan Mountain Lake. Under the 2009 Travel Plan decision, all motorized trails were retained resulting in no change in roadless/wilderness characteristics.

Cumulatively, the 99 acres of shaded fuel break in the Idaho roadless area (plus 23 acres in the Idaho roadless area and within the Lost Trail Pass Ski area) along with 164 acres of fuels reduction thinning with associated temporary roads and 133 acres of shaded fuel break on unroaded lands west of Lost Trail Pass Ski area would have little effect to the overall integrity of the Idaho roadless area or unroaded lands. These activities would occur adjacent or near the Ski area which receives heavy use and contributes noise to the area during the winter season. Firewood collection adjacent to open roads and logging activities associated with the Bitterroot National Forest’s sanitation and hazard tree removal project on Lost Trail’s special use permit area contribute to an already diminished solitude and primitive recreation opportunity in this vicinity.

Effects of past timber harvest and associate road development within eastern perimeter areas of the Idaho roadless area and unroaded lands are somewhat reversed by proposed road decommissioning, but does not improve the undeveloped feel because of existing open roads and active timber management on adjacent forest lands outside the Idaho roadless area and unroaded lands.

Restoration, broadcast burning and wildland fire management activities combined are expected to change the landscape appearance throughout the project area, these actions would be phased in over the life of the project. The visual appearance would eventually become more natural-appearing as treatments achieve their effect and vegetation regrows.

Table 71. Summary of past, present, and reasonably foreseeable activities in or near the Allan Mountain Idaho Roadless Area and unroaded lands[a]

	Activity	Acres/Miles	Description	Result
Past	Commercial harvest 1970s-1980s	140 acres	Visually evident on location, but not from Idaho roadless area interior	Effect to roadless/wilderness characteristics diminishing; activity was next to roadless boundary where open roads and other harvest areas exist
	Large fire history in Allan Mtn IRA and contiguous unroaded areas	Includes 730 ac in 1919, 1,085 ac in 2000, 1,752 ac in 2003. Most forest stands have been fire free since prior to 1919.	Wildfire activity is most noted as blackened ground surfaces and the presence of blackened or red-needled trees. Fire often creates natural appearing mosaics in the existing tree canopy. Effects tend to blend well with natural process in subsequent years after fire. Wildfires in 2000-2003 still visually dominate the local landscape because of high mortality in the tree overstory.	Wildfire can affect opportunities for solitude and remoteness by creating a more open landscape. In some ways, wildfire may actually increase the opportunity for primitive recreation by making it more difficult to travel cross country. Past wildfire activity has had visually evident, but limited effect on the wilderness characteristics of unroaded lands in the Upper North Fork HFRA Ecosystem Restoration Project area.
	Travel Plan Decision 2009	N/A	Closed system roads and areas restricting year round motorized use (except snow machine) under original travel plan were maintained in same status prohibiting public use in bordering areas.	Roadless characteristics in Idaho roadless area and unroaded lands maintained to limited degree by restricting motorized access to boundary zones and reducing sense of proximity to development.
Past, Present, Reasonably foreseeable	State Highway Transportation System- Road Construction, Maintenance, Use	Hwy 93 - 15.5 miles Hwy 43 - 1.3 miles outside of Idaho roadless areas /Unroaded areas	U.S. Highway 93 bisects length of project area; short segment of Montana Highway 43 at north end of project area. Traffic is expected to increase with time.	Year-round traffic on State Highway system has the most influential effect on roadless/unroaded lands adjacent/nearby to road corridors. Impacts are auditory and visual to Idaho roadless area and unroaded lands not screened by topography, vegetation
	Lost Trail Pass Ski area and Chief Joseph Pass Ski Trails	Northern perimeter of project area; outside of Idaho roadless areas/unroaded lands	O & M of Lost Trail Pass Ski area SUP and Nordic trailhead and trail system along Hwy 43	Winter recreation activities originating at Alpine and Nordic ski facilities adjacent to Allan Mtn Idaho roadless area boundary; off trail/run skiing and snow machine use occurring in Idaho roadless area and unroaded lands
	Firewood gathering	outside of Idaho roadless areas/unroaded lands	It is anticipated that many of the dead trees within close proximity of open system roads will be removed by local residents for firewood.	Often, roadways that have firewood removed appear messy, with slash piles and tree tops left randomly scattered. These effects may be noticed both from within Idaho roadless areas and from unroaded lands adjacent to Idaho roadless areas. The effects will diminish over time, but will initially create a visual change to forested areas where large patches of dead trees are removed.
Reasonably Foreseeable	Lost Trail Pass Sanitation Salvage Project (Bitterroot NF) on SUP are for Lost Trail Pass Ski Area	200 acres (Idaho); outside of Idaho roadless areas/unroaded lands	Sanitation/Hazard tree removal in forest stands with heavy insect infestation.	Little change or effect to roadless characteristics as the activity occurs adjacent to existing SUP ski area which has limited roadless character; removes individual or clumps of trees. Salvage/sanitation activities would be visually evident for a few years but will begin to blend with the surrounding environment after the area re-vegetates

a - Past, present, and reasonably foreseeable activities considered in cumulative effect analyses for this resource area obtained from the document titled: Upper North Fork HFRA Ecosystem Restoration Project Catalog of Activities and Actions for Consideration for Cumulative Effects Analysis 02/11/2012, in the project record.

Direct and Indirect Effects on Anderson Mountain Idaho Roadless Area #942

The Upper North Fork HFRA Ecosystem Restoration Project proposes shaded fuel breaks, directed fuels reduction thinning, wide-spread meadow restoration treatments and mixed severity prescribed burns within the boundary of the Anderson Mountain Idaho roadless area and unroaded lands. Fuels reduction activities emphasize the community protection zone adjacent to Moose Creek Estates, Royal Elk Ranch, Pierce Creek private lands and areas close to the Highway 93 corridor. In the Idaho roadless area are shaded fuel breaks 17a, 17b, 17d, 227 (71 acres), commercial thinning units 213-221, 225 (585 acres) with temporary roads (2.1 miles), meadows units 21-32 (1075 acres).

On unroaded lands are commercial thinning units 38b, 39, 40, 232, 233 (187 acres) with (1.2 miles) temporary roads in the northern area; shaded fuel break 17c (49 acres), commercial thinning units 218, 222, 224 (116 acres) with (2.4 miles) temporary roads in the central area; commercial thinning units 44, 50a, 50b, 50c, 234-237 (485 acres) with temporary roads (1.2 miles) plus a portion of shaded fuel break unit 227 (47 acres), and meadow restoration unit 32 (48 acres) in the south area. Restoration treatments to whitebark pine and aspen stands would also be accomplished where opportunities for these types of actions are encountered. Decommissioning of 1.7 miles of a system road that crosses and borders private lands along lower Pierce Creek and changing use designation of the Pierce Creek trail from open to motorcycles to nonmotorized are other planned actions. Proposed treatments in this part of the project area would result in short (<5 years) to mid-term (10 to 20 years) effects to wilderness characteristics within the Anderson Mountain Idaho roadless area and unroaded lands

Effects to Natural: The proposed shaded fuel breaks, fuels reduction thinning units and associated temporary roads in the Idaho roadless area and unroaded lands would initially create stumps, slash, forest canopy openings and roadways that would be noticeable. The units and activities would modify the natural integrity of the area until temporary roads are decommissioned and naturalized, and areas regenerate (generally 20 years or less). Shaded fuel breaks are anticipated to retain their open understory with maintenance treatments. The most extensive of these activities are immediately adjacent to Moose Creek Estates and other private lands at the North Fork and Pierce Creek confluence on the periphery of the Idaho roadless area and unroaded lands, adjacent to existing roads, development and previous fuels reduction. Restoration treatments in mountain meadows, whitebark pine and aspen stands would initially create tree stumps and slash that would rapidly diminish following pile and broadcast burning.

Prescribed broadcast burning and management of wildland fire events on the overall project area would be an attempt to mimic natural ecological processes and to move vegetation and landscapes towards conditions that would likely result if fire intervention had not occurred.

Proposed road decommissioning and motorized trail use change would eliminate a mechanized encumbrance that bisects the Idaho roadless area and unroaded lands with long term benefits to area natural integrity.

Overall, proposed fuels reduction actions would have short to mid-term impacts to perimeter areas which are near current development. Other proposed activities would also re-establish the natural appearance and wilderness characteristics of the interior of the Anderson Mountain Idaho Roadless Area and unroaded lands because burning, fires and restoration treatments would incrementally move the area toward a more historically natural condition. Alterations to vegetation species composition, density, and structural classes are positive results from mechanical treatments, prescribed burning and management of wildland fire events in forest stands. Tree vigor improvement from thinning and burning would serve to reduce susceptibility to insect and disease disturbances, drought effects and exhibit their normal fire adaptability and resilience. Ecosystem function and forest health are both expected to improve with treatments.

Effects to Undeveloped: Shaded fuel breaks, fuels reduction thinning units and associated temporary roads in the IRA and unroaded lands as mentioned above are located in close proximity to private lands and Highway 93 and 43 corridors which already have a "developed" feel. These activities are generally located on the mountain slopes immediately adjacent to the North Fork drainage and to various degrees topographically screened from view of the Anderson Mountain Idaho Roadless Area interior. In contrast, these activities would be visible from segments of Highway 93 and from locations within the Allan Mountain Idaho Roadless Area on the west side of the North Fork drainage. These affects are created by the stumps, landing slash piles and surface disturbances associated with temporary roads. These treatments would initially appear unnatural to recreation users. These effects are temporary and would diminish once thinned timber is removed, slash from the units removed or burned and roads decommissioned. The affects would be diminished in the future (5-20 years) with the growth of new vegetation.

Restoration treatments in mountain meadows, whitebark pine and aspen stands and application of prescribed broadcast burning and management of wildland fire events on the overall project area would be expected to maintain the undeveloped character of the Idaho roadless area and unroaded lands.

Decommissioning of the road along lower Pierce Creek and proposed motorized trail use change would contribute to an "undeveloped feel" of this drainage within the Idaho roadless area in the long term.

Prescribed burns and management of wildland fire events, both within and outside of the IRA, would be seen as blackened ground surfaces, blackened tree stumps and clumps of red-needled and fire killed trees. These effects would be temporary and would blend with other natural processes in subsequent years after treatment.

Effects to Opportunities for Solitude or Primitive and Unconfined Recreation: Vegetative treatments for fuels reduction and ecosystem restoration, prescribed burning and management of wildland fire events would open the forests on these landscapes and make it easier to view into and across them. This openness, particularly fuels reduction thinning, within the interior of the Anderson Mountain Idaho Roadless Area and unroaded lands, would impact feelings of solitude for recreation users within this area. Implementation of these actions would have a short-term effect on the solitude and remoteness in those areas. Overall these short-term effects would diminish once the activities are completed and as the forest recovers with new vegetation growth following thinning, prescribed and managed burning, and road decommissioning.

Opportunities for solitude would be temporarily impacted while the Anderson Mountain Idaho Roadless Area and unroaded lands are undergoing treatments. The sounds of chainsaws, machinery, and helicopters associated with logging and the sight of tree removal would affect the ability of recreation users on these unroaded lands to experience a sense of remoteness only during implementation activities. However, the areas of proposed treatment already exhibit minimal feeling of remoteness and solitude because of proximity to private land and development, and year-round traffic on Highways 93 and 43.

Effects to Special Features: The Continental Divide National Scenic Trail coincides with the alignment of the Anderson Mountain Road #60081 along the eastern boundary of the project area and the Anderson Mountain Idaho Roadless Area. This trail/road corridor would benefit from the fuels reduction thinning and landscape prescribed burning that are activities included in this alternative by reducing the risk of a high severity wildland fire event. The trail/road corridor is situated in a strategic location for fire suppression actions to control a wildland fire occurring in this vicinity. Without fuels/risk reduction actions, control lines constructed by dozer and broad width shaded fuel breaks are likely features to be created in such areas. This would greatly change the recreation experience of Continental Divide National Scenic Trail users traveling this area after high severity wildland fire event. Beneficial effects to

whitebark pine communities, an ecologically important component of native vegetation, would also be anticipated to occur.

Effects to Manageability: No Idaho roadless area boundaries would be reduced or altered. Project activities under this alternative would not be expected to change the current condition of manageability of this Idaho roadless area.

Cumulative effects to Anderson Mountain Idaho Roadless Area and unroaded areas

The Anderson Mountain Idaho Roadless Area and unroaded lands are essentially natural appearing with human influences on natural integrity being low. At the same time the proximity of these roadless and unroaded lands to Moose Creek Estates, a developing residential tract, and other private lands along the North Fork and Pierce Creek bottoms, Highway 93 and 43 corridors and use designation on the Pierce Creek trail impart a developed feel to primarily perimeter areas while providing only moderate opportunities for solitude. No special features are present in what are considered common landscapes.

Cumulatively, the proposed 1,579 acres of fuels reduction activities and associated 6.9 miles of temporary along with restoration actions designed to address wildfire risks to private property, public transportation corridors, and ecosystem health/resilience would create substantial change to the roadless characteristics of the Anderson Mountain Idaho Roadless Area and unroaded lands. Mechanical treatments for fuels reduction and companion temporary roading have the majority of this impact to aspects of natural integrity, undeveloped environment. As previously mentioned, these affects are short to mid-term in duration with full recovery expected following project completion, road decommissioning and vegetation reestablishment. Prescribed burning, management of wildland fires, and restoration treatments for mountain meadows, whitebark pine and aspen stands are expected to improve the overall natural integrity of the IRA over time by returning fire into the ecosystem. Opportunities for solitude and primitive recreation would not change appreciably from current conditions because of impacts already associated with private lands and highway corridors, but some improvement is anticipated with the decommissioning of the road in lower Pierce Creek and use designation change on the trail route.

Table 72. Summary of past, present, and reasonably foreseeable activities in or near the Anderson Mountain Idaho Roadless Area and unroaded lands

	Activity	Acres/Miles	Description	Result
Past	Commercial harvest	Acres – none in Idaho roadless area; 2 acres in northern unroaded lands area	Visual evidence of timber stand management with roads and openings in forest canopy	Roadless/wilderness characteristics of Idaho roadless area and unroaded lands have not been impacted or have recovered from past harvest entries.
	Large fire history in Anderson Mountain Idaho Roadless Area and contiguous unroaded areas	None in project area	Blackened ground surfaces, presence of blackened or red-needled trees, openings and/or natural appearing mosaics in the existing tree canopy.	Wildfires have not occurred or have effectively been excluded for last 100 years on this portion of the landscape. Natural integrity, remoteness, opportunities for solitude and primitive recreation may appear to be unaffected, but in fact may be uncharacteristic for this forested environment.
	Travel Plan Decision 2009	Pierce Creek Road #60082 and Trail #6121 (1.7 miles road, 1.9 miles trail)	Trail status regarding motorized use under original travel plan not readily evident; current travel plan designated this road as open to all vehicles and trail to motorcycles only	Roadless characteristics in Idaho roadless area and central unroaded lands area impacted by these motorized routes bisecting the area; integrity, sense of solitude and undeveloped feel diminished to limited degree by route presence.
Past, Present, Reasonably foreseeable	State Highway Transportation System- Road Construction, Maintenance, Use	Hwy 93 - 15.5 miles Hwy 43 - 1.3 miles	U.S. Highway 93 bisects length of project area; short segment of Montana Highway 43 at north end of project area. Traffic is expected to increase with time.	Year-round traffic on State Highway system has the most influential effect on roadless/unroaded lands adjacent/nearby to road corridors. Impacts are auditory and visual to IRA and unroaded lands not screened by topography, vegetation.
	Private Lands – Development, Occupancy & Uses	392 acres along North Fork, Pierce Creek; adjacent to Idaho roadless area and unroaded lands	Moose Creek Estates-two residences, Royal Elk Ranch-several residential structures and cabins, Pierce Creek private land parcel with no structures	Moose Creek Estates, a gated low-density planned development, has conducted extensive logging and thinning on 200 acre property in last 10-20 years; additional residences in planning; received certification as Fire-Wise Community. Human activity has blended well with surroundings but contributes to visual and auditory impacts of North Fork river corridor to Idaho roadless area which is immediately adjacent to private property.
	Continental Divide National Scenic Trail Maintenance & Use	East boundary of Anderson Mountain Idaho Roadless Area and project area	Scenic Trail is co-located with Anderson Mountain Road #60081, a route open to all vehicles	Sight and sounds of vehicle use of this route are evident year round in adjoining perimeter area. Accessible to all wheeled vehicles during non-snow season; utilized for winter recreation activities by over the snow machines and Nordic skiers; no groomed routes are present.
	Lost Trail Pass Ski area and Chief Joseph Pass Ski Trails	Northern perimeter of project area; outside Idaho roadless area and unroaded lands	O & M of Lost Trail Pass Ski area SUP; Cross Country ski trailhead and trail system at Chief Joseph Pass along Hwy 43	Winter recreation activities originating at Nordic ski facilities with primary use to north in Montana; skiing and over the snow machine use occurring along Continental Divide Trail/Anderson Mtn Road in Idaho roadless area and unroaded lands; Lost Trail Pass ski area visible from Idaho roadless area and unroaded lands
	Firewood gathering	Outside Idaho roadless area and unroaded lands	It is anticipated that many of the dead trees within close proximity of open system roads will be removed by local residents for firewood.	Often, roadways that have firewood removed appear messy, with slash piles and tree tops left randomly scattered. These effects may be noticed from within the Idaho roadless area and from unroaded lands adjacent to the Idaho roadless area. The effects will diminish over time, but will initially create a visual change to forested areas where large patches of dead trees are removed.

	Activity	Acres/Miles	Description	Result
Reasonably Foreseeable	Lost Trail Pass Sanitation Salvage Project (Bitterroot NF) on SUP are for Lost Trail Pass Ski Area	200 acres (Idaho); outside Idaho roadless area and unroaded lands	Sanitation/Hazard tree removal in forest stands with heavy insect infestation.	Little change or effect to roadless characteristics of Idaho roadless area and unroaded lands; activity occurs adjacent to existing SUP ski area on opposite mountain slope, at distance from Idaho roadless area; removes individual or clumps of trees. Salvage/sanitation activities would be visually evident for a few years but will begin to blend with the surrounding environment after the area re-vegetates

Direct and Indirect Effects on West Big Hole Idaho Roadless Area #943

There are no specific, pre-identified vegetative treatments, but extensive prescribed burning is proposed within the West Big Hole Idaho Roadless Area and small unroaded lands area. Undelineated whitebark pine and aspen stands are possible occurrences within the Idaho roadless area where hand felling, restoration thinning treatments may be conducted. Parts of several designated old growth stands are located in the Idaho roadless area and unroaded lands where hand, pre-treatment pruning and limb-up are likely to occur prior to prescribed burning. One short segment of non-system road intrusion in the Idaho roadless area (0.1 miles) has been identified for decommission treatment.

Effects to Natural: Since activities proposed within the West Big Hole Idaho Roadless Area and unroaded lands are primarily restoration related, the effect to the natural wilderness character of the area would generally be beneficial with improvement in the current condition. The activities are designed to maintain or restore natural processes and retain species in decline (aspen and whitebark pine) on the landscape.

Stumps, slash, small openings and blackened/fire killed trees would be visible following treatment. Over time these disturbances would revegetate and would regain their natural looking character.

Effects to Undeveloped: The portion of the Idaho roadless area and unroaded lands within the Upper North Fork HFRA Ecosystem Restoration project area would not be visible from locations within the larger West Big Hole Idaho Roadless Area immediately to the south because of topographic screening. Recreation users in the roadless area within the project area are already adjacent to and within full view of past timber management units and associated roading in the entire Lick Creek drainage. This existing condition of highly developed feel (versus physical presence) would not likely change in the short or mid-term because of other proposed project treatments planned for this managed landscape in Lick Creek. Pre-commercial and non-commercial thinning, restoration treatments for meadows, whitebark pine and aspen stands, road decommissioning and seasonal closure, prescribed burning and management of wildland fire would occur over most of the area outside of the roadless area and unroaded areas. Though the effects of these activities would be temporary in nature, active management of forest vegetation and retention of the road transportation network in Lick Creek is anticipated for the foreseeable future.

Effects to Opportunities for Solitude, Remoteness, and Primitive Recreation: Fuels reduction and restoration activities would affect the opportunities for solitude on the project area portion of the roadless area and unroaded lands. The sounds of chainsaws and machinery used for thinning, road decommissioning, and restoration actions and prescribed burning, along with the sights of personnel implementing these activities would temporarily affect the ability of recreationists in the unroaded areas to experience solitude. However, this area already exhibits little feeling of remoteness and solitude because of the existing roads, some which are open to all vehicles year round, and the associated amount of dispersed recreation, fuelwood gathering and hunting that occurs along these roads outside the IRA and unroaded lands.

Effects to Special Features: No special features are present in the project area portion of this Idaho roadless area. As mentioned previously in the Affected Environment section, this Idaho roadless area overall has a number of special features including: the Continental Divide National Scenic Trail Corridor, outstanding scenery, two Research Natural Areas and about 2,000 acres of the Salmon River Wild and Scenic River corridor. In summary the project area portion of the West Big Hole Idaho Roadless Area provides no contribution to the presence or condition of the special features and values attribute, so this alternative would have no effect to this attribute.

Effects to Manageability: No Idaho roadless area boundaries would be reduced or altered. Project activities under this alternative would not be expected to change the current condition of manageability of this Idaho roadless area.

Cumulative effects to West Big Hole IRA and unroaded lands

In general, the interior of the West Big Hole Idaho Roadless Area provides a large area with little past activity. However, extensive human activity has occurred in the Lick Creek drainage on the outer perimeter of the West Big Hole Idaho Roadless Area and unroaded lands within the project area.

Approximately 2,175 acres of the forest overstory received harvest varying from partial removal to clearcut harvest by various logging methods between 1960s and 1990s. These areas have since revegetated to varying degrees but are visually noticeable to the casual user. These activities are located near or surrounding existing roads and not located within the Idaho roadless area itself, but are within unroaded lands adjacent to the Idaho roadless area.

There are multiple miles of low standard, system roads throughout the Lick Creek drainage some of which are closed. An extensive network of non-system roads are present from past timber harvest entries as well. While they are still visible, many of the roads remain closed to motorized travel through the 2009 Travel Plan.

Hard rock mining exploration occurred throughout the Lick Creek drainage with scattered diggings still visible. A 20 acre land parcel was patented near the Lick Creek bottom in the upper 1/3 of the drainage. Remnants of surface trenching and workings and a cabin are present on the private parcel. Disturbances have stabilized and revegetated to a moderate extent. No current activity or occupancy is known.

Cumulatively, the proposed 565 acres of prescribed burning, management of wildland fires, 0.1 miles of non-system road decommissioning and possible restoration actions in whitebark pine and aspen stands would yield a slight beneficial improvement to the roadless characteristics of the project area portion of the West Big Hole Idaho Roadless Area and unroaded lands. This expected enhancement relates to the overall natural integrity of the roadless area over time by returning fire into the ecosystem in the project area. Opportunities for solitude and primitive recreation would not change appreciably from current conditions because of impacts already associated with public uses and Forest Service management for multiple uses of National Forest System lands outside the Idaho roadless area in the Lick Creek drainage.

Table 73. Summary of past, present, and reasonably foreseeable activities in or near the West Big Hole Idaho Roadless Area and unroaded lands

	Activity	Acres/Miles	Description	Result
Past	Commercial harvest 1960s - 1990s	5 acres within Idaho roadless area; 2,175 acres outside Idaho roadless area	Visually evident from Idaho roadless area interior in project area, but none occurred in Idaho roadless area or unroaded lands	Indirect effect to roadless/wilderness characteristics still visible/evident; activity was adjacent/outside Idaho roadless area boundary.
	Large fire history in West Big Hole Idaho Roadless Area and unroaded lands	None in project area	Blackened ground surfaces, presence of blackened or red-needled trees, openings and/or natural appearing mosaics in the existing tree canopy.	Wildfires have not occurred or have effectively been excluded for last 100 years on this portion of the landscape. Natural integrity, remoteness, opportunities for solitude and primitive recreation may appear to be unaffected, but in fact may be uncharacteristic for this forested environment.
	Travel Plan Decision 2009		Closed system roads and areas restricting year round motorized use (except snow machine) under original travel plan were maintained in same status prohibiting public use in bordering areas.	Roadless characteristics in Idaho roadless area and unroaded lands maintained to limited degree by restricting motorized access to boundary zones and reducing sense of proximity to development.
Past, Present, Reasonably foreseeable	State Highway Transportation System- Road Construction, Maintenance, Use	Hwy 93 - 15.5 miles; outside Idaho roadless area and unroaded lands	U.S. Highway 93 bisects length of project area. The Highway is 1 to 3 miles from Idaho roadless area /unroaded lands and screened from view by topography. Traffic is expected to increase with time.	Year-round traffic on State Highway system has minimal effect on Idaho roadless area /unroaded lands in the project area. Impacts are auditory from distance as areas are screened from view by topography.
	Forest Transportation System – Open, Closed, Non-system Routes in the Lick Creek drainage	10.9 miles open, 9.2miles closed, 20.6 miles non-system; outside Idaho roadless area and unroaded lands	O & M, use of transportation system routes in the Lick Creek drainage for administrative and public motorized access to forest administered and private lands	Motorized use of transportation network in Lick Creek drainage has readily evident visual and auditory effect to locations within the project area portion of the Idaho roadless area and unroaded lands. Year-round traffic is low volume, but likely frequent based on proximity to development and residences along North Fork river corridor.
	Firewood gathering	Outside Idaho roadless area and unroaded lands	It is anticipated that many of the dead trees within close proximity of open system roads will be removed by local residents for firewood.	Often, roadways that have firewood removed appear messy, with slash piles and tree tops left randomly scattered. These effects could be noticed from within the Idaho roadless area and s unroaded lands. The effects would diminish over time, but could initially create a visual change to forested areas where large patches of dead trees are removed.

Environmental Consequences summary for Alternative 1 – Proposed Action by issue indicator:

- Miles of new temporary road constructed within Idaho roadless areas – 2.2 miles
- Acres harvested (cutting) outside community protection zones within Idaho roadless areas – 2 acres (thin); 1190 acres (meadows)

Alternative 2 – No New Temporary Road Construction

Summary

Alternative 2 differs from the Proposed Action in that no new temporary road construction would occur in Idaho roadless areas and unroaded lands.

Vegetation Treatments

Existing road prisms may still be used as temporary roads. All proposed harvest units which are not accessible without the new temporary road construction would either be dropped, have modified unit boundaries, or harvest system changed to be suitable with the available road system. Harvest activities in Idaho roadless area and unroaded lands in alternative 2 include commercially thinning from below to reduce the understory on approximately 1,569 acres, and 6 acres of pre-commercial thinning.

Strategically located shaded fuel break treatments would occur on approximately 481 acres in Idaho roadless area and unroaded lands in alternative 2.

Roads

In alternative 2 less than 0.1 miles of existing temporary road in the Lost Trail Pass Ski area and 0.7 miles of existing temporary road in an area of unroaded lands are proposed to be used. In addition 3.0 miles of existing roads in Idaho roadless area and 0.2 miles in unroaded lands are proposed for decommissioning.

Other features of alternative 2 relating to roads which are located outside of Idaho roadless area and unroaded lands and not included in this analysis include: 11.6 miles of existing unclassified roads to be used as temporary roads rather than completely new construction; approximately 61.5 miles of non-system roads and 6.4 miles of closed system roads to be decommissioned; the Hammerean Loop Road would no longer be a loop; National Forest System Road 60078A would be seasonally closed for elk security from September 30th through May 21st; and the Pierce Creek Trail would be converted to a nonmotorized use trail (figure 28).

Table 74 presents a detailed summary of treatment acres and miles to facilitate disclosure of environmental consequences of alternative 2 on individual roadless areas and unroaded areas within the Upper North Fork HFRA Ecosystem Restoration Project Area.

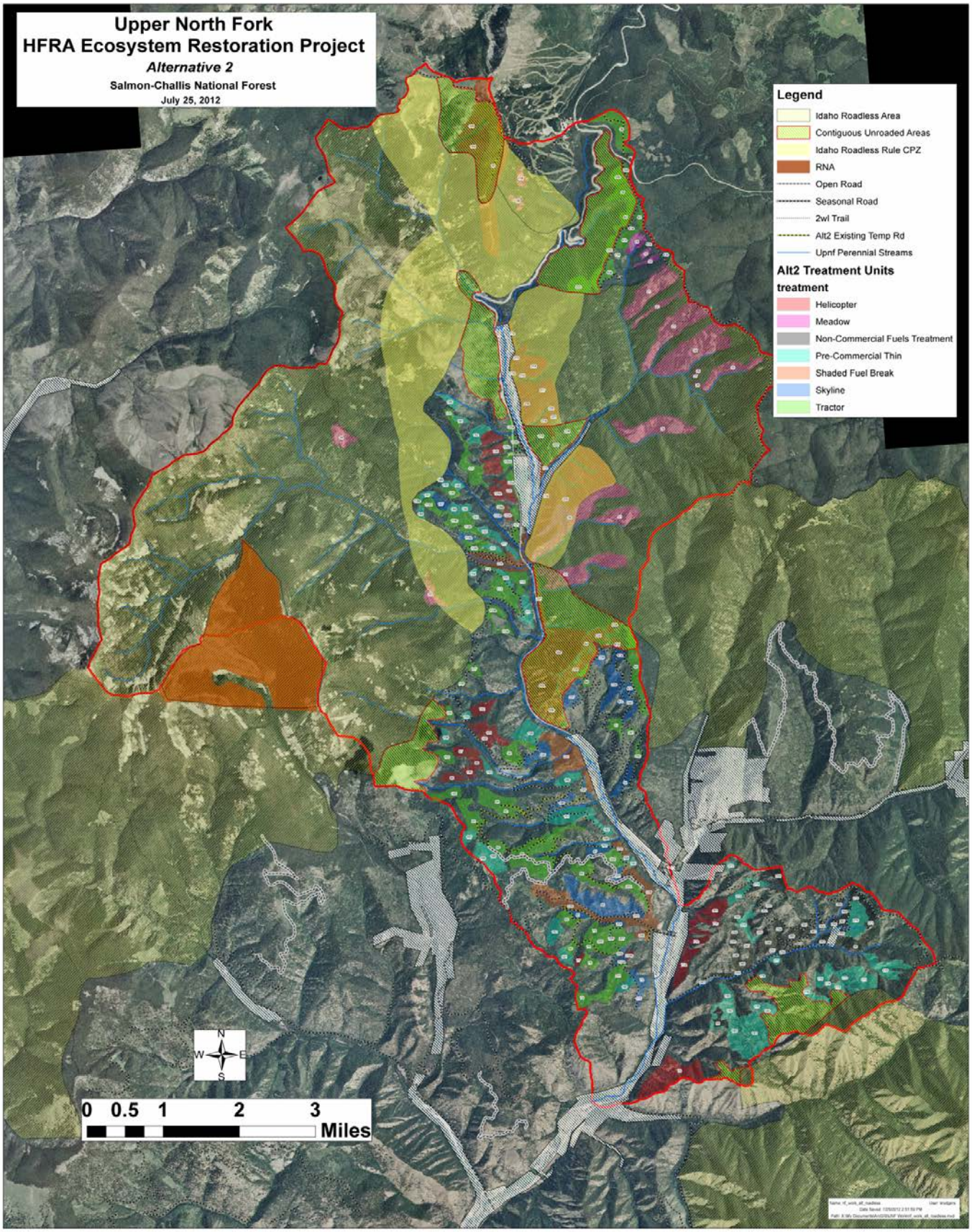


Figure 28. Alternative 2 – no new temporary roads

Table 74. Alternative 2 – summary of proposed treatments with no new temporary roads - Idaho Roadless Areas and unroaded lands

Idaho Roadless Area	Idaho Roadless Rule Exception	Rx Burn (Acres)	Pre-commercial Thin (acres)	Fuel Breaks (Acres)	Non-commercial Fuel Treatment (Acres)	Commercial Thinning (acres)	Meadow Restoration	Temporary Road Construction	Road Decommissioning
Allan Mountain #946	294.24(c)(1)(i) & (ii) CPZ timber	0	2	99	0	0	0	0	0
	294.24(c)(1)(iii) & (iv) Ecosystem restoration	0	0	0	0	0	81	0	0
	294.23(b)(2) & (3) CPZ roads	0	0	0	0	0	0	0	0
	294.24(c)(vii)[a] Incidental to	14,992	0	0	0	0	0	0	2.3
	294.28(f) FPSA – ski area[b]	409	0	23	0	0	34	0.1	0
	Unroaded Lands	1,559	0	193	0	104	0	0.7	0.2
Anderson Mountain #942	294.24(c)(1)(i) & (ii) CPZ timber	0	0	70	0	583	0	0	0
	294.24(c)(1)(iii) & (iv) Ecosystem restoration	0	0	0	0	2	1,075	0	0
	294.23(b)(2) & (3) CPZ roads	0	0	0	0	0	0	0	0
	294.24(c)(vii)[a] Incidental to	6,556	0	0	0	0	0	0	0.6
	Unroaded Lands	1,803	0	96	0	788	48	0	0
West Big Hole #943	294.24(c)(vii)[a] Incidental to	204	0	0	0	0	0	0	0.1
	Unroaded Lands	361	4	0	0	0	0	0	0
Total	**in Idaho Roadless Areas**	**22,161**	**2**	**192**	**0**	**585**	**1,190**	**0**	**3**
Total	**Unroaded Lands**	**3,723**	**4**	**289**	**0**	**892**	**48**	**0.7**	**0.2**

a - The Idaho Roadless Rule does not apply to prescribed burning except to the degree that cutting trees for firelines is considered incidental to an management activity not otherwise prohibited (73 FR 201 [61463]).

b. – The Idaho Roadless Rule restrictions do not apply to Forest Plan Special Areas (73 FR 201 [61489]), but activities occurring in the Lost Trail Ski area within an IRA are reflected in this table.

Direct and Indirect Effects to Allan Mountain IRA #946

Alternative 2 of the Upper North Fork HFRA Ecosystem Restoration Project proposes limited vegetative treatments and extensive prescribed burning within the Allan Mountain Idaho Roadless Area and unroaded lands similar to alternative 1. These activities would also produce similar direct and indirect effects to the wilderness characteristics of roadless areas. Shaded Fuel Break 16, adjacent Lost Trail Pass Ski area, is partially in the Idaho roadless area (122 acres centered on a dozer line and associated cleared strip from fire suppression actions in 2000); Meadow Restoration Units 33, 34, 138, 139 (115 acres) and additional areas of undelineated meadow, whitebark pine and aspen stand occurrences are also within the Idaho roadless area; 2.3 miles of closed and non-system roads are slated for decommissioning in the IRA. On unroaded lands there would be commercial thinning unit 184 (104 acres), shaded fuel break 16 (193 acres) with 0.7 miles associated temporary road use, and non-system roads to be decommissioned totaling 0.2 miles.

Effects to Natural: Effect to the natural integrity of the area would be the same as alternative 1 and primarily be limited to perimeter areas where thinning, fuel break and road decommissioning are located. The interior/core of the Idaho roadless area would have minimal impacts.

The shaded fuel break and thinning units would initially create noticeable stumps, slash and a degree of opening in the overstory canopy. The vegetation would appear patchy to somewhat uniform following initial harvest, but with green trees remaining. Thinning units would recover quickly as young trees and shrubs replace existing vegetation, but the shaded fuel break would retain its open understory with anticipated maintenance treatments. Mechanical treatments, prescribed burning and management of wildland fire events in forest stands is expected to alter vegetation species composition, density, and structural classes to conditions closer to historic circumstances. Tree vigor improvement from thinning and burning would serve to reduce susceptibility to insect and disease disturbances, drought effects and exhibit their normal fire adaptability and resilience. Overall, ecosystem function and forest health are both expected to improve with treatments.

Restoration treatments in mountain meadows, whitebark pine and aspen stands would initially create tree stumps and slash that would rapidly diminish following pile and broadcast burning. Application of prescribed broadcast burning and management of wildland fire events on the overall project area would be expected to re-establish a more natural appearance to the Idaho roadless area and unroaded lands.

Decommissioned closed system and non-system roads would take a short to moderate time length to naturalize in appearance depending on the amount of ground disturbance involved in rehabilitation activity. These routes are near to the roadless area perimeter and not visible from the interior of the roadless area.

Effects to Undeveloped: Shaded fuel break 16, partially located within the Idaho roadless area boundary, would be visible from locations within the Allan Mountain Idaho Roadless Area itself and from short segments of Highway 93. The fuel break feature would affect the perceived “undeveloped” characteristic of this part of the Idaho roadless area. These affects are created by the stumps and slash piles associated with this hand treatment. Helicopter thinning unit 184 is adjacent to this fuel break on unroaded lands which expands the amount of area perceived as “developed”. This thinning unit is topographically screened from the Idaho roadless area interior and Highway 93. The effects would be diminished in the future (3-5 years) with the growth of new vegetation. These treatments would initially appear unnatural to recreation users. These effects are temporary and would diminish once thinned timber is removed and slash from the units burned.

Restoration treatments in mountain meadows, whitebark pine and aspen stands and application of prescribed broadcast burning and management of wildland fire events on the overall project area would be expected to maintain the undeveloped character of the Idaho roadless area and unroaded lands.

Other decommissioned roads are close to the roadless area perimeter near to other open system roads and the Highway 93 corridor so would not change the existing developed feel of their respective areas.

Effects to Opportunities for Solitude or Primitive and Unconfined Recreation: Thinning and shaded fuel break treatment activities west of Lost Trail Pass Ski area would have minimal effect on the current opportunities for solitude within the Allan Mountain Idaho Roadless Area and unroaded lands because these activities are occurring at the northern extent of the project area close to the ski area and busy Highway 93 corridor. As mentioned in the Affected Environment section, solitude opportunities are excellent in the southern and western portion of the Idaho roadless area in the vicinity of Allan Mountain and the divide ridge between Idaho and Montana. Alternative 2 activities should not change these prospects because actions would primarily occur outside of the Idaho roadless area and unroaded lands, and in previous timber harvest units and along existing roads on adjacent lands to the east nearer to the North Fork drainage bottom. The opportunity for solitude and primitive recreation has already been diminished at the eastern and northern perimeters.

Implementation of restoration treatments, prescribed burns, management of wildland fire events and helicopter logging of thinning units along the North Fork drainage corridor and west of Lost Trail Pass Ski area would have short term effects on solitude. The sounds of aircraft and chainsaws used for the treatments and the sights of felled trees, slash piles and hand constructed fire lines would affect the ability of recreational users in the Idaho roadless area to feel as if they are alone and away from civilization. Areas where prescribed fire or active management of a wildland fire event was occurring would likely be closed to the public. These effects are temporary as they would only occur while restoration, prescribed burning and wildland fire events were underway. The potential to see other users would diminish as the forest recovers from the treatments and grass, shrubs and other vegetation begin to grow.

Effects to Special Features: Identified special features in this Idaho roadless area, the Allan Mountain Research Natural Area and Lost Trail Pass Ski Area would benefit from the fuels reduction thinning and landscape prescribed burning that are activities included in this alternative by reducing the risk of a high severity wildland fire event. In the case of the research natural area the botanical values tied to the occurrence of subalpine larch stands would be maintained by potentially avoiding the impacts from a high-severity fire with lethal mortality to existing trees. The Lost Trail Pass Ski Area, with only a small acreage of permit area within the Idaho roadless area, would potentially avoid damage or loss of ski area facilities and snowfall capture characteristics in the event of large scale wildland fire. Suppression actions to protect the ski area from approaching fires in the future would likely result in reduced visual and recreation use impacts because of the benefits gained from fuel reduction thinning and prescribed burn implementation. Beneficial effects to whitebark pine communities, an ecologically important component of native vegetation, would also be anticipated to occur.

Effects to Manageability: No Idaho roadless area boundaries would be reduced or altered. Project activities under this alternative would not be expected to change the current condition of manageability of this Idaho roadless area.

Cumulative effects to Allan Mountain Idaho Roadless Area and unroaded lands

As noted above there is little visual or audio disturbance in the southern and western parts of the Idaho roadless area interior and from adjacent development due to the topography in the area. Additionally, due to the emphasis on keeping part of the area a reference landscape (research natural area), there has been

no development and only limited effect from trail use and maintenance, recreation and outfitter guide use at Allan Mountain Lake. Under the 2009 Travel Plan decision, all motorized trails were retained resulting in no change in roadless/wilderness characteristics.

Cumulatively as with alternative 1, the 99 acres of shaded fuel break in the Idaho roadless area (plus 23 acres in the Idaho roadless area and within the Lost Trail Pass Ski area), 193 acres of shaded fuel break and 104 acres of fuels reduction thinning (with no temporary roads) on unroaded lands west of Lost Trail Pass ski area would have little effect to the overall integrity of the Idaho roadless area or unroaded lands. These activities would occur adjacent or near the ski area which receives heavy use and contributes noise to the area during the winter season. Firewood collection adjacent to open roads and logging activities associated with the Bitterroot National Forest's sanitation/hazard tree removal project on Lost Trail's special use permit area contribute to an already diminished solitude and primitive recreation opportunity in this vicinity. Natural integrity of the unroaded lands receiving thinning with helicopter removal instead of 2.2 miles of temporary road would be expected to recover in a shorter period of time.

Effects of past timber harvest and associate road development within eastern perimeter areas of the roadless area and unroaded areas are somewhat reversed by proposed road decommissioning, but does not improve the undeveloped feel because of existing open roads and active timber management on adjacent forest lands outside the roadless area.

Restoration, broadcast burning and wildland fire management activities combined are expected to change the landscape appearance throughout the project area, these actions would be phased in over the life of the project. The visual appearance would eventually become more natural-appearing as treatments achieve their effect and vegetation regrows.

Table 75. Summary of past, present, and reasonably foreseeable activities in or near the Allan Mountain Idaho Roadless Area and unroaded lands

	Activity	Acres/Miles	Description	Result
Past	Commercial harvest 1970s – 1980s	140 acres	Visually evident on location, but not from Idaho roadless area interior	Effect to roadless/wilderness characteristics diminishing; activity was next to Idaho roadless area boundary where open roads and other harvest areas exist
	Large fire history in Allan Mtn Idaho Roadless Area and unroaded lands	Includes 730 ac in 1919, 1085 ac in 2000, 1752 ac in 2003. Most forest stands have been fire free since prior to 1919.	Wildfire activity is most noted as blackened ground surfaces and the presence of blackened or red-needled trees. Fire often creates natural appearing mosaics in the existing tree canopy. Effects tend to blend well with natural process in subsequent years after fire. Wildfires in 2000-2003 still visually dominate the local landscape because of high mortality in the tree overstory.	Wildfire can affect opportunities for solitude and remoteness by creating a more open landscape. In some ways, wildfire may actually increase the opportunity for primitive recreation by making it more difficult to travel cross country. Past wildfire activity has had visually evident, but limited effect on the wilderness characteristics of unroaded lands in the Upper North Fork HFRA Ecosystem Restoration Project area.
	Travel Plan Decision 2009		Closed system roads and areas restricting year round motorized use (except snow machine) under original travel plan were maintained in same status prohibiting public use in bordering areas.	Roadless characteristics in Idaho roadless area and unroaded lands maintained to limited degree by restricting motorized access to boundary zones and reducing sense of proximity to development.
Past, Present, Reasonably foreseeable	State Highway Transportation System-Road Construction, Maintenance, Use	Hwy 93 - 15.5 miles Hwy 43 - 1.3 miles; outside Idaho roadless area and unroaded lands	U.S. Highway 93 bisects length of project area; short segment of Montana Highway 43 at north end of project area. Traffic is expected to increase with time.	Year-round traffic on State Highway system has the most influential effect on Idaho roadless area /unroaded lands adjacent/nearby to road corridors. Impacts are auditory and visual to Idaho roadless area and unroaded lands not screened by topography, vegetation
	Lost Trail Pass Ski area and Chief Joseph Pass Ski Trails	Northern perimeter of project area; outside Idaho roadless area and unroaded lands	O & M of Lost Trail Pass Ski area SUP and Nordic trailhead and trail system along Hwy 43	Winter recreation activities originating at Alpine and Nordic ski facilities adjacent to Allan Mtn Idaho roadless area boundary; off trail/run skiing and snow machine use occurring in Idaho roadless area and unroaded lands
	Firewood gathering	Outside Idaho roadless area and unroaded lands	It is anticipated that many of the dead trees within close proximity of open system roads will be removed by local residents for firewood.	Often, roadways that have firewood removed appear messy, with slash piles and tree tops left randomly scattered. These effects will be noticed from within the Idaho roadless area and from unroaded lands adjacent to the Idaho roadless area. The effects will diminish over time, but will initially create a visual change to forested areas where large patches of dead trees are removed.
Reasonably Foreseeable	Lost Trail Pass Sanitation Salvage Project (Bitterroot NF) on SUP are for Lost Trail Pass Ski Area	200 acres (Idaho); outside Idaho roadless area and unroaded lands	Sanitation/Hazard tree removal in forest stands with heavy insect infestation.	Little change or effect to roadless characteristics as the activity occurs adjacent to existing SUP ski area which has limited roadless character; removes individual or clumps of trees. Salvage/sanitation activities would be visually evident for a few years but will begin to blend with the surrounding environment after the area re-vegetates

Direct and Indirect Effects to Anderson Mountain Idaho Roadless Area #942

Alternative 2 would result in shaded fuel breaks, directed fuels reduction thinning, wide-spread meadow restoration treatments and mixed severity prescribed burns within the boundary of the Anderson Mountain Idaho Roadless Area and unroaded lands. As with alternative 1, fuels reduction activities emphasize the community protection zone adjacent to Moose Creek Estates, Royal Elk Ranch, Pierce Creek private lands and areas close to the Highway 93 corridor. In the Idaho roadless area are shaded fuel breaks 17a, 17b, 17d, 227 (71 acres), commercial helicopter thinning units 213-221, 225 (585 acres), and meadows units 21-32 (1075 acres). On unroaded lands are commercial thinning units 39b, 39, 40, 232, 233 (187 acres) with (1.2 miles) temporary roads in the northern area; shaded fuel break 17c (49 acres), commercial thinning units 218, 222, 224 (116 acres) with helicopter removal in the central area; commercial helicopter thinning units 44, 50a, 50b, 50c, 234-237 (485 acres), plus a portion of shaded fuel break unit 227 (47 acres), and meadow restoration unit 32 (48 acres) in the south area. Restoration treatments to whitebark pine and aspen stands would also be implemented where opportunities for these types of actions are encountered. 1.7 miles of a system road that crosses and borders private lands along lower Pierce Creek would be decommissioned and Pierce Creek trail would become nonmotorized.

Again, alternative 2 proposes similar fuels reduction treatments within the Idaho roadless area and unroaded lands as in alternative 1 except without new temporary roads. Proposed treatments in this part of the project area would result in short (less than 5 years) to mid-term (10 to 20 years) effects to wilderness characteristics within the Anderson Mountain Idaho Roadless Area and unroaded lands.

Effects to Natural: The proposed shaded fuel breaks, fuels reduction thinning units in the Idaho roadless area and unroaded lands would initially create stumps, slash, and forest canopy openings that would be noticeable. The units and activities would modify the natural integrity of the area until treatment units naturalized and vegetation recovered (generally less than 20 years). Shaded fuel breaks are anticipated to retain their open understory with maintenance treatments. The most extensive of these activities are immediately adjacent to Moose Creek Estates and other private lands at the North Fork and Pierce Creek confluence on the periphery of the Idaho roadless area /unroaded lands, adjacent to existing roads, development and previous fuels reduction. Restoration treatments in mountain meadows, whitebark pine and aspen stands would initially create tree stumps and slash that would rapidly diminish following pile and broadcast burning.

Application of prescribed broadcast burning and management of wildland fire events on the overall project area would be an attempt to mimic natural ecological processes and to move vegetation and landscapes towards conditions that would likely result if fire intervention had not occurred.

Proposed road decommissioning and motorized trail use change would eliminate a mechanized encumbrance that bisects the Idaho roadless area and unroaded lands with long term benefits to area natural integrity.

Overall, proposed fuels reduction actions would have short to mid-term impacts to perimeter areas which are near current development. Other proposed activities would also re-establish the natural appearance and wilderness characteristics of the interior of the Anderson Mountain Idaho Roadless Area and unroaded lands because burning, fires and restoration treatments would incrementally move the area toward a more historically natural condition. Alterations to vegetation species composition, density, and structural classes are positive results from mechanical treatments, prescribed burning and management of wildland fire events in forest stands. Tree vigor improvement from thinning and burning would serve to reduce susceptibility to insect and disease disturbances, drought effects and exhibit their normal fire adaptability and resilience. Ecosystem function and forest health are both expected to improve with treatments.

Effects to Undeveloped: Shaded fuel breaks and fuels reduction thinning units as mentioned above are located in close proximity to private lands and Highway 93 and 43 corridors which already have a "developed" feel. These activities are generally located on the mountain slopes immediately adjacent to the North Fork drainage and to various degrees topographically screened from view of the Anderson Mountain Idaho Roadless Area interior. In contrast, these activities would be visible from segments of Highway 93 and from locations within the Allan Mountain Idaho Roadless Area on the west side of the North Fork drainage. These affects are created by the stumps, landing slash piles and surface disturbances associated with tractor skidding in some units. These treatments would initially appear unnatural to recreation users. These effects are temporary and would diminish once thinned timber is removed, slash from the units removed or burned. The effects would diminish in the future (5-20 years) with the growth of new vegetation.

Restoration treatments in mountain meadows, whitebark pine and aspen stands and prescribed broadcast burning and management of wildland fire events on the overall project area should maintain the undeveloped character of the Idaho roadless area and unroaded lands.

Decommissioned of the road along lower Pierce Creek and proposed motorized trail use change would contribute to an "undeveloped feel" of this drainage within the Idaho roadless area in the long term.

Prescribed burns and management of wildland fire events, both within and outside of the Idaho roadless area, would be seen as blackened ground surfaces, blackened tree stumps and clumps of red-needled and fire killed trees. These effects would be temporary and would blend with other natural processes in subsequent years after treatment.

Effects to Opportunities for Solitude or Primitive and Unconfined Recreation: Vegetative treatments for fuels reduction and ecosystem restoration, prescribed burning and management of wildland fire events would open the forests on these landscapes and make it easier to view into and across them. This openness, particularly fuels reduction thinning, within the interior of the Anderson Mountain Idaho Roadless Area and unroaded lands, would impact feelings of solitude for recreation users within this area. Implementation of these actions would have a short-term effect on the solitude and remoteness in those areas. Overall these short-term effects would diminish once the activities are completed and as the forest recovers with new vegetation growth following thinning, prescribed and managed burning.

Opportunities for solitude would be temporarily impacted while the Anderson Mountain Idaho Roadless Area and unroaded lands are undergoing treatments. The sounds of chainsaws, machinery, and helicopters associated with logging and the sight of tree removal would affect the ability of recreation users in these unroaded lands to experience a sense of remoteness only during implementation activities. However, the areas of proposed treatment already exhibit minimal feeling of remoteness and solitude because of proximity to private land and development, and year-round traffic on Highways 93 and 43.

Effects to Special Features: The Continental Divide National Scenic Trail coincides with the alignment of the Anderson Mountain Road #60081 along the eastern boundary of the project area and the Anderson Mountain Idaho Roadless Area. This trail/road corridor would benefit from the fuels reduction thinning and landscape prescribed burning that are activities included in this alternative by reducing the risk of a high severity wildland fire event. The trail/road corridor is situated in a strategic location for fire suppression actions to control a wildland fire occurring in this vicinity. Without fuels/risk reduction actions, control lines constructed by dozer and broad width shaded fuel breaks are likely features to be created in such areas. This would greatly change the recreation experience of Continental Divide National Scenic Trail users traveling this area after high severity wildland fire event. Beneficial effects to whitebark pine communities, an ecologically important component of native vegetation, would also be anticipated to occur.

Effects to Manageability: No Idaho roadless area boundaries would be reduced or altered. Project activities under this alternative would not be expected to change the current condition of manageability of this Idaho roadless area.

Cumulative effects to Anderson Mountain Idaho Roadless Area and unroaded lands

The Anderson Mountain Idaho Roadless Area and unroaded lands are essentially natural appearing with human influences on natural integrity being low. At the same time the proximity of these roadless and unroaded lands to Moose Creek Estates, a developing residential tract, and other private lands along the North Fork and Pierce Creek bottoms, Highway 93 and 43 corridors and use designation on the Pierce Creek trail impart a developed feel to perimeter areas while providing only moderate opportunities for solitude. No special features are present in what are considered common landscapes.

Cumulatively, the proposed 1,539 acres of fuels reduction activities without temporary roading along with restoration actions designed to address wildfire risks to private property, public transportation corridors, and ecosystem health/resilience would create temporary changes to the roadless characteristics of the Anderson Mountain Idaho Roadless Area and unroaded lands. Mechanical treatments for fuels reduction and hand treatments for meadow restoration are the source of this impact to aspects of natural integrity, undeveloped environment. As previously mentioned, these effects are short to mid-term in duration with full recovery expected following project completion and vegetation reestablishment. Prescribed burning, management of wildland fires, and restoration treatments for mountain meadows, whitebark pine and aspen stands are expected to improve the overall natural integrity of the IRA over time by returning fire and desired vegetation conditions to the ecosystem. Opportunities for solitude and primitive recreation would not change appreciably from current conditions because of impacts already associated with private lands and highway corridors, but some improvement is anticipated with the decommissioning of the road in lower Pierce Creek and use designation change on the trail route.

Table 76. Summary of past, present, and reasonably foreseeable activities in or near the Anderson Mountain Idaho Roadless Area and unroaded lands

	Activity	Acres/Miles	Description	Result
Past	Commercial harvest	Acres – none in Idaho roadless area; 2 acres in northern unroaded lands area	Visual evidence of timber stand management with roads and openings in forest canopy	Roadless/wilderness characteristics of Idaho roadless area and unroaded lands have not been impacted or have recovered from past harvest entries.
	Large fire history in Anderson Mountain Idaho Roadless Area and unroaded lands	None in project area	Blackened ground surfaces, presence of blackened or red-needled trees, openings and/or natural appearing mosaics in the existing tree canopy.	Wildfires have not occurred or have effectively been excluded for last 100 years on this portion of the landscape. Natural integrity, remoteness, opportunities for solitude and primitive recreation may appear to be unaffected, but in fact may be uncharacteristic for this forested environment.
	Travel Plan Decision 2009	Pierce Creek Road #60082 and Trail #6121 (1.7 miles road, 1.9 miles trail)	Trail status regarding motorized use under original travel plan not readily evident; current travel plan designated this road as open to all vehicles and trail to motorcycles only	Roadless characteristics in Idaho roadless area and central unroaded lands area impacted by these motorized routes bisecting the area; integrity, sense of solitude and undeveloped feel diminished to limited degree by route presence.
Past, Present, Reasonably foreseeable	State Highway Transportation System- Road Construction, Maintenance, Use	Hwy 93 - 15.5 miles Hwy 43 - 1.3 miles; outside IRA and Unroaded	U.S. Highway 93 bisects length of project area; short segment of Montana Highway 43 at north end of project area. Traffic is expected to increase with time.	Year-round traffic on State Highway system has the most influential effect on roadless/unroaded lands adjacent/nearby to road corridors. Impacts are auditory and visual to Idaho roadless area and unroaded lands not screened by topography, vegetation.
	Private Lands – Development, Occupancy & Uses	392 acres along North Fork and Pierce Creek drainage bottoms; adjacent to Idaho roadless area and unroaded lands	Moose Creek Estates-two residences, Royal Elk Ranch-several residential structures and cabins, Pierce Creek private land parcel with no structures	Moose Creek Estates, a gated low-density planned development, has conducted extensive logging and thinning on 200 acre property in last 10-20 years; additional residences in planning; received certification as Fire-Wise Community. Human activity has blended well with surroundings but contributes to visual and auditory impacts of North Fork river corridor to Idaho roadless area which is immediately adjacent to private property.
	Continental Divide National Scenic Trail Maintenance & Use	East boundary of Anderson Mountain Idaho Roadless Area and project area	Scenic Trail is co-located with Anderson Mountain Road #60081, a route open to all vehicles	Sight and sounds of vehicle use of this route are evident year round in adjoining perimeter area. Accessible to all wheeled vehicles during non-snow season; utilized for winter recreation activities by over the snow machines and Nordic skiers; no groomed routes are present.
	Lost Trail Pass Ski area and Chief Joseph Pass Ski Trails	Northern perimeter of project area; outside Idaho roadless area and unroaded lands	O & M of Lost Trail Pass Ski area SUP; Cross Country ski trailhead and trail system at Chief Joseph Pass along Hwy 43	Winter recreation activities originating at Nordic ski facilities with primary use to north in Montana; skiing and over the snow machine use occurring along Continental Divide Trail/Anderson Mtn Road in Idaho roadless area and s unroaded lands; Lost Trail Pass ski area visible from Idaho roadless area and unroaded lands
	Firewood gathering	Outside Idaho roadless area and unroaded lands	It is anticipated that many of the dead trees within close proximity of open system roads will be removed by local residents for firewood.	Often, roadways that have firewood removed appear messy, with slash piles and tree tops left randomly scattered. These effects will be noticed from within the Idaho roadless area and from unroaded lands adjacent to the Idaho roadless area. The effects will diminish over time, but will initially create a visual change to forested areas where large patches of dead trees are removed.

	Activity	Acres/Miles	Description	Result
Reasonably Foreseeable	Lost Trail Pass Sanitation Salvage Project (Bitterroot NF) on SUP are for Lost Trail Pass Ski Area	200 acres (Idaho); outside Idaho roadless area and unroaded land	Sanitation/Hazard tree removal in forest stands with heavy insect infestation.	Little change or effect to roadless characteristics of Idaho roadless area and unroaded lands; activity occurs adjacent to existing SUP ski area on opposite mountain slope, at distance from IRA; removes individual or clumps of trees. Salvage/sanitation activities would be visually evident for a few years but will begin to blend with the surrounding environment after the area revegetates

Direct and Indirect Effects to West Big Hole Idaho Roadless Area #943

There are no specific, pre-identified vegetative treatments, but extensive prescribed burning proposed within the West Big Hole and small adjacent unroaded lands area (the same as alternative 1). Undelineated whitebark pine and aspen stands are possible occurrences within the roadless area where hand felling, restoration thinning treatments may be conducted. Parts of several designated old growth stands are located in the Idaho roadless area and unroaded lands where hand, pre-treatment pruning and limb-up are likely to occur prior to prescribed burning. One short segment of non-system road intrusion in the Idaho roadless area (0.1 miles) has been identified for decommission treatment.

Effects to Natural: Since activities proposed within the West Big Hole Idaho Roadless Area and unroaded lands are primarily restoration related, the effect to the natural wilderness character of the area would generally be beneficial with improvement in the current condition.

Stumps, slash, small openings and blackened/fire killed trees would be visible following treatment. Over time these disturbances would revegetate and would regain their natural looking character.

Effects to Undeveloped: The portion of the Idaho roadless area and unroaded lands within the Upper North Fork HFRA Ecosystem Restoration project area would not be visible from locations within the larger West Big Hole Idaho Roadless Area immediately to the south because of topographic screening. Recreation users in the Idaho roadless area in the project area are already adjacent to and within full view of past timber management units and associated roading in the entire Lick Creek drainage. This existing condition of highly developed feel would not likely change in the short or mid-term because of other proposed project treatments planned for this managed landscape. Pre-commercial and non-commercial thinning, restoration treatments for meadows, whitebark pine and aspen stands, road decommissioning and seasonal closure, prescribed burning and management of wildland fire would occur over most of the area. Though the effects of these activities would be temporary in nature, active management of forest vegetation and retention of the road transportation network in Lick Creek is anticipated for the foreseeable future.

Effects to Opportunities for Solitude, Remoteness, and Primitive Recreation: Fuels reduction and restoration activities would affect the opportunities for solitude on the project area portion of the Idaho roadless area and unroaded lands. The sounds of chainsaws and machinery used for thinning, road decommissioning, restoration activities and prescribed burning, along with the sights of personnel implementing these activities would temporarily affect the ability of recreationists in the Idaho roadless area / unroaded lands to experience solitude. However, this area already exhibits little feeling of remoteness and solitude because of the existing roads, some which are open to all vehicles year round, and the associated amount of dispersed recreation, fuelwood gathering and hunting that occurs along these roads.

Effects to Special Features: No special features are present in the project area portion of this Idaho roadless area. As mentioned previously in the Affected Environment section, this Idaho roadless area overall has a number of special features including: the Continental Divide National Scenic Trail Corridor, outstanding scenery, two research natural areas and about 2,000 acres of the Salmon River Wild and Scenic River corridor. In summary the project area portion of the West Big Hole Idaho Roadless Area provides no contribution to the presence or condition of the special features and values attribute, so this alternative would have no effect to this attribute.

Effects to Manageability: No Idaho roadless area boundaries would be reduced or altered. Project activities under this alternative would not be expected to change the current condition of manageability of this Idaho roadless area.

Cumulative effects to West Big Hole Idaho Roadless Area and unroaded lands

In general, the interior of the West Big Hole Idaho Roadless Area provides a large area with little past activity. The following is a synopsis of extensive human activity which has occurred in the Lick Creek drainage on the outer perimeter of the Idaho roadless area that is within the project area:

Approximately 2,175 acres received harvest of the forest overstory varying from partial removal to clearcut harvest by various logging methods between 1960s and 1990s. These areas have since revegetated to varying degrees but are visually noticeable to the casual user. These activities are located near or surrounding existing roads and not located within the Idaho roadless area itself, but are within unroaded lands adjacent to the Idaho roadless area.

There are multiple miles of low standard, system roads throughout the Lick Creek drainage some of which are closed. An extensive network of non-system roads are present from past timber harvest entries as well. While they are still visible, many of the roads remain closed to motorized travel through the 2009 Travel Plan.

Hard rock mining exploration occurred throughout the Lick Creek drainage with scattered diggings still visible. A 20 acre land parcel was patented near the Lick Creek bottom in the upper 1/3 of the drainage. Remnants of surface trenching and workings and a cabin are present on the private parcel. Disturbances have stabilized and revegetated to a moderate extent. No current activity or occupancy is known.

Cumulatively, the proposed 565 acres of prescribed burning, management of wildland fires, 0.1 miles of non-system road decommissioning and possible restoration actions in whitebark pine and aspen stands would yield a slight beneficial improvement to the roadless characteristics of the project area portion of the West Big Hole Idaho Roadless Area and unroaded lands. This expected enhancement relates to the overall natural integrity of the Idaho roadless area over time by returning fire into the ecosystem in the project area. Opportunities for solitude and primitive recreation would not change appreciably from current conditions because of impacts already associated with public uses and Forest Service management for multiple uses of National Forest administered lands in the Lick Creek drainage.

Table 77. Summary of past, present, and reasonably foreseeable activities in or near the West Big Hole Idaho Roadless Area and roadless area expanse

	Activity	Acres/Miles	Description	Result
Past	Commercial harvest 1960s - 1990s	5 acres in Idaho roadless area; 2,175 acres outside IRA/unroaded lands	Visually evident from Idaho roadless area interior in project area, but only limited acres occurred in Idaho roadless area	Indirect effect to roadless/wilderness characteristics still visible/evident; activity was primarily adjacent/outside Idaho roadless area boundary.
	Large fire history in West Big Hole Idaho Roadless Area and unroaded lands	None in project area	Blackened ground surfaces, presence of blackened or red-needled trees, openings and/or natural appearing mosaics in the existing tree canopy.	Wildfires have not occurred or have effectively been excluded for last 100 years on this portion of the landscape. Natural integrity, remoteness, opportunities for solitude and primitive recreation may appear to be unaffected, but in fact may be uncharacteristic for this forested environment.
	Travel Plan Decision 2009		Closed system roads and areas restricting year round motorized use (except snow machine) under original travel plan were maintained in same status prohibiting public use in bordering areas.	Roadless characteristics in Idaho roadless area and unroaded lands maintained to limited degree by restricting motorized access to boundary zones and reducing sense of proximity to development.
Past, Present, Reasonably foreseeable	State Highway Transportation System- Road Construction, Maintenance, Use	Hwy 93 15.5 miles; outside Idaho roadless area and unroaded lands	U.S. Highway 93 bisects length of project area. Highway is 1 to 3 miles distant from Idaho roadless area /unroaded lands and screened from view by topography. Traffic is expected to increase with time.	Year-round traffic on State Highway system has minimal effect on roadless/unroaded lands in the project area. Impacts are auditory from distance as areas are screened from view by topography.
	Forest Transportation System – Open, Closed, Non-system Routes in the Lick Creek drainage	10.9 miles open, 9.2 miles closed, 20.6 miles non-system; outside Idaho roadless area and unroaded lands	O & M, use of transportation system routes in the Lick Creek drainage for administrative and public motorized access to forest administered and private lands	Motorized use of transportation network in Lick Creek drainage has readily evident visual and auditory effect to locations within the project area portion of the Idaho roadless area and unroaded lands. Year-round traffic is low volume, but likely frequent based on proximity to development and residences along North Fork river corridor.
	Firewood gathering	Outside Idaho roadless area and unroaded lands	It is anticipated that many of the dead trees within close proximity of open system roads will be removed by local residents for firewood.	Often, roadways that have firewood removed appear messy, with slash piles and tree tops left randomly scattered. These effects could be noticed from within the Idaho roadless area and unroaded lands. The effects would diminish over time, but could initially create a visual change to forested areas where large patches of dead trees are removed.

Environmental Consequences summary for Alternative 2 – No New Temporary Road Construction by issue indicators:

- Miles of new temporary road constructed within Idaho roadless areas – miles (0.1 miles of existing temporary road in the Lost Trail Ski area to be used)
- Acres harvested (cutting) outside community protection zones within Idaho roadless areas – 2 acres (thin); 1,190 acres (meadows)

Summary for Alternatives 1 and 2

While project activities could temporarily reduce the feeling of solitude during the time of implementation and undeveloped feel of areas during short to mid-term recovery periods, there would be no long-term negative effects to the roadless characteristics of the Idaho roadless areas. Cumulatively, the current roadless characteristics and wilderness suitability of the Allan Mountain, Anderson Mountain and West Big Hole Idaho Roadless Areas would be maintained and some criteria improved; and would not be notably affected by action alternatives 1 and 2.

- Fuels reduction and temporary road construction activities proposed inside these Idaho roadless areas and unroaded lands would occur adjacent to private lands, existing highways, and areas with Forest system roads and active management.
- Fuels reduction treatments in the Idaho roadless areas and unroaded lands would result in stand conditions with varying tree densities and would not be noticeable in the future (20 or more years).
- Restoration activities for mountain meadows, whitebark pine and aspen stands and decommissioning of unneeded roads would result in landscape appearance and ecosystem processes more representative of historic conditions in the long term.
- Prescribed burning and management of wildland fire occurrences mimics and/or returns a natural disturbance process.
- Activities proposed outside and adjacent to these Idaho roadless areas would occur within areas that have been previously developed on National Forest System lands.
- Neither alternative would reduce the existing capability of these Idaho roadless areas to be suitable for wilderness consideration.

Table 78. Summary of effects[a] of alternatives to the wilderness attribute/roadless characteristic criterion for Upper North Fork HFRA Ecosystem Restoration Project

Wilderness Attribute/Roadless Characteristic Criterion	No Action with Wildfire	Alternative 1 – Proposed Action	Alternative 2 – No New Temporary Roads
Natural	Continue degrading condition	Short term negative, long term benefit and improvement	Short term negative, long term benefit and improvement
Undeveloped	Long term negative	Short to mid term negative, long term maintenance	Short to mid term negative, long term maintenance
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Diminished and changed from current condition	Short term negative during treatment implementation, mid to long term maintenance	Short term negative during treatment implementation, mid to long term maintenance
Special Features and Values	Long term negative	Maintained and long term improvement	Maintained and long term improvement
Manageability	No change	No change	No change

a - Effects are summarized for Allan Mountain, Anderson Mountain and West Big Hole Idaho Roadless Areas and adjacent unroaded lands within the project area.

Consistency with the Forest Plan

Alternatives 1 and 2 are consistent with the Salmon Forest plan. The Forest Plan does not prohibit vegetation treatment, prescribed fire, or temporary road construction in Idaho roadless areas and the unroaded lands adjacent to the Idaho roadless areas. Forest Plan Management Area Prescriptions 1A, 2A, 3A-4A and 3A-5A allow for the activities proposed within this project.

Consistency with the Idaho Roadless Rule

The Idaho Roadless Rule does not apply to Forest Plan Special Areas (36 CFR 294.28(f). Management direction in the Salmon National Forest Plan continues to guide activities within Management Area 1A-Lost Trail Pass Ski Area, and Management Area 6A - Allan Mountain Research Natural Area. Based on this any activities within the Forest Plan Special Areas are consistent with the Rule.

Under the Idaho Roadless Rule areas with a backcountry/restoration management classification, timber cutting, sale and removal, and temporary road construction are permissible under certain conditions (36 CFR 294 Part C, §294.23(b)(2) and 294.24 (c)).

Community Protection Zone Activities

In alternative 1, approximately 192acres of fuel break, 585 acres of commercial thinning, 2 acres of precommercial thinning would occur in the community protection zone. Outside the community protection zone 2 acres of commercial thin. Alternative 1 would construct 2.1 miles of temporary road and use 0.1 miles of existing temporary road in the community protection zone.

In alternative 2, approximately 192 acres of fuel break, 585 acres of commercial thinning, 2 acres of precommercial thinning would occur in the community protection zone. Outside the community protection zone 2 acres of commercial thin. Approximately 0.1 miles of existing temporary roads would be used under alternative 2 in the community protection zone.

The Idaho Roadless Rule permits timber, cutting, sale or removal within the community protection zone if, in the responsible official's judgment, the project generally retains large trees as appropriate for the forest type and is consistent with land management components (36 CFR 294.24(c)(1)(i). In addition the Rule permits temporary road construction or road reconstruction for community protection zone activities pursuant to 294.24(c)(1)(i) if in the official's judgment the community protection objective cannot be reasonably accomplished without a temporary road. (36 CFR 294.23(b)(2). The requirement to retain one or more roadless area characteristics over the long term does not apply to either permission.

The fuel break, commercial thinning and precommercial thinning activities meet the timber cutting permissions because:

1. They are located within the community protection zone
2. They remove hazardous fuel conditions
3. They retain large trees as appropriate for the forest type
    a. Prescriptions for commercial thinning are essentially identical for each harvest system (tractor, skyline, and helicopter). Fuel break and pre-commercial thinning target the understory component of forest stands.
    b. Project alternatives include the following design features: Emphasis on large tree retention. Priority for leave trees would be largest diameter ponderosa pine and largest diameter Douglas-fir, then largest diameter lodgepole pine, insect and disease free, largest crown, trees with tallest height, straightest stem. Favor ponderosa pine over Douglas-fir where

characteristics are similar; favor Douglas-fir over lodgepole pine where characteristics are similar; and favor or enhance aspen wherever it occurs. There would be no harvest in designated old growth retention stands. Special measures to be taken in designated old growth retention stands include pretreatments such as ladder and tree-well fuel reduction for each unit as needed prior to prescribed burning.

4. The activities are consistent with the land management plan as they are designed to provide for a healthy forest cover over the long term. See above and also table 15 of the Silviculture Report, 2012 for the Upper North Fork HFRA Ecosystem Restoration Project.

A decision regarding whether or not to approve the temporary road construction will be based on the analysis and will be documented in the final decision document.

Prescribed Fire and Wildland Fire Activities

The Idaho Roadless Rule for the backcountry/restoration management classification areas also allows for activities away from roads in the form of prescribed fire or wildland fire use for fuels reduction to reduce wildland fire risk. In these instances any such projects would be designed to maintain or improve roadless characteristics over the long term.

Meadow, Aspen and Whitebark Pine Restoration Activities

The Idaho Roadless Rule permits timber cutting, sale and removal in the backcountry/restoration management classification areas to maintain or restore the characteristics of ecosystem composition, structure and function (36 CFF 294.24(c)(iv). Meadow restoration, aspen and whitebark pine restoration activities meet this exception because they serve to maintain native species composition, ecological processes and forest structure at both stand and landscape scales. They also help support the desired fire regime and viable populations of native plant species in functional networks of habitat.

In addition, these activities meet the following conditions associated with this exception:

1. Maintain or improve one or more of the roadless characteristics over the long-term by:
    c. supporting a diversity of plant and animal communities (aspen and whitebark pine);
    d. habitat for threatened, endangered, proposed, candidate, and sensitive species (aspen, whitebark pine and meadows);
    e. natural appearing landscapes with high scenic quality (meadows).
2. Maximize retention of large trees as appropriate for the forest type to the extent the trees promote fire resilient stands. See discussion above under community protection zone.
3. Is consistent with the land management components. See discussion above under community protection zone

Adverse Environmental Effects

The adverse environmental effects to Idaho roadless areas and unroaded land resources associated with implementation of alternatives 1 or 2 as outlined in this section would be short (1-5 years) to mid-term (6-19 years) in duration. Application of either of these alternatives would likely avoid to some degree the adverse impacts associated with taking no action and risk of an uncharacteristic landscape-scale wildland fire. Damage or loss to public and private property, infrastructure and economic activities are part of the effects that would potentially be avoided by an action alternative.

Long-term Productivity

Implementation of alternatives 1 or 2 would contribute to the maintenance and enhancement of long-term productivity of the Upper North Fork HFRA Ecosystem Restoration Project area. Again, the short to mid-term nature of disturbances and environmental effects associated with the proposed and alternative activities would produce long term benefits to ecosystem health, resilience and function compared to the current condition and direction of change.

Irreversible or Irretrievable Commitment of Resources

Temporary road construction in alternative 1 could have short to mid-term effects to roadless character in the local area of the road construction. However, the stand thinning and strategic fuel break could improve the overall resiliency of the landscape especially in the area adjacent to Moose Creek Estates and Lost Trail Pass Ski area. Temporary roads would be decommissioned after use and the effects to roadless character would reduce overtime. Some might consider the effect of road construction to be irreversible or irretrievable commitments of resources; however, the effects of the road construction would become less evident as roads revegetate.

Project activities in alternatives 1 and 2 are designed as a continuum of treatments across the landscape to address the project objectives, needs and conditions of the area. Environmental consequences to IRAs and unroaded lands as disclosed previously in this section address both types of areas as the roadless resource without distinction to their classification. Temporary road construction proposed on unroaded lands under both action alternatives should not produce any different impacts than what would happen in IRAs. Thus, temporary roads would have little overall effect on the unroaded lands' existing natural or undeveloped, special features, primitive recreation, or manageability characteristics over the long term. Future considerations of wilderness character and potential would not be precluded by activities proposed on unroaded lands in the Upper North Fork HFRA Ecosystem Restoration Project area.

Visual Resources

Introduction

Scenery, as well as other natural resources, must be cared for and managed for future generations. Visual resources vary by location and existing natural features including vegetation, water features, landform and geology, and human-made elements. All activities that forest visitor experience are performed in a scenic environment defined by the arrangement of the natural character of the landscape along with components of the built environment.

Existing forest stand structure and forest vegetation have created the potential for large-scale, high-intensity wildfires that threaten human life, property, and natural resources.

The rich biodiversity within the project area is at risk which creates the need to restore the area. The proposed project area is approximately 42,000 acres. Rehabilitation of the vegetation in the project area would shift the existing condition closer to the characteristic vegetative cover in the project area.

Overview of Issues Addressed

This analysis will discuss the effects to visual resources from the proposed management activities, and determine whether or not the Forest Plan will be met.

Issue Indicators

- Whether or not the visual quality objectives of retention, partial retention, modification, and maximum modification would be achieved in the project area.

Forest Plan Direction

Forest-wide Goals

Provide for pleasing visual landscapes in areas viewed from major travel routes crossing the Salmon National Forest. (pg IV-1)

Forest-wide Direction for Visual Resources (pages IV-8-9)

Apply the Visual Management System to all National Forest System (NFS) lands. Travel routes use areas and water bodies determined to be of primary importance are sensitivity Level 1 and appropriate visual quality objectives are established according to the visual management system.

Rehabilitate all existing projects and areas which do not meet the adopted visual quality objective(s) specified for each management area. Set priorities for rehabilitation, considering the following:

- Relative importance of the area and the amount of deviation from the adopted visual quality objective. Foreground areas have highest priority:
- Length of time it will take natural processes to reduce the visual impacts so that they meet the adopted visual quality objective:
- Length of time it will take rehabilitation measures to meet the adopted visual quality objective: and
- Benefits to other resource management objectives to accomplish rehabilitation

3. Achieve enhancement of landscapes through addition, subtraction or alteration of elements of the landscape such as vegetation, rockform, water features or structures.

    a. Addition of vegetation species to introduce unique form, color or texture to existing vegetation:
    b. Vegetation manipulation to open up vistas or screen out undesirable views.

4. Plan, design and locate vegetation manipulation in a scale which retains the color and texture of the characteristic landscape, borrowing directional emphasis of form and line from natural features.

    a. Meet the visual quality objectives of retention and partial retention one full growing season after completion of a project. Meet modification and maximum modification objectives three full growing seasons after completion of a project.

5. Blend soil disturbance into natural topography to achieve a natural appearance, reduce erosion and rehabilitate ground cover.

6. Revegetate disturbed soils. In large projects this may have to be done in stages.

    a. Revegetate disturbed soils, except when project objectives require minimum ground cover such as reforestation.

Forest-wide Direction for Trail System Maintenance and Operation

8. Manage the Continental Divide National Scenic Trail in accordance with the November 6. 1985 Continental Divide National Scenic Trail Comprehensive Plan incorporated herewith by reference.

9. Manage the Lewis and Clark National Historic Trail in accordance with the January 1982 Comprehensive Plan for management and use incorporated herewith by reference.

Desired Future Condition

Visual quality will be emphasized in areas viewed from sensitivity level 1 and 2 travel routes (pg IV-88).

Management Area Direction

1A Winter Sports

Visual resources are managed so that the character is one of forested areas interspersed with openings of varying widths and shapes. Facilities may dominate, but harmonize and blend with the natural setting (pg IV-97).

2A Dispersed Recreation

Visual resources are managed so that management activities are not evident or remain visually subordinate. Past management activities such as historical changes caused by early mining, logging, and ranching may be present which are not visually subordinate but appear to have evolved to their present state through natural processes. Landscape rehabilitation is used to restore landscapes to a desirable visual quality. Enhancement aimed at increasing positive elements of the landscape to improve visual variety is also used. Treatments to increase forage production alter plant species composition or to create and maintain hiding and thermal cover for big game are applied. Prescribed burning, seeding, planting, spraying, mechanical treatments, and mechanical fireline construction may occur.

5A High TM Sawtimber Output

The area will generally eventually have a mosaic of relatively even-aged stands that follow natural patterns and avoid geometric shapes. Vertical diversity will be provided in the following areas:

- One or more visual quality objectives will be established and mapped for the area and these objectives will be met as described in Salmon National Forest General Direction and under Activity A04 in the prescription.

Legal and Administrative Framework

The National Environmental Policy Act of 1969 (NEPA)

NEPA states that it is the “continuing responsibility of the Federal Government to use all practicable means to assure for all Americans, aesthetically and culturally pleasing surroundings.” NEPA also requires a systematic and interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts into planning and decision-making which may have an impact on man's environment.

Numerous federal laws require all Federal land management agencies to consider scenery and aesthetic resources in land management planning, resource planning, project design, implementation, and monitoring.

Several USDA handbooks have been developed to establish a framework for management of visual resources including but not limited to: National Forest Landscape Management, Volume 2, Chapter 5 Timber; Agriculture Handbook No. 559.

Forest Service Manual 2300 direction includes:

FSM 2380.11b - Environmental Analysis and Disclosure

The National Environmental Policy Act of 1969 (42 U.S.C. 4321) directs the Federal Government to "(2) assure for all Americans . . . healthful, productive, and aesthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, [or] risk to health; (4) preserve important historic, cultural, and natural aspects" of our environment. It further directs agencies to "insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment." This act directs agencies to develop methods and procedures "which will insure that [scenery and other] unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations."

2380.31 - Resource Planning and Management

1. Use the basic concepts, elements, principles, and variables defined in the National Forest Landscape Management Agriculture Handbook (AH) series to manage landscape aesthetics and scenery (see FSM 2380.6 for a full listing of the AH publications in this series).

2380.43 - Forest Supervisor

5. Ensure application of the principles of landscape aesthetics, scenery management, and environmental design in project-level planning.

FSM 2353.11 Relationship Between National Recreation, National Scenic, and National Historic Trails and NFS Trails

Manage National Recreation, National Scenic, and National Historic Trails as NFS trails. Administer each National Recreation, National Scenic, and National Historic Trail corridor to meet the intended nature and purposes of the corresponding trail (FSM 2353.31).

FSM 2353.31

1. The National Trails System (16 U.S.C. 1242(a)) includes: ... b. National Scenic Trails. These extended trails are located so as to provide for maximum outdoor recreation potential and for conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas through which these trails pass (16 U.S.C. 1242(a)(2)...

2. Ensure that management of each trail in the National Trails System addresses the nature and purposes of the trail and is consistent with the applicable land management plan (16 U.S.C. 1246(a)(2)).5

3. Trail management objectives for a national recreation, national scenic, or national historic trail should reflect the nature and purposes for which the trail was established.

FSM 2353.42 – Policy

Administer national scenic and national historic trail corridors to be compatible with the nature and purposes of the corresponding trail. Continental Divide National Scenic Trail: The nature and purposes of the Continental Divide National Scenic Trail are to provide for high-quality scenic, primitive hiking and horseback riding opportunities and to conserve natural, historic, and cultural resources along the Continental Divide National Scenic Trail corridor.

1982 Lewis and Clark National Historic Trail Comprehensive Management Plan

Administer, manage, protect and maintain cultural and natural resources within initial protection sites and segments in accordance with the purpose of the trail.

Federal agencies should manage the sites and segments under their jurisdiction in accordance with the provisions and authorities of the National Trails System Act and this Comprehensive Management Plan.

Existing land uses within the sites and segments which are compatible with historic preservation and public use should be continued. Land uses which adversely affect sites and segments should be carefully monitored and, if necessary, modified.

Development and management of each segment of the National Trails System shall be designed to harmonize with and complement any established multiple-use plans for that specific area in order to ensure continued maximum benefits from the land.

Salmon River Scenic Byway Comprehensive Management Plan

Goals applicable to this project (pages 2-9)

- Preserve the rural scenic character of the corridor and important views
- Promote greater awareness of the byway and its recreation, historic, and cultural resources.

Methodology for Analysis

Assumptions: This analysis assumes that the existing condition within the project area is in compliance with Forest Plan direction regarding past management activities and their impact on scenic/ visual resources in regards to the design elements of form, line, texture and color. It is also assumed that all design features would be implemented.

Methodology:

This analysis was completed using the framework of the USDA Forest Service Landscape Management Series Volume 2, Chapter 1, The Visual Management System. A review of the existing condition descriptions of the Silvicultural and Fuels analyses was done to determine the degree of alteration the existing vegetation condition is from the characteristic vegetative composition, structure, and fire regime condition classes. Existing conditions of vegetative species includes overstocked decadent stands, a mix of epidemic and endemic insects and disease, along with a high level of fuels illustrate a need to rehabilitate the landscape back to more natural characteristics. This analysis applies the use of the rehabilitation interim visual quality objective within the project area.

Application of the rehabilitation interim visual quality objective within the project area includes merging some concepts of the Visual Management System with the Scenery management System. As shown above, FSM 2380 includes direction on application of the principles of Landscape Aesthetics, scenery management, and environmental design in project-level planning. Although the Salmon- Challis Land and Resource Management Plan direction for management of visual resources was developed using the Visual Management System, the current direction is to apply the Scenery Management System. Therefore this analysis combines concepts from both systems related to this project.

The Scenery Management System describes the context for scenery management on page 23 of the handbook.

> Ecosystem management provides the foundation for planning and the necessary context and basis for managing scenery. Landscape Aesthetics, a Handbook for Scenery Management encourages

> integration throughout the entire systematic approach from inventory, analysis, planning, design, and implementation, to monitoring. Integration within the ecosystem planning framework relates the scenery management system to other relevant planning models for the biological, physical and social dimensions of the ecosystems.
>
> Within a range of sustainable ecosystem management parameters there may be several landscape character options or variations that provide more diverse scenic character or that best reflect the integrity of special places. These solutions should be encouraged as the desired conditions where scenic values are high.

Application of the rehabilitation visual quality objective for this project combines the concepts of the ecological context of scenery management as described above with the interim visual quality objective of rehabilitation from the Visual Management System. Both systems for visual/ scenery resources are relevant to this project.

During field observations, a variety of photos were taken from various viewpoints. The viewpoints were established along Highway 93 which is designated as the Salmon River Scenic Byway where proposed activities may be viewed from. Appendix A and B of the scenery report have various maps illustrating the viewpoint's. The photos of the existing condition were used in conjunction with descriptions of proposed activities and photos of similar treatments in other locations, and visual simulations developed with Visual Nature Studio (VNS) to determine the extent and duration of potential impacts to scenic/ visual resources.

ArcMap geographic information system (GIS) was used to analyze the proposed activities in regards to visual quality objectives assigned to the area, distance zones, and visibility from Highway 93 and Continental Divide National Scenic Trail. This report includes several maps created with GIS. Visual quality objectives, distance zones and visibility were determined for the project area using the Forest's GIS data. Maps were created prior to the final adjustments of unit boundaries. Acreages provided in the analysis are reflective of the final unit boundaries. However, the original maps are used since total differences in treatment acres is about 100 acres. Maps used in this analysis are not at a scale where a person would be able to actually see those differences.

Proposed treatment methods for specific species were analyzed to determine if the effects to visual/scenic resources were compatible with the assigned visual quality objectives and if any design features or mitigation measures were necessary.

The terms visual/scenery resources and landscape characteristics are used throughout the analysis and all refer to visual resources.

Incomplete data includes no specific locations for landings or skyline cable corridors. Site specific effects cannot be determined. However, design features are in place to minimize impacts to scenery resources.

Spatial and Temporal Context for Effects Analysis

Temporal context of the analysis applied in the analysis: It may take up to 5 years for the landscape to recover from some activities in order to meet retention, therefore 1 to 5 years was used as the short-term time period. In contrast, the forest plan allows only 1 full growing season for activities to meet retention. Effects lasting longer than the 5 years it would take to meet retention are considered long term.

- Short-Term 1 to 5 years
- Long-Term 6 years and beyond

The project area boundary was used as the spatial bounds for determining direct and indirect effects for the analysis since the project area is a valley surrounded by ridges on the east, north and west. Very limited views into the project area occur south of the project area. See appendix C for a comprehensive list of past, present and foreseeable activities and events considered in this analysis.

Existing Condition

The project area lies in the northernmost part of the forest between the community of Gibbonsville and top of Lost Trail Pass at the Idaho and Montana border. The North Fork of the Salmon River and Highway 93 run through the project area. Highway 93 is designated as the Salmon River Scenic Byway and Lewis and Clark National Historic Trail. There are several pull-offs along the highway with interpretive information of the area's heritage and natural resources. "U.S. Highway 93 follows the Expedition route so closely that marking it as a motor route will provide excellent opportunities for tracement of the historic route. Many recreation areas and historic and interpretive sites relating to the Expedition are located along the highway." (National Park Service 1982) The segment associated with this project is segment 26 Salmon and Bitterroot Valleys.

Sites associated with the expedition along this portion of the historic trail include:

- Salmon Explorations Wayside- on the Salmon River and U.S. Highway 93 at the confluence of the North Fork.
- Lewis and Clark Monument- approximately 5 miles north of North Fork, Idaho; the site of the Expedition's September 1, 1805, camp.
- Deep Creek Picnic Area- Approximately 5 miles north of Gibbonsville, Idaho U.S. Forest Service, is a picnic area with restrooms. An interpretive sign mentions the Expedition's September 2, 1805, camp near this site. This site is also viewpoint 2.
- Twin Creek Campground- On Twin Creek just west of U.S. Highway 93, about 6 miles north of Gibsonville, Idaho , (Map 34) U.S. Forest Service, has a campground, picnic area, drinking water, and restrooms. The campground is viewpoint 5. Refer to figure 30.
- Lost Trail Pass- U.S. Highway 93 at the Idaho-Montana State line, the U.S. Forest Service has developed a picnic area with drinking water and restrooms. An interpretive sign tells of Lewis and Clark losing the, trail to this pass on September 3, 1805, and crossing into what is today Montana at a point approximately 3 miles to the west. This site is viewpoint 13.

The east portion of the project area is within the Beaverhead Mountain Range. The west side of the project area lies in the Bitterroot Mountain Range. Elevations vary from 7,014 feet at the top of Lost Trail Pass to 4,570 feet at Gibbonsville.

A 6.25 mile portion of the Continental Divide National Scenic Trail runs along the northeast end of the project area following Forest road 081 also known as Anderson Mountain Road. Visitors hiking this portion of the cross-country trail would see meadows interspersed with Douglas fir and lodgepole pine stands. Trail users may encounter vehicles using the road at the same time. Refer to the Recreation Analysis for additional information.

The Chief Joseph Cross Country Ski Area is adjacent to the portion of the Continental Divide National Scenic Trail that runs through the project area. A small portion of this ski area is within the project area.

Lost Trail Pass Ski Area lies at the north end of the project area on lost trail pass. Ski runs have created un-natural lines that have altered the characteristic landscape. Skiers have views of the into the project area in all distance zones.

Figure 29. Viewpoint 16 North end of Project Area near Lost Trail Pass Ski Area

Twin Creek Campground is the other developed recreation facility within the project area. The campground is somewhat centrally located in the project area off of Highway 93. Vegetation around the campground includes a Douglas fir- lodgepole/ ponderosa pine mix.

The north-east side of the project area is defined by the continental divide, then follows the ridgeline at East Pierce Creek down to the Gibbonsville area. The north-west portion of the project area follows the forest boundary to Twin Creek, and then down the ridgeline between Twin Creek and Ditch Creek to Sheep Creek. The Lick Creek drainage is also included in the project area. Private properties are found throughout the Highway 93 corridor. Refer to figure 30 for a photo of the landscape between Royal Elk Ranch and Moose Creek Estates. Figure 31 is a photo near Gibbonsville depicting the landscape on the southern end of the project.

Figure 30. View at Twin Creek Campground Viewpoint 5

The project is located in Ecoregion M332- Middle Rocky Mountain Steppe – Coniferous Forest – Alpine Meadow Province. The ecoregion has the following landscape characteristics. The topography of the project area is heavily dissected with several drainages and mountains with a great diversity of elevations. Granitic outcroppings are scattered throughout the area. Given the range in elevation, there is also a diverse range of vegetation. Species at the higher elevations include Douglas fir, Englemann spruce, white bark pine and grass meadows. Douglas fir and lodgepole pine are the dominant species in the project area. In the middle to lower elevations pockets of aspen and ponderosa pine add variety to the vegetative mosaic. Several creeks drain into the North Fork of the Salmon River.

The descriptions of the silvicultural and fuels analyses was reviewed and used as a reference to determine the degree of alteration to the vegetative component of the characteristic landscape. Existing conditions of vegetative species includes overstocked decadent stands, a mix of epidemic and endemic insects and disease, along with a high level of fuels illustrate a need to rehabilitate the landscape back to more natural characteristics. Refer to the silviculture analysis for more specific information on vegetative composition and insects and disease. Refer to the fire and fuels analysis for additional information on fire regimes and fire risk.

Past activities that have altered the landscape characteristics include timber harvesting, natural and prescribed burning, grazing, mining, and endemic insect and disease outbreaks, along with epidemic outbreaks of mountain pine beetle. The ski runs on the Lost Trail Pass Ski Area have also altered the characteristic landscape. Refer to figure 29.

Viewpoints were established along Highway 93 during the site visit. Some of the following photos are from the viewpoints were activities would be the most noticeable by the average forest visitor. See figure 31 for the location of viewpoints.

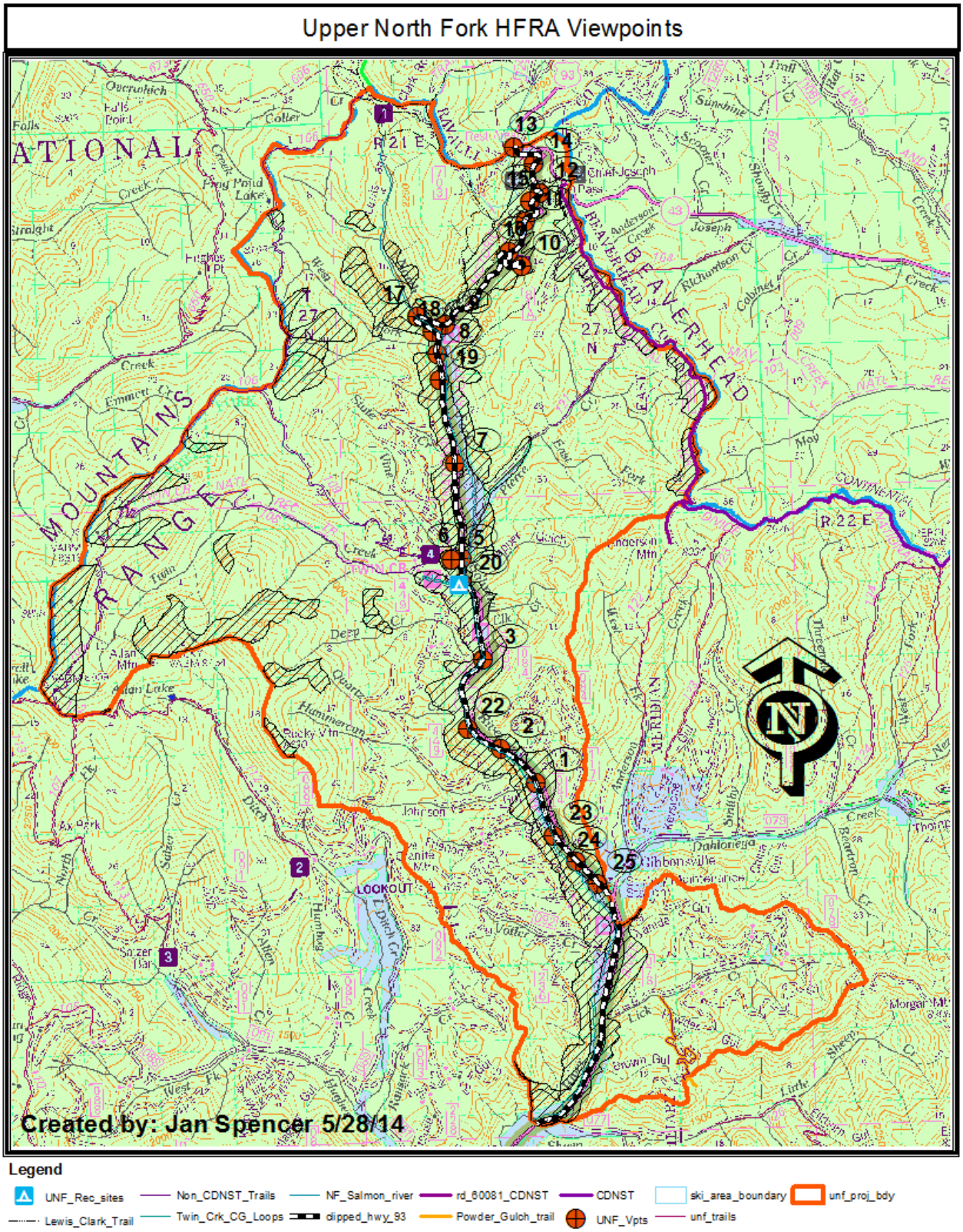


Figure 31. Map of project viewpoints

Figure 32. Project Area seen from Viewpoint 7 between the Royal Elk Ranch and Moose Creek Estates

Figure 33. Photo 2 at Viewpoint 7

Figure 34. Viewpoint 26 Gibbonsville Area

Figure 35. Panoramic View from Viewpoint 3

Figure 36. Viewpoint 20 near Twin Creek

Monitoring

No monitoring was recommended for visual resources.

Environmental Consequences

No Action Alternative

Direct Effects

Changes in forest structure in the project area have significantly increased the potential for uncharacteristic fire behavior. A landscape scale, stand-replacing wildland fire during summer drought and extreme weather conditions with devastating fire severity to 50 percent of forested and riparian ecosystems is a plausible event as a consequence of not implementing hazardous fuels reduction activities. This is the context for which “No Action with Wildfire” was evaluated for the Upper North Fork HFRA Ecosystem Restoration Project.

Direct and Indirect Effects

Under the No Action Alternative, the crowded, overstocked conditions of the forest would continue. The risk of an intense fire at the landscape level would be high. A landscape level fire would dramatically change the scenic characteristics and recreational setting of the project area. Continuation of overstocked conditions could induce a rapid spread of insects and disease, causing additional mortality in the stand, heightening the risk of fire. Together, these elements would maintain the uncharacteristic vegetative mosaic across the landscape. If the vegetation is consumed by intensive fire, or widespread insect infestations, a major deviation from the desired landscape character would occur because the vegetative component of scenic attractiveness would drop from its current rating to class C indistinctive. This would result in lowering the visual quality objectives for the project area. It may take decades to meet the desired landscape character and visual quality objectives for the project area under this alternative.

The following Forest-wide direction would not be met:

Rehabilitate all existing projects and areas which do not meet the adopted visual quality objective(s) specified for each management area.

The following Forest-wide goals and strategies would not be met:

Provide for pleasing visual landscapes in areas viewed from major travel routes crossing the Salmon National Forest (pg IV-1).

Action Alternative 1 - Proposed Action

Direct Effects of Visual Resources (short–term and long–term)

Mechanical Logging Removal Methods

Table 79 shows the acres of the different types of logging methods that would occur within each visual quality objective.

Table 79. Alternative 1 acres of logging methods per visual quality objective

Logging Method	Acres per Visual Quality Objective			
	Retention	Partial Retention	Modification	Maximum Modification
Tractor	373	1,238	554	183
Skyline	176	424	398	35
Helicopter	330	745	39	21

Tractor logging

Direct effects to visual resources from the use of tractor logging removal methods would include visible evidence of slash on the ground, soil disturbance, and other types of evidence of where machinery was working for one or two growing seasons. “Residual woody debris is one of the most significant predictors of negative perception of scenic beauty.” (Ryan 2005) Design features are in place to reduce the impact of slash on the visual quality of the project area. Skid trails and landings for tractor logging may be noticeable to the average forest visitor.

Approximately 2,351 acres of tractor logging are proposed in this alternative. Refer to table 81 through table 85 to see the sensitivity level 1 travel routes with tractor logging systems proposed in the immediate foreground (300 feet). Approximately 1,348 acres of tractor logging systems are proposed in the foreground distance zone, which includes 184 acres proposed in the immediate foreground, and 1,003 acres in the middle-ground distance zone. The units in the immediate foreground and foreground would be easily noticeable by the average forest visitor for two summer seasons and after slash piles treatment and design features have been completed.

Tractor logging operations could achieve the retention visual quality objective along the sensitivity level 1 travel routes with the reduction of impacts from implementation of the design features around three years after completion of implementation of a unit. However, proposed activities would take ten to fifteen years to implement, so the landscape would be in a state of change for over a decade. During unit implementation the visual quality objectives of modification could be achieved, and as the work in the unit progresses, the visual quality objective of partial retention would be met, and eventually retention would be met within three years after completion of unit implementation.

Refer to table 79 for the amount of acres of tractor logging per visual quality objective. Refer appendix A to see the design features in place to minimize effects to visual resource. Results from simulations using Visual Nature Studio from the project viewpoints illustrate that the tractor units shown in table 80 would be visible along Highway 93.

Table 80. Tractor Units visible from Highway 93

Viewpoint	Tractor Unit
5	121
7	125b, 125c, 218, 221,
20	113,116b
24	200
25	200

Skyline logging

Direct effects to visual resources from the use of skyline-logging-removal systems include potential views into the cable corridor from Highway 93, Twin Creek and Twin Ridge Trails. A trail user and/or traveler along Highway 93 may notice trees that have damaged or even been broken off by other trees going up the cable system. The cable corridor could create an unnatural line void of vegetation that would be an apparent change from the surrounding canopy. Design features are in place to minimize effects to visual resources, refer to appendix A for a complete list of design features.

The proposed action includes 1,032 acres of commercial thinning using skyline removal methods. Approximately 357 acres of proposed skyline cable system are proposed in the foreground of Highway 93, Lewis and Clark National Historic trail and Salmon River Scenic Byway. Nearly all of those acres are in the retention visual quality objective. In the foreground of the Twin Creek Campground approximately 22 acres are proposed and 62 acres in the foreground of trails within the project area. Around 25 acres of those occur in the immediate foreground. There aren't any proposed skyline units in the foreground of the Continental Divide National Scenic Trail. The remaining 591 acres of the skyline units fall within the middle-ground of all of the sensitivity level 1 travelways and use areas. The proposed skyline units in the middleground, and are not expected to be easily noticed by the average forest visitor. Results from simulations using Visual Nature Studio from the project viewpoints illustrate that the skyline units shown in table 81 would be visible along Highway 93. Refer to appendix C of the visual resources report, located in the project record, for Visual Nature Studio simulations at each viewpoint and viewpoint maps.

Table 81. Skyline units visible from Highway 93

Viewpoint	Skyline Unit	Visual Quality Objective
1	237	Partial Retention/ Modification
7	216, 219	216- Retention, 219 Partial Retention
9	213	Retention
24	203	Modification
25	87, 201	Partial Retention

Approximately 1,032 treated acres would be removed by skyline logging in the project area. Refer to table 81 through table 85 to see the sensitivity level 1 travel routes with skyline logging systems proposed in the immediate foreground (300 feet). Refer to table 79 for the amount of acres of skyline logging per visual quality objective. The majority of skyline logging would occur in partial retention and modification visual quality objectives. After the design features are implemented, the modification visual quality objective would be met. After one growing season the appearance of slash would be reduced, and ground cover would come back in meeting the partial retention visual quality objective. The length of time it would take skyline logging units to meet retention varies depending upon whether or not the corridors are

visible from Highway 93 or other sensitivity level 1 areas, and the width of the skyline corridor. It would take from 3 to 5 years to meet retention based on the factors described above.

Helicopter logging

Evidence of timber removal by helicopter is not easily noticeable on the landscape. Approximately 1,137 acres of timber would be removed by helicopter in the project area. Approximately 441 acres of helicopter logging would take place in the foreground, including 21 acres occurring in the immediate foreground. About 696 acres are proposed in the middle-ground distance zone. The visual quality objectives would be maintained in areas of helicopter timber removal. Refer to table 86 for the amount of acres of helicopter logging per visual quality objective. Design features are in place to minimize effects to visual resources. Refer to appendix A for a complete list of design features. Since helicopter removal methods are not easily noticeable units viewed from specific viewpoints is not illustrated.

Landings

Exact locations of landings would be determined during project layout in the field. Landings could be located in retention, partial retention, modification and maximum modification visual quality objectives, and in all distance zones. It would take 1 to 2 growing seasons before landings would meet partial retention and between 3 to 5 years to meet retention. Typically landings are cleared of vegetation to use the area for decking the logs. After a landing is done being used a lot of slash may be left on the site. Landings are very evident to forest visitors for the first few years. Design features are in place to minimize effects to visual resources from the creation of landings, refer to appendix A for the list of design features. Without further information on landing location, no additional effects can be predicted.

Indirect Effects from logging Systems

Forest visitors would be indirectly affected by mechanical logging systems from the sights, sounds, and smells of equipment operating in the Forest for approximately ten to fifteen years during the operating seasons.

Direct and Indirect Effects of Treatment Types (short–term and long–term)

The proposed action states that with the exception of areas immediately adjacent to private land, shaded fuel breaks, and ingress/egress routes, the mechanical treatments would be implemented in such a manner as to create a complex mosaic of forest structures and seral stages with structural and seral patch sizes ranging from 1 to 100 acres in size. With the same exceptions listed above, all mechanical activities described below would also be implemented in such a manner as to create, enhance and perpetuate variability of tree density within individual stands, characterized by a complex assemblage of gaps/openings, and small (less than 0.1 acre in size) clumps of trees with interlocking crowns.

Table 82 illustrates the proposed treatment types and the acres of visual quality objective of each treatment. Additional information and effects are described below.

Table 82. Proposed treatment types in alternative 1

Vegetative Treatment	Acres per Visual Quality Objective			
	Retention	Partial Retention	Modification	Maximum Modification
Commercial Thin to 18X18 ft & Pre-commercial thin to <7" dbh	879	2407	991	239
Pre-commercial thin to <7" dbh	215	579	520	16
Non-commercial treatments (burning, hand thinning, pruning, hand piling)	0	72	373	0
Meadow Treatment	205	455	622	9
Shaded Fuelbreak	462	255	225	31
Prescribed Burning	1761	3768	2731	295

Commercial thin to 18 by 18 ft spacing followed by Pre-Commercial Thinning of trees under7 inches dbh

The removal of dead, diseased, and dying trees would restore and improve the existing landscape characteristics from an overstocked decadent landscape to a healthy vegetative mosaic. In areas planned for hazardous fuel reduction treatments, insect and disease levels should return to endemic levels. Thinning and removal of live trees and reducing the shrub/understory component would open up the stands to a park-like vegetative mosaic that is characteristic of pre-fire suppression efforts, essentially rehabilitating the landscape characteristics and enhancing the visual quality. "The amount of visual access, or how far one can see into a forest, also has been found to be a significant predictor of landscape preference… As the density of smaller trees increases, visibility and scenic beauty decrease" (Ryan 2005). An emphasis would be placed on retaining large trees especially older ponderosa pine. This would create additional variety in the canopy versus the existing condition. The variability of seral stages and stand patch sizes would increase the diversity of the vegetative mosaic enhancing the aesthetics of the landscape characteristics. Research by Ryan provides information that supports this determination. "Many studies have shown that people prefer large mature trees….Likewise, forests with many closely spaced small trees receive lower scenic ratings (Brown and Daniel 1986) For example, Schroeder and Daniel (1981) found the number of large ponderosa pine trees (greater than 16 inches diameter at breast height) had a significant positive impact on scenic beauty ratings.….In forestry terms, areas with low visual quality would include wide-open areas caused by extensive clearcuts or windthrow and forests with dense, even-aged stands as characterized by early stages of regeneration after timber harvest (Anderson 1978, Brush 1979, Magill 1994) However, some types of timber harvesting that involves selective cutting and thinning can actually improve visual quality."(Ryan 2005)

Aspen would be enhanced whenever it is present in these units. Regeneration of aspen will add diversity of color and texture to the stands. These activities would create additional visual depth into the forest, and increase age-class diversity by decreasing the density of vegetation. Essentially this treatment would rehabilitate the landscape to the desired landscape characteristics.

Commercial thinning in the forested stands would occur over approximately 4,516 acres in the project area. Approximately 786 acres would occur in retention within the foreground, and the remainder of the 3,730 acres occurring in the middle-ground distance zone and retention, partial retention and modification visual quality objectives. Treated units would have slash piles that remain in the units for a year. Design features 46, 47, 49, 52, 53, 55 and 57 have measures to reduce the visual impact of slash. If the design features are implemented partial retention and modification visual quality objectives would be met within 2 years, and retention within 2 to 3 years.

Pre-Commercial Thinning of trees under7 inches dbh (tractor & skyline) over 1,330 acres

Thinning medium to high stocked stands helps to reduce risk of insect and disease problems, as well as reducing the risk of fire. The healthier the forest stands are, the better they appear visually. Thinning densely stocked stands improves and rehabilitates the scenic character of the stand. The visual quality objectives assigned to these units would be met if the design features described above are implemented.

Non-commercial fuels treatment

Non-commercial fuels treatments would occur on 445 acres which would include a combination of burning, hand thinning, pruning, hand piling to achieve the desired level of fuels reduction in each of the proposed units. These units occur in partial retention and modification visual quality objectives. Partial retention is expected to be met after the first growing season, and modification would be met after implementation of the treatment.

Meadow treatment of hand felling, piling and burning of encroaching conifers

Effects to visual resources include enhancing the vegetative mosaic by retaining and improving the meadows from pine encroachment. This would occur by adding spatial variety into the stands and modifying the form of the stands and meadows. All visual quality objectives would be met with implementation of this activity and associated design features.

Shaded Fuelbreak (pruned and commercial thin/ or handpile and burned with 10 foot crown separation)

The direct effect, both short and long-term, of the fuelbreak treatment would be reduction of density in the existing canopy cover. Management activities in these fuelbreaks could be noticeable by forest visitors, primarily those units in the foreground displayed in table 83. The appearance of overstocked units would be improved by decreasing the stand density. Forest visitors would be able to see deeper into the Forest improving the overall view of that landscape. Forest visitors at the Lost Trail Pass Ski area may notice the changes in the stand density.

> A fuelbreak (or shaded fuelbreak) is an easily accessible strip of land of varying width (depending on fuel and terrain), in which fuel density is reduced, thus improving fire control opportunities. The stand is thinned, and remaining trees are pruned to remove ladder fuels. Brush, heavy ground fuels, snags, and dead trees are disposed of and an open, park like appearance is established. (Dennis)

Table 83. Proposed shaded fuelbreaks

Unit	Distance Zone	Visual Quality Objective
16	Middleground	Partial Retention/ Maximum Modification
17a, b	Foreground	Retention
17c	Foreground/ Middleground	Retention
17d	Foreground/ Middleground	Retention/ Partial Retention
227	Foreground	Retention
229	Foreground	Retention
231	Foreground	Retention/ Partial Retention
23b	Foreground	Retention
229	Foreground	Retention
226	Middleground	Modification

Aspen and Whitebark pine treatments

The removal of competitive species by the use of fire and non-ground disturbing mechanical treatments would improve the diversity of species, color, texture and the forms of the stands. This activity would rehabilitate the landscape towards the desired landscape characteristics. These activities would occur in the foreground and middleground distance zones. All visual quality objectives would be met with implementation of this activity and associated design features.

Ladder fuels

Ladder fuels would be reduced along ingress/egress routes – 400 feet on each side of route – where other thinning is not planned this would be accomplished through hand treatment, hand piling and burning (non-commercial 18 by 18 foot spacing).

The effects to visual/scenery resources from ladder fuel reduction is the same as described above for commercial thinning, with the difference of the ladder fuels treatment being parallel to the roads. Although these treatments are not displayed on a map, the areas to be treated for ladder fuel reduction along Highway 93 would be evident to the average Forest visitor. The majority of the landscape adjacent to Highway 93 is assigned the retention visual quality objective. After design features are implemented and the first growing season has passed it is anticipated that these treatments would meet modification. After 2 growing seasons the partial retention visual quality objective should be achieve, and retention after 3 growing seasons.

Prescribed burning

Short-term direct effects from prescribed burning include the presence of black and charred vegetation and sometimes soils. “While prescribed burning can mimic natural disturbance, like a wildland fire it can leave a forest blackened and charred and is perceived negatively by the public(Ryan 2005).” This effect is overcome within one year, and would only have a short-term effect as seen by the average forest visitor. Multiple prescribed burns may be ignited during the annual period of time when the forest performs prescribed burning. The individual burns would not last long, however burning in the project area could occur for 15 consecutive years.

Long-term direct effects from broad scale, low to moderate intensity underburning in thinning units and surrounding locations would reduce fuel loading and promote regeneration of trees, shrubs, wildflowers and other herbaceous plants. This activity would diversify the vegetative mosaic in regards to vegetative forms, natural appearing lines, and additional colors and textures in the forest stands. When aspen is present in the stand, the aspen regeneration will be enhanced by burning. Prescribed burning is a management tool that can be used to rehabilitate the landscape towards the desired landscape characteristics. After the first growing season of a burned area and implementation of design features 47-49 and 54-56, the visual quality objectives of partial retention and modification would be met. The retention visual quality objective should be met after1 to 2 growing seasons.

Approximately 212 miles of fireline would be created on the perimeters of all helicopter, pre-commercial thin, skyline and tractor units in order to implement prescribed burning after the other treatments have been completed. An additional 15.5 miles fireline along burn unit perimeters could potentially be needed. Typically, firelines are about twelve to eighteen inches wide. Forest visitors traveling along Highway 93 would not likely notice any firelines due to their high speed of travel. Trail users and campers at Twin Creek Campground may notice firelines after construction and up to re-establishment of ground cover. Firelines would be constructed in all visual quality objectives and in all distance zones over a ten to fifteen year period. After implementation of design features, the visual quality objectives of partial retention and modification would be met. The retention visual quality objective should be met after 1 to 2 growing seasons.

Roads

Approximately 13.9 miles of new temporary roads would be constructed. About 3 miles in retention, 8 miles in partial retention, Miles of temporary roads proposed on existing road templates include 1 in retention, 8 in partial retention, 2 in modification and 18 in maximum modification visual quality objectives. All proposed new temporary roads would be rehabilitated and closed following use. With the implementation of design feature 42 the decommissioning the temporary roads would meet the all of the visual quality objectives. However, it may take 3 years or longer to meet retention since slash may be stored along the road according to design feature 114.

In addition, around 66 miles of road would be decommissioned. Miles of road decommissioning proposed on existing road templates include 6 in retention, 33 in partial retention, 25 in modification and 1 in maximum modification visual quality objectives. This activity would improve the scenic characteristics of the project area, and meet all of the project visual quality objectives.

Direct and Indirect Effects Viewed from Sensitivity Level 1 Areas

Proposed Activities within the Immediate Foreground (300 feet) of Sensitivity Level 1 Developed Recreation Sites and Trails

A variety of treatments are proposed within the immediate foreground of sensitivity level 1 trails and Highway 93 the Salmon River Scenic Byway /Lewis and Clark National Historic Trail within the project area. The Chief Joseph Ski Area lies within the maximum modification visual quality objective, therefore it is not displayed below. Table 84 through table 88 show the types of proposed treatments for each sensitivity level 1 area. Design features 46 to 54 are in place to minimize affects to visual resources adjacent to sensitivity level 1 area. Other design features may apply depending upon the activity proposed. It is probable that some landings would be located in the immediate foreground of these areas. If so, the landings would be visually disruptive to the surrounding landscape and would not blend into the landscape for several years as mentioned above. The landings would not appear natural to forest visitors.

Continental Divide National Scenic Trail

Proposed activities viewed along the Continental Divide National Scenic Trail include meadow treatments and commercial thinning with tractor logging and prescribed burning. These activities would be noticeable in the immediate foreground and foreground distance zones. The effects to scenery are the same as described above for commercial thinning followed by prescribed burning and meadow treatments. Portions of the units drop over the ridge making those portions of the unit unlikely to be seen by trail users. Commercial thinning and meadow treatments would enhance the recreation setting and landscape characteristics of the trail. The forest visitor’s experience along the portion of the Continental Divide National Scenic Trail may be directly affected by logging trucks and other associated equipment operating in the trail corridor that is also planned as a haul route for the proposed activities adjacent to the trail. The sights and sounds of the logging equipment would be a distraction from the natural environment. Refer to table 84 for additional detail.

Table 84. Activities within the immediate foreground of the Continental Divide National Scenic Trail

Unit #	Treatment	Harvest Method
36, 38a, 38b, 39, 40, 42, 43, 43a, 43b,	Commercial thin/ prescribed burning	Tractor
20-25	Meadow	Hand treatment

Twin Creek Campground

A shaded fuel break treatment is proposed around and within Twin Creek Campground. See table 85 for additional detail. The effects to scenery are the same as described above for shaded fuel-breaks. Campers would notice disturbance on the forest floor lasting about 2 to 3 growing seasons. The forest canopy would be opened up with several large trees remaining. This would provide increased views into the forest as seen from the campground. Visual simulations were developed for Viewpoint 5 at Twin Creek Campground. Refer to appendix B of the scenery analysis, located in the project record, for the location of viewpoint 5, and the simulations from that point. Figure 30 is a photo taken at Twin Creek Campground.

Table 85. Activities within the immediate foreground of Twin Creek Campground

Unit #	Treatment	Harvest Method
228	Shaded Fuelbreak	Hand treatment

Twin Creek and Twin Creek Ridge Trails

Proposed activities adjacent to these trails include commercial thinning with tractor and skyline logging systems, pre-commercial thinning and prescribed burning, and meadow treatments. The effects of these logging removal systems and treatments are described above. The tractor and skyline removal areas and landings would be the most visible activities with long duration of views by trail users. Prescribed burning would be evident to the trail users, but would recover quickly after one growing season. Refer to table 86 and figure 31 for additional detail.

Table 86. Activities within the immediate foreground Twin Creek and Twin Creek Ridge Trails

Unit #	Treatment	Harvest Method
228, 116b, 118b-e	Commercial thin/ prescribed burning	Tractor
187,118a	Commercial thin/ prescribed burning	Skyline
117,152,147, 148, 149	Pre-commercial thinning/ prescribed burning	Hand treatment
34	Meadow	Hand treatment

Powder Gulch Trail

Proposed activities adjacent to the Powder Gulch trail include pre-commercial thinning, and non-commercial fuel treatments. The effects of these logging removal systems and treatments are described above. The overall scenic characteristics of the stand would be improved, thus improving the views for trail users. The sights and sounds of the logging equipment would be a distraction from the natural environment. See table 87 for details.

Table 87. Activities within the immediate foreground of the Powder Gulch Trail

Unit #	Treatment	Harvest Method
181-183, 189	Pre-Commercial Thin/ prescribed burning	Hand treatment
68, 244	Non-commercial Fuels	Hand treatment

Highway 93, Salmon River Scenic Byway/ Lewis and Clark Historic Trail

Several activities are proposed adjacent to the Scenic Byway. Commercial thinning by tractor, skyline, and helicopter systems followed by prescribed burning, shaded fuelbreaks, and pre-commercial thinning and prescribed burning. Travelers on the highway are moving at a high speed. They would not notice as much of the detail of changes in the landscape as the campers and trail users described above would, unless they are stopped at a pullout. Units using skyline logging removal have the potential to be the most noticeable activities from the byway/historic trail, depending upon the location of the skyline corridors. If the corridors can be placed at an angle to the highway, the corridor would be less noticeable than if it is perpendicular to the highway. If landings are located adjacent to the highway they would stand out as an unnatural part of the landscape and appear very obvious to forest visitors, even traveling at high speeds. The immediate foreground of Highway 93 occurs in retention making it even more important to blend activities into the landscape in this area. Ladder fuel reduction activities would also be noticeable to travelers on Highway 93 with a medium duration of view depending upon how long the ladder fuel treatment units end up.

Visual simulations were done using Visual Nature Studio along Highway 93. Figure 31 is a map of the viewpoints. Simulations are illustrated in appendix B of the visual resources report, located in the project record. Twenty-five viewpoints were established along Highway 93. The viewpoints with views of proposed units are: 1, 3, 5, 7, 9, 20, 23, 24, and 25. Refer to table 88 for specific units. Figure 33 through figure 36 display the units along Highway 93. Proposed activities are the most dominant seen from viewpoints 3, 7 and 20. Viewpoint 3 is at the confluence of Deep Creek and the North Fork of the Salmon River. Viewpoint 7 is near Moose Creek Estates, and viewpoint 20 is at Twin Creek. Refer to figure 30 through figure 36 for the existing condition photos of these views.

Table 88. Activities within the immediate foreground of Highway 93

Unit #	Treatment	Harvest Method
54, 123,	Commercial thin/ prescribed burning	Skyline
121, 125a- 125e	Commercial thin/ prescribed burning	Tractor
50a- 50c	Commercial thin/ prescribed burning	Helicopter
17a, 17d, 227, 228	Shaded Fuelbreak	Hand treatment
117	Pre-commercial thin/ prescribed burning	

Activities within the Retention VQO and Foreground Distance Zone of the CDNST and Highway 93

Multiple activities are proposed within the retention visual quality objective and foreground distance zone of Highway 93 the Salmon River Scenic Byway/ Lewis and Clark Historic Trail. In the foreground distance zone a high level of detail in the landscape is apparent to people. “Normally in foreground views, the individual boughs of trees form texture.” (USDA 1974) Approximately 1,386 acres of treatment is proposed within retention and the foreground distance zone of Highway 93. Table 89 shows the units and treatment types within retention and the foreground distance zone.

Table 89. Activities within the retention visual quality objective and foreground distance zone of Highway 93

Unit #	Treatment	Harvest Method	Acres
36, 38a, b, 39, 40, 40a, b, 42, 43a,b, 51, 98, 112-114, 116B, 121, 124, 125a,b,c,d,e, 199, 200, 202, 214, 217, 218, 221	Commercial thin/ prescribed burning	Tractor	287
54, 73, 87, 122, 123, 195, 196, 197, 201, 208, 212, 213, 215, 216, 219, 222	Commercial thin/ prescribed burning	Skyline	174
50s,b,c, 70, 71a,b,c, 126, 224, 225	Commercial thin/ prescribed burning	Helicopter	325
111, 117 153, 155, 160, 162, 164, 165, 194	Precommercial thinning/ prescribed burning		155
18-25, 30, 32	Meadow	Hand felling	31
17a,b,c,d, 226-231	Shaded Fuelbreak		414

Activities are also proposed within retention and the foreground distance zone of the Continental Divide National Scenic Trail. Most of proposed activities in this area are meadow treatments. Approximately 270 acres of treatment is proposed within retention and the foreground distance zone of the Continental Divide National Scenic Trail. Table 90 shows the units and treatment types within retention and the foreground distance zone.

Table 90. Activities within the retention visual quality objective and foreground distance zone of the Continental Divide National Scenic Trail

Unit #	Treatment	Harvest Method	Acres
38a,b, 39, 40, 41a,b, 42,43a,b. 134	Commercial thin/ prescribed burning	Tractor	131
18-25	Meadow/ prescribed burning	Hand felling	139

These treatments would be very noticeable to hikers on the Continental Divide National Scenic Trail during and up to 2 growing seasons after completion of the activities. Trail users would have long duration of views of the proposed commercial thinning, meadow treatments and prescribed burning. After the first growing season following the management activities and implementation of the design features the changes is the characteristic landscape wouldn't be very noticeable to trail users. If landings are located adjacent to the Continental Divide National Scenic Trail they would stand out as an unnatural part of the landscape and appear very obvious to trail users. The majority of immediate foreground of the Continental Divide National Scenic Trail within the project area occurs in retention making it even more important to blend activities into the landscape in this area.

A series of maps was created to display the proposed activities in relationship to the sensitivity level 1 areas. The maps are located in the specialist report in the project record.

Cumulative Effects

The cumulative effects analysis area for this resource is the project area, including both National Forest System lands and those under other ownership. Past management activities including but not limited to timber harvesting/ vegetation management, mining, domestic grazing, transportation system construction, Lost Trail Pass Ski Area Special Use Permit, fire suppression, prescribed burning and fuels reduction, and insects and disease levels have created a mosaic of forested areas interspersed with meadows and some

pockets of hardwoods and spruce providing diversity in the landscape. The timeframe for the cumulative effects analysis is twenty years.

Reasonable foreseeable activities in the project area that could affect visual/scenery resources include:

- Sanitation salvage project on within the Lost Trail Pass Ski Area to reduce hazard trees.
- Pre-commercial thinning in approximately twenty years.
- Fire suppression is expected to occur within the project area to control natural and human caused fires. It is expected that fires would continue to occur at a rate of 2 fires per year.
- Continued outbreak and cycles of insects and disease especially in roadless parts of the project area where there is no active forest management. In areas planned for hazardous fuel reduction treatments, insect and disease levels should return to endemic levels.
- Continued noxious weed management within the project area.
- Residential development in Moose Creek estates would occur over the next decade, and potentially on other private lands within the project area.

The sanitation salvage and pre-commercial thinning projects would improve the visual/scenic characteristics of those areas. Fire suppression would attempt to control the spread of fire leaving as much of the forest canopy intact as possible. Noxious weed management is a tool in achieve the desired characteristic landscape. These activities considered with the proposed actions do not contribute to cumulative effects regarding visual/scenery resources. It is anticipated that the Forest Plan would be met with the addition of the activities above.

Since there are no regulations for scenic resource management on private lands, the effects of ongoing private development adjacent to Forest lands can sometimes have negative effects on scenic resources of the continuous landscape. When activities on private land are designed to limit impacts to scenic resources, the differences between private lands and Forest lands are less noticeable.

The potential for insects and disease to increase in the Allan Mountain and Anderson Mountain Roadless Areas during and after implementation of the proposed activities would cumulatively effect visual/scenic characteristics of the project area. The visibility maps shown in Appendix B, illustrate that the majority of the roadless areas are seen from Highway 93. An increase in dead and dying trees would be visible by the average forest visitor along Highway 93, Twin Creek Campground, Continental Divide National Scenic Trail, and other trails in the project area. If an increase in insects and disease occurs, those areas would deviate from their assigned visual quality objectives.

Conclusion

The reasonable foreseeable activities considered with the proposed actions do not contribute to cumulative effects regarding visual/scenery resources. It is anticipated that the Forest Plan would be met with the addition of the activities above. If an increase in insects and disease occurs in the Allan Mountain and Anderson Mountain Roadless Areas during and after implementation of the proposed activities, those areas would deviate from their assigned visual quality objectives.

Adverse Effects

No adverse effects to visual/scenery resources are expected to result from the implementation of the proposed activities.

Irreversible & Irretrievable commitments of resources

No irreversible or irretrievable commitments of visual/scenery resources are expected to result from the implementation of the proposed activities.

Compliance with the Forest Plan and Other Regulatory Direction

Twenty-five viewpoints were established along Highway 93. Refer to figure 31 for a map of the viewpoints. Simulations were created of proposed activities from each of the viewpoints and are illustrated in Appendix B of the visual resources report, located in the project record. The viewpoints with views of proposed units are: 1, 3, 5, 7, 9, 20, 23, 24, and 25. Refer to table 88 for specific units. Figure 33 through figure 36 display the units along Highway 93. Proposed activities are the most dominant seen from viewpoints 3, 7 and 20. Viewpoint 3 is at the confluence of Deep Creek and the North Fork of the Salmon River. Viewpoint 7 is near Moose Creek Estates, and viewpoint 20 is at Twin Creek. Refer to figure 30 through figure 36 for the existing condition photos of these views.

The following proposed activities would promote rehabilitation of the landscape back to more natural characteristics:

- Thinning and removal of live trees and reducing the shrub/understory component would open up the stands to a park-like vegetative mosaic that is characteristic of pre-fire suppression efforts, essentially rehabilitating the landscape characteristics and enhancing the visual quality.
- Aspen would be enhanced whenever it is present in these units. Regeneration of aspen will add diversity of color and texture to the stands. These activities would create additional visual depth into the forest, and increase age-class diversity by decreasing the density of vegetation. Essentially this treatment would rehabilitate the landscape to the desired landscape characteristics.
- The appearance of overstocked units would be improved by decreasing the stand density in units proposed for shaded fuelbreaks.
- Prescribed burning is a management tool that can be used to rehabilitate the landscape towards the desired landscape characteristics.

The forest wide direction regarding visual resources in the Forest Plan includes the ability to rehabilitate and enhance landscapes across the Forest. The proposed activities would rehabilitate the existing landscape as described above in the effects analysis. Although the retention visual quality objective would not be met until 3 to 5 years in some areas with implementation of the design features, overall the end goal of rehabilitating the landscape would be in compliance with the Forest Plan. Forest wide direction states that retention and partial retention are supposed to be met 1 growing season after completion of a project. Since several landscape characteristics will be rehabilitated with the implementation of the project, it would take longer to meet retention and partial retention.

With application of the design features direction for all management areas regarding visual resources would be met within 5 years of completion of an activity.

Design features are in place to minimize the effects to visual/scenery resources along Highway 93 the Salmon River Scenic Byway and Lewis and Clark National Historic Trail, Continental Divide National Scenic Trail as well as other areas. If the design features are implemented, the resource management strategies outlined in the Salmon River Scenic Byway Corridor Management Plan would be met.

If the design features are implemented and landing locations are avoided in the immediate foreground of Highway 93 and the Continental Divide National Scenic Trail alternative 1 would be in compliance with the Forest Plan within 5 years as described above. However, in the short-term some impacts to scenery

resources along the Continental Divide National Scenic Trail and Lewis and Clark National Historic Trail would be evident to those trail users as described above, and may conflict with the nature and purpose of the trails until the assigned visual quality objective is met over time. Since the portion of the Continental Divide National Scenic Trail in the project area is coincidental with Forest road 081 also known as Anderson Mountain Road, and that road is going to be used as a haul route to implement the proposed activities, there is a potential conflict with the proper use and management of the road that also serves as the Continental Divide National Scenic Trail.

Action Alternative 2 – No New Temporary Road Construction

Direct and Indirect Effects (short–term and long–term)

Effects from mechanical logging removal methods are the same as for alternative 1 the proposed action. However, the acreage does vary between alternatives. Refer to table 91 for the acres of each logging method proposed in the range of visual quality objectives.

Approximately 1,899 acres of tractor logging are proposed in this alternative. This is a decrease of 449 acres proposed in alternative 1. The visual quality objective with the biggest decrease in tractor removal method is partial retention. Refer to table 93 to see the sensitivity level 1 use areas with tractor logging systems proposed in the immediate foreground. Approximately 569 acres of tractor logging systems are proposed in the foreground distance zone of Highway 93, with 229 of those acres in retention. About 1,330 acres are in the middle-ground distance zone. The units in the immediate foreground and foreground would be easily noticeable by the average forest visitor for at least two summer seasons and after slash piles treatment and design features have been completed. The effects to visual/scenery resources from tractor logging removal are the same as described in alternative 1.

About 596 acres of skyline logging are proposed in this alternative. This is a decrease of 436 acres proposed in alternative 1. The biggest decrease occurs in retention and partial retention visual quality objectives. Approximately 178 acres of proposed skyline cable system are proposed in the foreground of Highway 93, Salmon River Scenic Byway. About 53 of those acres are in the retention visual quality objective. The remaining 418 acres of the skyline units fall within the middle-ground of all of the sensitivity level 1travelways and use areas. Results from simulations using Visual Nature Studio from the project viewpoints illustrate that the skyline units shown in table 91 would be visible along Highway 93.

Table 91. Skyline units visible from Highway 93

Viewpoint	Skyline Unit	Visual Quality Objective
9	213	Retention
25	201	Partial Retention

The amount of skyline logging methods viewed along Highway 93 is greatly reduced in alternative 2 than what is proposed in Alternative 1 reducing the overall impacts to visual/scenery resources.

Around 1,949 acres of timber would be removed by helicopter in the project area. This is an increase of 814 acres from what was proposed in alternative 1. Approximately 501 acres of helicopter logging would take place in retention in the foreground and about 1,448 acres in other visual quality objectives in the middle-ground distance zone. The increase of helicopter removal and decrease of tractor and skyline removal methods would result in fewer impacts to the scenic characteristics of the project area than alternative 1. Table 92 displays the acres of the logging removal methods per visual quality objective proposed in alternative 2.

Table 92. Alternative 2 acres of logging removal methods per visual quality objective

Logging Method	Acres per Visual Quality Objective			
	Retention	Partial Retention	Modification	Maximum Modification
Tractor	314	977	495	113
Skyline	53	225	318	0
Helicopter	509	1196	153	91

Landings

The location of landings has not been identified at this point. Any landing that would be adjacent to Highway 93 or the Continental Divide National Scenic Trail would meet modification in the short-term. Following implementation of design features it would take 1 to 2 growing seasons before the landing would meet partial retention and between 3 to 5 years to meet retention. Without further information on landing location, no additional effects can be predicted.

Table 93. Alternative 2 acres of vegetative treatment per visual quality objective

	Visual Quality Objective			
Vegetative Treatment	Retention	Partial Retention	Modification	Maximum Modification
Commercial Thin to 18X18 ft & Pre-commercial thin to <7” dbh	876	2398	966	204
Pre-commercial thin to <7” dbh	155	579	520	16
Non-commercial treatments (burning, hand thinning, pruning, hand piling)	0	72	373	0
Meadow Treatment	205	455	622	9
Shaded Fuelbreak	462	265	251	68
Prescribed Burning	1698	3769	2732	297

Direct and Indirect Effects of Treatment Types (short–term and long–term)

Effects from implementing the proposed treatment types are the same as for alternative 1 the proposed action. The acreage between alternatives is very similar. There is a slight increase in the amount of commercial thin to 18 by 18 feet in the retention and modification visual quality objectives. The shaded fuelbreak acreage decreases in visual quality objective and increases in partial retention and modification visual quality objectives. The other treatments remain at the same level as in alternative 1. Table 93 displays the acres of treatment by visual quality objective.

The viewpoints with views of proposed units in the immediate foreground of alternative 2 are: 7, 9, 20, 23, 24, and 25. Figure 33 through figure 36 display the units along Highway 93. With the exception of unit 123 that has changed from a skyline unit to helicopter, the units and effects are the same as alternative 1. Proposed activities are the most dominant seen from viewpoints 3, 7 and 20. Viewpoint 3 is at the confluence of Deep Creek and the North Fork of the Salmon River. Viewpoint 7 is near Moose Creek Estates, and viewpoint 20 is at Twin Creek. Refer to figure 30 through figure 36 for the existing condition photos of these views.

Activities within the Immediate Foreground of Developed Recreation Sites and Trails

A variety of treatments are proposed within the immediate foreground of sensitivity level 1 trails, Highway 93, and Twin Creek Campground within the project area. The Chief Joseph Ski Area lies within the Maximum Modification visual quality objective, therefore it is not included in this analysis. The majority of proposed treatments and units are the same as Alternative 1, with the exception that no skyline logging would occur in the immediate foreground of Highway 93. Proposed treatments and potential effects along the Continental Divide National Scenic Trail are the same as alternative 1. A series of maps were created to display the sensitivity level 1 areas and the proximity to proposed activities. These maps are located in the scenery specialist report in the project record.

Activities within the Retention VQO and Foreground Distance Zone of the CDNST and Highway 93

Multiple activities are proposed within the retention visual quality objective and foreground distance zone of Highway 93 the Salmon River Scenic Byway. In the foreground distance zone a high level of detail in the landscape is apparent to people. “Normally in foreground views, the individual boughs of trees form texture.” (USDA 1974) Approximately 1,393 acres of treatment is proposed within retention and the foreground distance zone of Highway 93. Table 94 shows the units and treatment types within retention and the foreground distance zone. The effects from the proposed treatments and harvest methods are described above.

Table 94. Activities within the retention visual quality objective and foreground distance zone of Highway 93

Unit #	Treatment	Harvest Method	HWY 93 Acres
36, 38a,b, 39, 40, 41a,b, 42, 51, 98, 112-114, 116B, 121, 124a, 125a,b,c,d,e, 134, 199, 200, 202, 273, 277, 278,	Commercial thin/ prescribed burning	Tractor	229
58, 141, 153, 161,162, 173, 196, 261, 272	Commercial thin/ prescribed burning	Skyline	53
50s,b,c, 70, 71a,b,c, 122b, 123, 124b, 126, 213-217, 219, 221, 225	Commercial thin/ prescribed burning	Helicopter	501
111, 117 153, 155, 160, 162, 164, 165, 194	Pre-commercial thinning		155
30, 32	Meadow	Hand felling	31
17a,b,c,d, 226-231	Shaded Fuelbreak		417

Activities are also proposed within retention and the foreground distance zone of the Continental Divide National Scenic Trail. Most of proposed activities in this area are meadow treatments. Approximately 152 acres of treatment is proposed within retention and the foreground distance zone of the Continental Divide National Scenic Trail. Table 95 shows the units and treatment types within retention and the foreground distance zone.

Table 95. Activities within the retention visual quality objective and foreground distance zone of the Continental Divide National Scenic Trail

Unit #	Treatment	Harvest Method	Acres
38a,b, 39, 40, 41a,b, 42,43a,b. 134	Commercial thin/ prescribed burning	Tractor	131
18-25	Meadow	Hand felling	139

The effects from commercial thinning/prescribed burning and meadow treatments are the same as described in alternative 1 along the Continental Divide National Scenic Trail.

Cumulative Effects

The cumulative effects for alternative 2 are the same as alternative 1.

Adverse Effects

No adverse effects would occur to visual/scenery resources from implementation of this alternative.

Irreversible and Irretrievable Commitments of Resources

No irreversible or irretrievable commitments of visual/scenery resources would occur to visual/scenery resources from implementation of this alternative.

Compliance with the Forest Plan and Other Regulatory Direction

Proposed activities are the most dominant seen from viewpoints 3, 7 and 20. Viewpoint 3 is at the confluence of Deep Creek and the North Fork of the Salmon River. Viewpoint 7 is near Moose Creek Estates, and viewpoint 20 is at Twin Creek. Refer to figure 30 through figure 36 for the existing condition photos of these views.

The following proposed activities would promote rehabilitation of the landscape back to more natural characteristics:

- Thinning and removal of live trees and reducing the shrub/understory component would open up the stands to a park-like vegetative mosaic that is characteristic of pre-fire suppression efforts, essentially rehabilitating the landscape characteristics and enhancing the visual quality.
- Aspen would be enhanced whenever it is present in these units. Regeneration of aspen will add diversity of color and texture to the stands. These activities would create additional visual depth into the forest, and increase age-class diversity by decreasing the density of vegetation. Essentially this treatment would rehabilitate the landscape to the desired landscape characteristics.
- The appearance of overstocked units would be improved by decreasing the stand density in units proposed for shaded fuelbreaks.
- Prescribed burning is a management tool that can be used to rehabilitate the landscape towards the desired landscape characteristics.

The proposed activities would promote rehabilitation of the landscape back to more natural characteristics. The forest wide direction regarding visual resources in the Forest Plan includes the ability to rehabilitate and enhance landscapes across the Forest. The proposed activities would rehabilitate the existing landscape as described above in the effects analysis. Although the retention visual quality objective would not be met until 3 to 5 years in some areas, overall the end goal of rehabilitating the landscape would be in compliance with the Forest Plan. Forest wide direction states that retention and partial retention are supposed to be met 1 growing season after completion of a project. Since several landscape characteristics would be rehabilitated with the implementation of the project, it would take longer to meet retention and partial retention.

Design features are in place to minimize the effects to visual/scenery resources along Highway 93, Salmon River Scenic Byway, as well as other areas. If the design features are implemented, the resource management strategies outlined in the Salmon River Scenic Byway Corridor Management Plan would be met.

Although alternative 2 has less impact to visual/scenery resources than alternative 1, both alternatives would be in compliance with the Forest Plan if the design features are implemented.

Socioeconomics

Affected Environment

Project Area: The Upper North Fork Ecosystem Restoration Project is on the North Fork Ranger District of the Salmon-Challis National Forest and is located approximately 40 miles north of Salmon, Idaho, about 20 miles south of Sula, Montana, and 25 miles west of Wisdom, Montana. The predicted economic impact area includes Lemhi County, Idaho (all of the project area is in Lemhi County); adjacent Ravalli and Beaverhead Counties in southwest Montana; and Missoula County, Montana. Seeley Lake, Montana, which is within Missoula County, is home to Pyramid Mountain Lumber, the most active bidder on commercial timber offerings in the North Fork Ranger District in recent years.

The communities in this area are public lands dependent -- three-fourths of the land base encompassed by the four county impact area is managed by various public agencies, with 69 percent of the nearly 9.6 million acres being federally owned an additional 6 percent owned by the states of Idaho and Montana. The Forest Service manages around 5,250,000 acres, or about 55 percent of the impact area. Lemhi County has the larger share of federal public lands (90.2 percent), followed by Ravalli County (74.5 percent), Beaverhead County (59.8 percent), and Missoula County (43.5 percent). By comparison, 28.8 percent of the continental United States is federally owned.

Socioeconomic measures used to describe the affected environment were obtained from the Headwaters Economics" Economic Profile System – Human Dimensions Toolkit (EPS-HDT), which compiles and summarizes primary population and economic data from a variety of government sources into county, multi-county or state assessments.

Table 96 through table 99 provide detailed descriptions of population, income, and employment trends in the four county area. The narrative for each county assesses infrastructure and workforce relevant to the types of economic activities associated with the Upper North Fork Ecosystem Restoration project.

Lemhi County, Idaho:

Lemhi County is a rural county with a population of 7,967 and a total of 1.7 persons per square mile. The racial makeup of the county is 3 percent minority. Per capita income in the county of $31,839 lags significantly behind the national per capita income average of $41,560 and trails the State of Idaho per capita income of $33,326. Above average unemployment has been a persistent problem in Lemhi County; in 2012, the unemployment rate for the county averaged 9.9 percent, higher than the 7.1 percent average employment for the state of Idaho. About 15 percent of the population is below the poverty line.

Lemhi County's 92 percent public lands encourage an active tourist industry and high dependency on natural resources. Management of those public lands and natural resources contributes to a high percentage of federal and state employment. Ranching is an important economic driver in this rural area. Grazing of public lands supplements most of the private ranching operations in the valley. Logging and mining employed hundreds of workers in the 1980s through the mid-1990s, but by the early 2000s, the last large sawmill was closed, and the Beartrack Mine and Blackbird Mine's only employees were working on mine closure and reclamation. From 1998 to 2011, timber employment shrank from 120 to 43 jobs – a 64 percent decrease. During that same period, mining employment shrank from 177 to 15 jobs – a 91.5 percent decrease.

Lemhi County has one remaining owner/operator sawmill, capable of kiln-drying dimensional lumber; however, because of low demand for dimensional lumber, this mill has recently been focusing on producing commercial firewood. Other than the owner/operator, this mill has no full-time employees. A laminated beam plant operates near Tendoy, Idaho, employing approximately 40 people; the wood material used in the beam manufacturing is typically sourced from out of state. There are several small-scale owner/operator post and pole operations remaining in the county, and several individuals harvesting timber in the area to sell to the home firewood market. Some hunting and fishing outfitters in the area have invested in cross-training their employees to include natural resource management skills such as tree thinning, trail improvement, and noxious weed abatement.

Beaverhead County, Montana:

Adjacent to the east side of the Upper North Fork project is the Big Hole Valley of Beaverhead County, Montana, and the Beaverhead-Deerlodge National Forest. Beaverhead County's per capita income average of $34,681 trails the national per capita income average of $41,560 and the Montana state average of $36,016, however unemployment is relatively low in the county. The racial makeup of the county is 4 percent minority. About 17 percent of the population is below the poverty line.

The timber industry has not played a significant role in the Beaverhead County economy, and mining employment has declined steeply. From 1998 to 2011, mining employment shrank from 178 to 71 jobs – a 60 percent decrease.

Beaverhead County's more than 3.5 million acres are comprised of 70 percent public lands. Ranching is an economic driver in the area, the county's fishing, hunting, and camping opportunities encourage an active tourist industry, and management of public lands and natural resources contributes to a high percentage of federal and state employment. Dillon, Montana, is home to the University of Montana Western. Education, health, and social services make up 24 percent of Beaverhead County's employment.

Ravalli County, Montana:

Adjacent to the north side of the Upper North Fork project is Ravalli County, Montana. Lost Trail Ski Resort, an important community asset identified during project design, straddles the borders of Lemhi County, Idaho, and Ravalli County.

Ravalli County grew from 36,301 people in 2000 to 40,450 in 2011 with most of the growth taking place in the communities of Hamilton, Victor, and Stevensville, while the communities closest to the project area – Sula, Conner, and Darby – maintained steady populations. The racial makeup of the county is 3 percent minority. From 2000 to 2011, per capita income increased from $28,258 to $32,070. Unemployment climbed to 8 percent in 2012, above the Montana average unemployment of 6 percent. About 14 percent of the population is below the poverty line.

The timber industry in Ravalli County has significantly diminished, but still maintains a presence. From 1998 to 2011, timber industry jobs fell from 720 to 171 – a 76 percent decrease. After large wildland fires in 2000, many private home owners in the smaller outlying communities (Sula, Conner and Darby) placed their properties for sale at reduced rates and left the area. Many jobs were lost after the 2008 recession eliminated the viability of several log home businesses in Ravalli County. Several small wood products businesses remain in Ravalli County, including log home and post and pole businesses. Companies with equipment and expertise in logging continue to reside in Ravalli County.

Lost Trail Ski Resort operates under a Special Use Permit under the Bitterroot National Forest, although the south side of the area also includes Salmon National Forest lands. Lost Trail, in operation since 1938, employs approximately 100 people during the ski season from November through April. These full and

part-time employees come primarily from Ravalli and Missoula County, Montana, and Lemhi County, Idaho.

Missoula County, Montana:

Missoula County is unique for the area of impact, in that it includes the city of Missoula – which meets the population threshold for a metropolitan area. The other three counties included within the economic impact analysis area – Lemhi, Beaverhead, and Ravalli – are entirely rural.

Missoula County's growth from 96,178 people in 2000 to 110,138 people in 2011 largely reflects the population growth in the Missoula metropolitan area, rather than more rural communities such as Seeley Lake or Swan Valley, where just a few thousand people reside. The racial makeup of the county is 6 percent minority. The timber industry has been particularly hard hit in this area in recent years. In 2007, a downward spiral of Missoula's lumber industry began with the closure of a plywood plant in Bonner, followed by the closure of Bonner's sawmill the next year, and finally the closing of the Smurfit-Stone Container pulp mill in early 2010. From 1998 to 2011, jobs in the timber industry shrank by 1,269 jobs. Missoula County's overall economy gained jobs, however, so unemployment has remained relatively low at under 6 percent average annual unemployment in 2012. About 15 percent of the population is below the poverty line.

Pyramid Mountain Lumber in Seeley Lake is the only remaining Missoula County mill with meaningful capacity, employing approximately 150 people. As referenced previously, Pyramid Mountain Lumber has responded to timber sale offerings on the Salmon-Challis National Forest, and is one of the most active commercial operators on the forest, most recently accomplishing commercial harvest and non-commercial thinning activities on the North Fork Ranger District's Hughes Creek project. Seeley Lake is approximately 150 miles from the Upper North Fork project area.

Table 96. Population

Area	2000 Population	2011 Population	Change 2000-2011	Persons/Square Mile	2000 Minority Population %
Lemhi County, ID	7,724	7,967	+243	1.7	3%
Beaverhead County, MT	9,204	9,198	-6	1.7	4%
Ravalli County, MT	36,301	40,450	+4,149	16.8	3%
Missoula County, MT	96, 178	110,138	+13,960	6.8	6%

Table 97. Employment

Area	2000 Full & Part-Time Jobs	2011 Full & Part-Time Jobs	Change
Lemhi County, ID	4,368	4,359	-9
Beaverhead County, MT	5,486	5,829	343
Ravalli County, MT	17,002	18,797	1,795
Missoula County, MT	66,444	75,726	9,282

Table 98. Per Capita Income

Area	2000 Per Capita Income	2011 Per Capita Income	Change	2000 Population Below Poverty Line
Lemhi County, ID	$27,887	$31,839	$3,952	15%
Beaverhead County, MT	$29,591	$34,681	$5,090	17%
Ravalli County, MT	$28,258	$32,070	$3,812	14%
Missoula County, MT	$33,864	$36,457	$2,594	15%

Table 99. Unemployment

Area	2000 Average Unemployment Rate	2012 Average Unemployment Rate	Change
Lemhi County, ID	7.9%	9.9%	+2%
Beaverhead County, MT	4.1%	5.2%	+1.1%
Ravalli County, MT	5.3%	8.0%	2.7%
Missoula County, MT	4.0%	5.9%	1.9%

Environmental Consequences

No Action Alternative

Under the No Action Alternative, the proposed project area would not be treated for improved forest health and decreased wildland fire risk. Negative economic impacts due to wildland fire are likely to be felt in the communities at risk surrounding the proposed project area: Gibbonsville, the Moose Creek Estates subdivision and surrounding private lands, and Lost Trail Ski Resort. This area has extensive experience with severe wildfire activity. Notable economic impacts from previous fire activities include a marked increase in the economic burden for local emergency services, including volunteer fire departments to support fire management efforts; a loss of tourism due to undesirable air quality; extended and unhealthy smoke levels in surrounding communities; a potential loss in private property values; area closures on public lands; and other safety hazards.

Under the no Action Alternative, the four county area of impact would not receive the economic benefit of potential employment opportunities from forest restoration activities such as timber harvest, heavy equipment operations and an increase in locally available timber and jobs for both large and small timber companies.

Alternative 1 – Proposed Action

The activities described under the proposed action are most likely to result in positive economic benefit in Lemhi County, Idaho; Ravalli County, Montana; and Missoula County, Montana. Although adjacent to the east side of the project area, Beaverhead County, Montana does not have significant forestry infrastructure or workforce to capitalize on economic opportunities associated with the proposed action.

Under alternatives 1 and 2, the types of activities that could involve contractors include: hazardous fuel reduction, noxious and invasive weeds treatment, aspen/whitebark/meadow restoration, multiparty monitoring, road and access improvements, culvert replacement/removal, and contract administration.

The proposed action includes hazardous fuels reduction treatments on approximately 4,535 acres of the project area. Ground based harvest systems using tractors would be utilized on 2,364 acres, skyline yarding systems would be utilized on 1,032.4 acres, and 1,139 acres would utilize helicopters for tree removal. Approximately 970 acres of strategically located shaded fuel breaks are proposed for treatment.

It is anticipated that tractor and skyline logging operations would be accomplished by local or regional companies due to hauling costs and access to the project area. Experience from the Hughes Creek Project showed that the majority of forest products went to Missoula County, and much of the work was accomplished by Missoula County residents. Given Pyramid Mountain Lumber's relative proximity to the Upper North Fork project area, this company is likely to benefit economically from alternative 1.

Many of the smaller components of alternative 1 such as hand thinning, road construction and decommission, and weed treatment could be accessible to smaller businesses and could provide an increase in available employment in the four county area during the lifespan of the project. These activities would also provide for continued skill development and retention in these industries. Workforce capacity to conduct pre-commercial and non-commercial thinning activities, shaded fuel breaks, and restoration treatments exists within Lemhi, Beaverhead, Ravalli, and Missoula Counties. Likewise, businesses and equipment are in place within these communities.

Helicopter logging has not been used on the Salmon-Challis National Forest in the past decade, and in that time market prices and the number of companies that log with helicopters have both fallen dramatically. It is likely that this facet of the hazardous fuels treatment activities would be awarded to a contractor outside the region.

Lemhi County Forest Restoration Group's design recommendations to the Salmon-Challis National Forest for the proposed action requested the use Stewardship Contracting to accomplish project objectives. This suggestion was made based on the group's experience with stewardship contracting on the collaboratively designed Hughes Creek Fuels Reduction project. Stewardship contracting authority allows the consideration of best value criteria, which provides for consideration of local economic benefit, and allows smaller local and regional companies to compete for contracting opportunities.

The Lemhi County Economic Development Association and the Salmon-Challis National Forest have entered into a stewardship agreement that includes the project area, making it likely that part or all of the contracting activities under the Proposed Action would be done using stewardship contracting authorities. In the event the Lemhi County Economic Development Association - Salmon-Challis National Forest Stewardship Agreement is used to accomplish Upper North Fork work, implementing Alternative 1 is likely to benefit Lemhi, Ravalli, or Missoula Counties economically.

For the Hughes Creek project, the Lemhi County Forest Restoration Group's multi-party monitoring committee reported on the project's social and economic indicators. The revenue from this project that went to private businesses and non-government organizations totaled $1,043,656 between 2008 and 2012. Of this amount, 39 percent went to Lemhi County entities, 47 percent went to Ravalli or Missoula County, Montana; and the remaining 14 percent of revenue earned went to contractors outside the region (defined as more than 150 miles away from the project area). Timber harvested from the Hughes Creek project area was primarily transported to Pyramid Mountain Lumber's Seeley Lake mill for processing.

Alternative 2 – No New Temporary Road Construction

Under alternative 2, no new temporary road construction would occur. Harvest activities would include commercially thinning from below to reduce the understory on approximately 4,444 acres of the project area, and strategically located shaded fuel break treatments would on approximately 1,050 acres. There

would be 1,899 acres of tractor logging, 596 acres of skyline logging and 1,949 acres of helicopter logging.

Assuming the Forest Service planned to use contractors to construct and/or obliterate the temporary road included as part of the proposed action, alternative 2 would not include the opportunity for economic benefit from these activities.

This alternative provides for less acreage treated with commercial harvest tractor and skyline systems, and more acres of helicopter logging. As no companies exist within the four county area of impact who offer these services, the economic benefit from these activities would be markedly reduced in Lemhi, Beaverhead, Ravalli, and Missoula Counties.

As with the proposed action, under alternative 2 workforce capacity to conduct pre-commercial and non-commercial thinning activities, shaded fuel breaks, and restoration treatments exists within Lemhi, Ravalli, and Missoula Counties. Businesses and equipment are in place within these communities to accomplish weed treatment, road construction, culvert installation, and monitoring objectives of alternative 2. In the event the Lemhi County Economic Development Association - Salmon-Challis National Forest stewardship agreement is used to accomplish Upper North Fork work, contract administration is likely to benefit Lemhi, Ravalli, or Missoula Counties.

Environmental Justice

Populations in the counties of the predicted economic impact area for this project are comprised of 3-5 percent minority people, and 14-17 percent of people below the poverty line. Individual communities within these counties that are in close proximity to the project or that are mostly likely to be affected by activities are not appreciably different in these demographics. Based on these percentages and relative similarity within the geographic area there is no indication of the existence of any readily identifiable low income group or minority population. In the absence of an Environmental Justice population in the area of predicted economic impact, there are no adverse or disproportionate adverse environmental effects from project alternatives to these population segments.

Project Cost Analysis

Proposed Project Activities

The following projects have been identified in the Upper North Fork HFRA Ecosystem Restoration Project. These projects would occur over the next 10 years. This cost analysis was completed in 2012 as part of a “Watershed Restoration Action Plan” which was used as part of a request for special funding towards the implementation of the Upper North Fork Project.

Upper North Fork Hazardous Fuels Prescribed Burning

Project Description: Conduct prescribed burning on up to approximately 40,273 acres, primarily low to moderate intensity under-burning. Reduce ladder fuels along ingress/egress routes (400 feet on each side). Approximately 90 percent of treatment area is in the wildland-urban inteface.

Possible Partners Involvement: Lemhi County Forest Restoration Group, Salmon Valley Stewardship, Lemhi County Economic Development Association. Partners would contribute at least 5 percent as in-kind contributions.

Estimated Timeline: 2014 to 2023

Estimated costs: $600,000 for planning/administration; $2,400,000 for implementation over 10 years ($60/acre average over 40,000 acres)

Upper North Fork Hazardous Fuels Mechanical Treatment

Project Description: Conduct commercial thinning on 4,550 acres (tractor, skyline, and helicopter logging), pre-commercial thinning on 1,270 acres, and non-commercial thinning on 445 acres. Create shaded fuel breaks on 1,971 acres adjacent to Lost Trail Ski Area and Moose Creek Estates. Approximately 90 percent of treatment area is in the wildland-urban Interface.

Possible Partners Involvement: Lemhi County Forest Restoration Group, Salmon Valley Stewardship, Lemhi County Economic Development Association. Partners would contribute at least 5 percent as in-kind contributions.

Estimated Timeline: 2014 to 2023

Estimated costs: $2,000,000 for planning/administration, $4,951,800 for commercial implementation and $1,951,400 for non-commercial over 10 years as shown below:

Table 100. Commercial thinning treatments

Treatment	Acres	Cost/acre	Total cost	Timing
Commercial tractor logging	2364	$300	$709,200	First 6 years
Commercial skyline logging	1032	$800	$825,600	First 6 years
Commercial helicopter logging	1139	$3000	$3,417,000	First 6 years
Total	4535		$4,951,800	

Table 101. Non-Commercial thinning treatments

Treatment	Acres	Cost/Acre	total Cost	Timing
Pre-commercial thinning	1270	$300	$381,000	10 years
Non-commercial thinning	445	$650	$289,250	10 years
Shaded fuel breaks	1971	$650	$1,281,150	First 5 years
Total	3686		$1,951,400	

Upper North Fork Meadow Restoration

Project Description: Conduct meadow restoration on 1,290 acres through hand felling, piling, girdling, and burning of encroaching conifers, improving forest diversity and wildlife habitat.

Possible Partners Involvement: Lemhi County Forest Restoration Group, Salmon Valley Stewardship, Lemhi County Economic Development Association. Partners would contribute at least 5 percent as in-kind contributions.

Estimated Timeline: 2014 to 2015

Estimated costs: $30,000 for planning/administration; $116,000 for implementation over 2 years (30 percent of the total acres would be treated at $300/acre)

Upper North Fork Aspen and Whitebark Pine Restoration

Project Description: Hand felling of competing conifers and prescribed burning to restore aspen and whitebark pine stands, improving forest diversity and wildlife habitat. Includes approximately 50 acres per year over 10 years to treat about 500 acres in the project area.

Possible Partners Involvement: Lemhi County Forest Restoration Group, Salmon Valley Stewardship, Lemhi County Economic Development Association. Partners would contribute at least 5% as in-kind contributions.

Estimated Timeline: 2014 to 2023

Estimated costs: $40,000 for planning/administration, $150,000 for implementation over 10 years (50 acres per year at $300/acre)

Upper North Fork Road Decommissioning

Project Description: Decommission 61.5 miles of non-system roads and 5.6 miles of closed system roads to reduce erosion, sediment delivery to streams, and the spread of weeds.

Possible Partners Involvement: Lemhi County Forest Restoration Group, Salmon Valley Stewardship, Lemhi County Economic Development Association

Estimated Timeline: 2013 to 2017

Estimated costs: $42,000 for planning/administration; $170,000 for implementation ($2,500/mile average for 67 miles of road) over 4 years (17 miles per year)

Upper North Fork Road Maintenance

Project Description: Conduct road maintenance, including blading and drainage repairs, on 70 miles of road. Approximately 23 miles of road would be maintained per year, on a 3-year cycle over 10 years to maintain adequate road conditions and meet best management practices.

Possible Partners Involvement: Lemhi County Forest Restoration Group, Salmon Valley Stewardship

Estimated Timeline: 2014 to 2023

Estimated costs: $30,000 for planning/administration; $130,000 for implementation ($600 per mile average) over 10 years (23 miles per year)

Upper North Fork Salmon River Aquatic Habitat Enhancement

Project Description: Construct approximately 3 to 5 instream rock and/or log structures along a 3-mile reach of the Upper North Fork Salmon River between Crone Gulch Road and Twin Creek Road (with a focus on the Twin Creek area) to promote pool development and spawning habitat for anadromous and resident fish.

Possible Partners Involvement: Lemhi County Forest Restoration Group, Salmon Valley Stewardship, Lemhi County Economic Development Association. Partners would contribute at least 5% as in-kind contributions. Potential partners also include Trout Unlimited and Idaho Department of Fish and Game.

Estimated Timeline: 2014 – 2015

Estimated costs: $10,000 for planning/design (year 1), $40,000 for implementation (year 2)

Upper North Fork Culvert Replacements

Project Description: Replace the Deep Creek, Hammerean Creek, and Johnson Gulch culverts with open-bottom structures to allow aquatic organism passage and restore natural channel function.

Possible Partners Involvement: Lemhi County Forest Restoration Group, Salmon Valley Stewardship, Lemhi County Economic Development Association

Estimated Timeline: 2014 – 2015

Estimated costs: $45,000 for planning/design (year 1); $220,000 for implementation (year 2)

Upper North Fork Weed Treatment

Project Description: Conduct comprehensive weed management throughout the project area, targeting roads and riparian areas and including treatment of up to 12,000 infested acres over 10 years using biological control and herbicides. Roads treatment would be a continuation of the weed-free travel corridor project, targeting spotted knapweed and hoary alyssum on 180 miles of road ($27,000 per treatment, every other year). Riparian treatment would target sulfur cinquefoil, houndstongue, and oxeye daisy to prevent these species from outcompeting native vegetation ($190,000 per treatment, every other year). Biological control would include youth involvement ($1500 per year).

Possible Partners Involvement: Lemhi County Weed Control Department, Lemhi Cooperative Weed Management Area, private landowners, Lemhi County Economic Development Association, Salmon Valley Stewardship. Partners would contribute at least 5% on top as in-kind contributions.

Estimated Timeline: 2014-2023

Estimated costs: $270,000 for planning, $1,100,000 for implementation over 10 years (3000 acres per year)

Comparison of Cost Between 2 Alternatives:

Total Project Costs for Alternative 1 - The Proposed Action

The following costs are needed to complete all of essential projects identified above in the Upper North Fork Project alternative 1 over the estimated 10 year life of the project:

Table 102. Total project costs - alternative 1

Alternative 1	Planning/ Design/ Administration	Implementation (contract cost)	Project Monitoring
FS Contribution	$3,067,000	$11,081,200	$90,000
Partner Contribution (both in kind and $)	$0	$887,100	$90,000
Total	$3,067,000	$11,968,300	$180,000

Total Project Costs for Alternative 2 – No New Temporary Road Construction

The only difference in treatment unit acreages between alternative 1 and alternative 2 are in the commercial thinning category. All other treatment types have the same acreages and costs between the two alternatives. The following table shows the acreages by logging system for alternative 2.

Table 103. Total project costs - alternative 2

Treatment	Acres	Cost/acre	Total cost	Timing
Commercial tractor logging	1899	$300	$569,700	First 6 years
Commercial skyline logging	596	$800	$476,800	First 6 years
Commercial helicopter logging	1949	$3000	$5,847,000	First 6 years
Total	4444		$6,893,500	

The following costs are needed to complete all of essential projects identified above in the Upper North Fork Project alternative 2 over the estimated 10 year life of the project:

Table 104. Costs over the life of the project

Alternative 2	Planning/ Design/ Administration	Implementation (contract cost)	Project Monitoring
FS Contribution	$3,067,000	$13,022,900	$90,000
Partner Contribution (both in kind and $)	$0	$887,100	$90,000
Total	$3,067,000	$13,910,000	$180,000

Heritage Resources

Introduction

Heritage resources are generally defined as the nonrenewable evidence of human activity as seen in any area, site, building, structure, artifact, ruin, object, work of art, architecture, or natural feature that was important in human history. In general, heritage resources must be at least 50 years old. The 1966 National Historic Preservation Act [amended 1980] and various other federal and state laws protect heritage resources.

Under federal regulations (26 CFR part 800) only significant heritage resources warrant consideration with regard to the effects of a federal action. Significant heritage resources are those that are determined eligible for inclusion in the National Register of Historic Places using criteria listed in 36 CFR 60.4. Heritage resources that meet one or more of the criteria are called historic properties. It is the focus of this analysis to evaluate the potential effects of the proposed project on significant historic properties in the project area.

Under Section 106 of the National Historic Preservation Act, a federal agency is also required to consult with any Indian tribe that may attach religious or cultural significance to properties located within the project area (16 USC 470a(d)(6)(A) and (B)). These Traditional Cultural Properties can include the locations of historic events, sacred areas, sources of raw material for tool making, traditional hunting and plant gathering areas, and natural features.

Forest Plan Direction and Desired Condition

Forest management objectives stated in the Land and Resource Management Plan for the Salmon National Forest (USDA Forest Service 1988: IV-83) are to locate, determine the significance of, and where appropriate, preserve, protect and interpret heritage resources.

Existing Condition

The NEPA analysis of the potential impacts to heritage resources within the proposed Upper North Fork HFRA Ecosystem Restoration project area included detailed historical background research and an intensive ground inventory within the area of potential affect. The area of potential affect was defined on the basis of proposed project activities.

Heritage Resource Inventory

Approximately 4,600 acres within the area of potential affect had already been intensively inventoried as part of earlier Section 106 compliance projects. An additional 2,237 acres were intensively inventoried within the project area during the 2009 - 2011 field seasons for this project.

A detailed report of the inventory findings, a project effects analysis, necessary site protection measures, and a signed State Histpric Preservation Office concurrence, can be found in the cultural resource inventory report (Project # SL-09-1585 and R2009-0413-17) in the NEPA project files.

Heritage inventory identified a total of 56 cultural resource sites within the project area. All are historic in age and most are associated with late 19th and early 20th century mining and settlement. The North Fork area was a major focus of gold discoveries during the late 1800s that falls within as the Gibbonsville Mining District. The boom town of Gibbonsville was established in 1877 and with it came businesses, homes and schools that provided the rapidly arriving miners and their families with goods and services. The documented sites demonstrate the importance of the gold mining in settlement and use of the area. Forest Service Administration is another important historical theme in the project area with important sites such as the Hughes Creek Guard Station, Granite Mountain Lookout and several recreational facilities and trails represented. The Civilian Conservation Corps constructed many of the buildings, roads and amenities found within the FS sites.

Present-day American Indian Use

The project area is within the traditional occupation area of the Shoshone-Bannock Tribes (Murphy and Murphy 1986:286). The Fort Bridger Treaty of 1868 established treaty rights for the tribal members to hunt on the unoccupied lands within the project area watershed(s). Subsequent Federal acts and agreements confirmed the rights of tribal members to hunt, fish, and gather plants in these same areas.

For many years the Shoshone-Bannock have expressed a particular concern for anadromous fish populations and their habitat within the Salmon-Challis National Forest. Walker (1993) notes the North Fork Salmon River and Hughes Creek are streams within the analysis area of interest to the Lemhi Shoshone for anadromous and resident fisheries. They are rated as ‘highest value’ streams that may have been important for fishing. Big game species including bighorn sheep, elk, mule deer, and moose are still found in the area. Black bear and cougar are resident within the area, and lynx and wolf sightings have been reported. Blue grouse is also a resident species. There is no information regarding present-day use of the project area by tribal members for procurement of any of these species.

Environmental Consequences

According to federal law, the Forest, in consultation with the State Historic Preservation Office, must consider the effects of the proposed project on all significant historic properties, and seek ways to reduce

or avoid anticipated adverse effects to them. Consultation with the State Historic Preservation Office regarding the sufficiency of heritage resource inventory, determinations of site eligibility, and necessary mitigation measures has been completed.

In taking no action, the eligible historic properties are at risk from wildland fire. Wooden structures would burn and other historic components could be destroyed or damaged.

Forty-nine of the 57 sites identified in the cultural resource inventory and review have been determined ineligible to the National Register of Historic Places. Due to their lack of significance these sites would not be affected by the proposed project and require no further consideration. Eight sites within the area of potential affect are historically significant and eligible for the National Register of Historic Places (Forest Site Numbers: SL-218, SL-366, SL-656, SL-1289, SL-1676, SL-1684, SL-1805 and SL-1806). These historic properties would be protected from damage through avoidance and the implementation of protective measures incorporated in the project design. The specific action required at each of the sites is stipulated in the cultural resource inventory report and on the project unit cards, both found in the NEPA project file. Provided the measures are taken the Upper North Fork HFRA Ecosystem Restoration Project would have no adverse effect on the historic properties located within the analysis area.

To minimize the potential effect of actions related to road construction, maintenance, use, reopening, and closure during the project, the following protection measures must be followed. All ground disturbing activities such as vegetation removal, scarification, and grading, would be carried out within the existing road footprint. Material for road closure berms must be taken from the existing roadbed or a pre-designated area and have no effect on known historic properties. All vehicles must remain on the road at all times. If any staging or storage areas must be established outside the existing roadbed, these areas would be situated within existing heritage inventory areas and the action must be determined through consultation with the North Zone Archaeologist to have no effect on known historic properties. Depending on the context of these locations and the scale of the proposed work, an on-site archaeologist may also be required to monitor the work.

Although inventory has been completed, properties may remain undiscovered because of difficulties locating them in areas of steep topography or where thick riparian vegetation obscures the surface. If unanticipated heritage resources are discovered during project implementation, all work in that area will cease and the North Zone Archaeologist will be notified within 24 hours to assess the significance of the find and the need for further consultation with State Historic Preservation Office and appropriate tribal parties. Preservation in place will be the preferred alternative if significant heritage resources are discovered. However, data recovery may be required if a site cannot be avoided. The USDA Forest Service in consultation with State Historic Preservation Office will develop avoidance, mitigation, or data recovery plans. If the property has potential religious or cultural significance for the Shoshone-Bannock Tribes, the appropriate tribal parties will be notified and consulted.

Cumulative Effects

The boundary for the analysis of cumulative effects is the same as the Upper North Fork Project area. Provided the protective measures are taken during implementation of the proposed project there will be no direct or indirect; and therefore no cumulative effects on heritage resources.

Short-term Uses and Long-term Productivity

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain

conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

The proposed activities; including commercial harvest and thinning, and non-commercial thinning, ladder fuel reduction, shaded fuel breaks, and prescribed burning; will help move the forest in the project area from relatively homogenous stands dominated by a single species to stands that have a mixture of species. Mixed stands are more resilient to insects and disease and are also more resistant to fire. A larger component of Douglas-fir and ponderosa pine, both of which are fire tolerant species, in lodgepole pine stands means that stand replacing fires will not be as likely as they are currently. The activities proposed would also have a substantial effect on forest vegetation density/canopy cover in the Upper North Fork project area. The general effect of the activities would be a reduction of canopy cover, resulting in a distribution shift toward lower density classes. High classes (relatively dense forests) would decrease, while lower classes (relatively sparse forests) would increase. Important factors driving expected fire severity are related to drivers of historic fire regimes, as well as existing local vegetation species composition, density, and structural classes. A less dense forest means that there will be less fuel to support large stand replacing fires. The reduction in density and canopy cover will move stands toward a fire regime condition class of 1, and contribute towards creating a fire-resilient forest.

Treatments would reduce hazardous wildland fire behavior from fires originating within treatment areas and from outside point sources (Graham et al. 1999). Treatment of surface, ladder, and canopy fuels would further help protect identified community protection zones communities of the Lost Trail Ski area, Moose Creek Estates/Royal Elk Ranch and resources in the broader wildland-urban interface while providing for increased safety for firefighters.

Reducing surface and canopy fuels moderates surface and crown fire behavior, providing opportunities for direct attack by hand crews and fire engines. Thinning treatments would reduce wildfire from passive and active crowning to surface fires in many of the stands. After treatment, reduced rate of spread means that the fire in the treated areas would be smaller when crews arrive and would be moving slower.

Reduced canopy continuity and fuel loads on the forest floor will reduce the risk of a stand replacement fire burning any treated units and adjacent lynx habitat.

While lynx habitat quality will be affected (reduced) in the short term, in the long term it would benefit through diversification of forest structure and movement towards a distribution that is more in line with the fire regime and potential vegetation for the site. As such, the vegetative conditions would be more resilient to stand replacement events such as wildfire and insect and disease outbreaks. This in turn would benefit lynx prey, and lynx.

Within the North Fork Headwaters lynx analysis unit, this project would alter the condition of, but not necessarily eliminate, 717 acres of lynx habitat (about two percent of the lynx analysis unit and about 3.2 percent of the suitable or modeled habitat in the lynx analysis unit). While the Forest does not have to comply with the Northern Rockies Lynx Management Direction, the small amount of lynx habitat affected is within the guidelines set forth in the direction.

The cover retention or spacing guidelines for the treatment units will retain sufficient canopy cover to permit lynx using the habitat in the linkage zone.

The project would alter vegetation in suitable wolverine habitat. While vegetation itself may not determine wolverine use of an area, vegetative conditions can affect a wolverine’s prey. In the short term, prey species may leave the area during implementation or shift their activity patterns around noise and

activity, in turn causing any present wolverines to do likewise. It is unlikely, however, that this would negatively affect a wolverine as they already move widely in time and space to attain food resources.

In the longer term, after treatments and when vegetative diversity increases and is not so departed from historical conditions, there may be more prey forage and cover, which could lead to an increase in prey abundance, and therefore more live food and potential carrion. This is an incidental benefit of the purpose and need of the project in that it reduces forest fuel continuity. This may be beneficial, but again, given the large home range of individual wolverines, the effect is somewhat diluted.

The action alternatives are unlikely to substantially directly or indirectly impact wolves. Because wolves range through a wide variety of habitats, vegetation changes on the order proposed under either action alternative would not cause the affected areas to become unsuitable. Wolves are unlikely to be active or near project activities while machinery is running or people are in the field, and therefore are unlikely to be disturbed. There are no known rendezvous sites that would be affected by the action alternatives.

It is reasonable to believe that wolf prey habitat will be affected by the proposed activities. Deer and elk habitat will be altered in treated units. In the high elevation meadow treatments, there will be an increase in suitable grassland habitat as a result of removing the encroaching conifers; adjacent cover habitat will essentially remain intact, however. At lower elevations, in particular in the Douglas-fir and ponderosa pine stands, there will be a decrease in cover immediately as a result of thinning and fuels reduction. In the short term, however, the forage cover will return in treated stands as a result of there being more light and precipitation available for understory shrubs. Opening the canopy will allow tree limbs to fill in the holes in the canopy, and along the edges of thinning units, thereby increasing the cover over time. This would in effect increase the habitat value for deer and elk, and thus for wolves, in the long term.

The decreased threat of a stand replacement wildfire benefits wolf prey populations, and thus benefits wolves.

Road accessibility in the project area would not increase, and as such, there would be no increased threat to wolves being harmed or killed as a result of this project.

Soil and water quality guidelines would be met (see chapter 3 for effects to soils and water resources). Based on the results of the cumulative watershed effects analysis, implementation of BMPs and integrated design features; along with rehabilitating roads designated as closed through the Salmon-Challis National Forest Travel Plan; would reduce the risk of adverse cumulative effects to aquatic resources within the project area. Beneficial uses would be maintained under both action alternatives.

Proposed treatments of mountain meadows, aspen and whitebark pine stands in the project area would reverse current trends of declining health, restore and enhance their productivity, and distinctive plant communities and habitat types.

Proposed aquatic habitat enhancement would help restore spawning and rearing habitat for Chinook salmon, steelhead/rainbow trout, bull trout and westslope cutthroat trout at the confluence with Twin Creek. The Deep Creek, Hammerean Creek and Johnson Gulch culverts would be replaced with new structures that would allow passage for all aquatic organisms, including fish. These three streams support westslope cutthroat trout populations.

The project would be implemented with integrated design features designed to avoid or reduce the potential negative effects of the proposed activities on all resources including watershed, soils, vegetation, wildlife, fisheries, botany, heritage resources, recreation, visual and roadless resources (integrated design features, appendix A).

The implementation of any of the action alternatives provides public benefits such as local jobs, and income generated from the forest products industry.

Unavoidable Adverse Effects

Short duration production of smoke and associated emissions would occur during prescribed burning. Several communities lie within proximity of the areas where prescribed burning is proposed. Adherence to the smoke management plan for prescribed burning would alleviate negative impacts to communities. By adhering to a smoke management plan developed by the Montana/Idaho State Airshed Group, particulate matter emissions from pile or understory burning would not violate National Ambient Air Quality Standards emission standards. Treatment of fuels under both action alternatives should result in decreased smoke production and associated emissions in the event of a wildfire.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

All resources were evaluated to determine if there would be irreversible or irretrievable commitment of resources. No irreversible or irretrievable commitments of resources were found in either action alternative.

Other Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders.”

The following laws, regulations and policy contain requirements and direction for protection of the environment that apply to the action alternatives:

Laws

Endangered Species Act

Pacific Anadromous Fish Strategy (PACFISH)/ Inland Native Fish Strategy (INFISH)

Clean Water Act

Clean Air Act

National Historic Preservation Act

Federal Noxious Weed Act of 1974

National Forest Management Act

Healthy Forest Restoration Act

Executive Orders

Invasive Species, Executive Order 13112 of February 3, 1999

Migratory Birds, Executive Order 13186 of January 10, 2001

Floodplain Management, Executive Order 11988 of May 24, 1977

Environmental Justice, Executive Order 12898 of February 11, 1994

State and Local Direction

Idaho Water Quality Standards-IDAPA 58, Title 01, Chapter 2

Water right from Idaho Department of Water Resources

Lemhi County Community Wildfire Protection Plan

Idaho Noxious Weed Control Act

Other Direction

National Fire Plan

Salmon National Forest Fire Management Plan

National Ambient Air Quality Standards

Stream Channel Alteration Permit from IDWR and the U.S. Army Corp of Engineers- IDAPA 37, Title 03, Chapter 07

Water Quality Standards Short Term Activity Exemption- IDAPA- 58, Title 01, Chapter 02

Northern Rocky Mountains Lynx Management Direction

2009 Continental Divide National Scenic Trail Comprehensive Plan Direction

1982 Lewis and Clark National Historic Trail Comprehensive Management Plan

The action alternatives comply with laws, regulations and policies that pertain to the following special areas:

Research Natural Areas

Continental Divide National Scenic Trail

Lewis and Clark National Historic Trail

Scenic Byways

Chapter 4. Preparers, Contributors, Consultation and Coordination

Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during development of this EIS. We specifically list the project role and qualifications for those members of the IDT that prepared sections of this document.

Core ID Team Members

Maggie Seaberg – IDT Leader: Bachelor of Science in Forest Management and in Recreation Resource Management from the University of Wisconsin – Madison. Graduate studies in NEPA from Utah State University. Maggie began her Forest Service Career as a seasonal employee on a Noxious Weeds Management Crew on the Gallatin National Forest. Her first permanent position with the FS was as a Pre-Sale Forester on the Rogue River-Siskiyou National Forest and she has been the North Zone Timber Program Manager on the Salmon-Challis National Forest since 2010. Maggie has experience in Wildland Fire Management and has worked on a variety of NEPA Projects (CE's, EA's and EIS's) in Region 6 and Region 4 as a both a team member and an IDT Leader.

Doug Leyva – Silviculturist: Bachelor of Science in Forestry from Colorado State University. Doug started his career with the Forest Service as a SCEP student on the Allegheny National Forest. His first permanent position was as a silviculture and reforestation forester on the Chequamegon-Nicolet National Forest where he worked mostly on the project development side of NEPA and small categorical exclusions. He completed the National Advanced Silviculture Program (NASP) in 2010 and became a Certified Silviculturist in 2011. Doug has been the North Zone Silviculturist on the Salmon-Challis since 2012.

Michael S. Smith – Fire/Fuels/Air Quality: Associates of Applied Sciences in Forest Technology from Central Oregon Community College (1994) and a Bachelor of Science in Resource Conservation Management from the University of Montana (1999). Mike works as a fuels specialist with the USDA Forest Service on the Salmon-Challis National Forest. Mike started with the Forest Service in 1992 as a seasonal employee conducting stand exams in Sisters, OR. After that he worked at many locations throughout the west until 1999 when he joined the army. After the army Mike got his first permanent job in fire 2003 and has been working in fuels since 2008.

Francine Smith – Fisheries Biologist: Bachelor of Science in Entomology from the University of California, Riverside and graduate study in fisheries and hydrology from Humboldt State University and Utah State University. Fran has worked as a fisheries biologist with the U.S. Forest Service since 1989 and has been working nation-wide with the Forest Service ACT2 Enterprise Unit since 2000. Prior to that, she worked for the National Park Service in California and Wyoming as a hydrologic technician and resources park ranger from 1983 to 1989.

David Deschaine – Hydrologist/Soils Scientist: Bachelor of Science in Watershed Science; Hydrology from Utah State University in 1998 and a Master of Science in Watershed Science; Hydrology from Utah State University in 2003. Graduate work focused on the influence of soil properties on sediment modeling predictions for small western rangeland watersheds. David has been working in a professional hydrology position on the Salmon-Challis National Forest for 12 years. Previous work included Research Assistant in the Watershed Science Unit at Utah State University, Hydrologic Technician on the Uinta-Wasatch-Cache National Forest and Biological Technician on the Boise National Forest.

Blaze Baker – Botanist: Blaze has Bachelor of Science degrees in botany and in environmental biology from Humboldt State University. He has worked for the Forest Service as a botanist since 1990. Blaze has worked on over 40 National Forests in every FS Region and on numerous other Federal Units. He has worked on almost every conceivable type of project from mineral developments and ski resort planning to timber/fuels and range projects. His work in the FS unit he co-developed in 2008 has been focused on restoration projects with a secondary emphasis on range management. He also continues to be involved in academia and in the private sector agriculture/horticulture industry.

Sean Hill – Wildlife Biologist: Bachelor of Science in Fisheries and Wildlife Conservation, University of Minnesota. Sean worked as a biological technician doing fisheries and wildlife work from 1996 through 1999. In 2004 he again joined the Forest Service in the Enterprise Program and has worked for Above and Beyond Ecosystems EU since February 2010. He has worked on a variety of projects in Regions 1, 2, 3, 4, 5, and 10, and with the BLM in Arizona and Nevada.

Mike Helm – GIS Specialist: Bachelor of Science in Forestry from the University of Idaho. Mike is very experienced in using multiple GIS applications. He excels in creating or revising complex GIS processing to facilitate analysis, modeling, programming, and creating GIS tabular, statistical, spatial, and mapping products for an array of projects.

Kenneth Rodgers – NEPA Specialist – Roadless/Unroaded Analysis: B.S. in Wildlife Biology from Arizona State University and a M.S. in Watershed Management from the University of Arizona. Forest Service employee for 38 years with natural resource management experience on National Forests in Arizona, Oregon and Idaho. Worked since 2001 as an Environmental Coordinator and NEPA Team Leader on the Salmon-Challis National Forest.

Jan Spencer – Landscape Architect: Bachelor of Landscape Architecture, Utah State University, 1988 (*Sigma Alpha Zeta*); Associate of Science, Northwest Community College, 1985. Jan has over 20 years of experience regarding environmental analysis, with an emphasis on scenery management in Forest Service Regions 2, 3, 4, 5, 6, 8 and 10. She has been a Landscape Architect for the Forest Service TEAMS Enterprise Unit for the last 11 years. She was previously a Landscape Architect on the White River National Forest for 10 years.

Pete Schuldt - Transportation: Graduated from University of Idaho 1988 B.S. Industrial Ed., University of Montana 1992 B.S. Forest Management. Currently employed by the Salmon-Challis National Forest as a Supervisory Civil Engineering Technician in road management and oversees the road maintenance program. Previous positions include approximately 8 years as a Timber Sale Administrator and several seasons of work as a Lead Forestry Technician overseeing timber stand improvement and reforestation projects. Recent projects include the forest-wide travel management plan and motor vehicle use map, as well as the ongoing minimum road system analysis under subpart A of the travel rule.

Camille Sayer –Archeologist: Bachelor of Arts from Boise State University and a Masters of Arts in Archeology from the University of New Mexico. Cammie is currently the North Zone Archeologist on the Salmon-Challis National Forest.

Larry Vogel – Recreation specialist: Bachelor of Science in Forestry from Utah State University. Larry works as a Recreation Staff on the Salmon-Challis National Forest. Prior to that Larry spent 8 years working in the recreation resource as an assistant staff and staff on the Tonto and Clearwater National Forests.

Kristin Whisennand – Writer/Editor: Bachelor of Arts in Anthropology from Dartmouth College and a Bachelor of Science in Resource Conservation Management from the University of Montana, graduate

study in archaeology and paleontology at the University of Montana. Kristin works as a technical writer/editor with TEAMS preparing environmental and technical documents. Prior to TEAMS, she worked for 5 years as a team leader with the Forest Service Content Analysis Team and for 9 years as an archaeologist with the Lolo National Forest. Kristin has been with TEAMS since 2002.

Consultation

The Forest Service consulted the following individuals, Federal, State, tribal, and local agencies during the development of this environmental impact statement:

Federal, State, and Local Agencies:	
Idaho Fish & Game	US Fish & Wildlife Service
Idaho Department of Parks and Recreation	NOAA Fisheries
Lemhi County Commissioners	National Marine Fisheries Service
Tribes:	
Nathan Small Chairman –Shoshone Bannock Tribes	McCoy Oatman Chairman – Nez Perce Tribes
Kevin Brackney Water Resources Division – Nez Perce Tribes	Dave Johnson Nez Perce Tribe
Aaron Miles Nez Perce Tribes	Michael Lope Nez Perce Tribe
Scoping Comments Provided by:	
Shoshone-Bannock Tribes	Steve Moranda
Stanley Davis	Jim Bigelow
Dr. Gregory Behm	Idaho Conservation League
Idaho Department of Parks & Recreation	Jay Davis
Robert Wilson	USA Citizen 1
US Environmental Protection Agency (EPA)	WildWest Institute
Allen Hoyt	Lemhi County Weed Control
John Goodman	Idaho Dept of Fish and Game
Alliance for the Wild Rockies	Western Watersheds Project

There were a total of 151 individuals and organizations contacted for this project. Additional contacts are in the project record and are available upon request to the North Fork Ranger District.

Distribution of the Environmental Impact Statement

The following is a list of agencies, organizations, and persons to whom copies of the public comment letter were sent.

Idaho Conservation League

Steve Flynn Resource, Manager Sun Mountain Lumber Inc.

Daniel Bertram, Lemhi County Weed Superintendent

Jeff Cook, Outdoor Recreation Analyst, Recreation Bureau - Idaho Department of Parks and Recreation

Jeff Juel, Forest Policy Director, The Lands Council

Cottonwood Environmental Law Center

Katie Fite, Biodiversity Director - Western Watersheds Project

Michael Garrity, Alliance for the Wild Rockies

Bitterroot Cross Country Ski Club

Spatial Interest, LLC

George Ambrose

Sharon S. Auen

Orval Baird

Dennis Baird, Idaho Environmental Council

Ann & Bruce Barnes

David D. Barton

Daniel Bertram, Vice Chair- Idaho Association of County Weed Control Superintendents

Joel D. Bender

Vern Bishop

Thomas Eugene Black

George Leonard Black III

Janet Bloemeke

Gary & Sandy Bonacci

Bill & Sally Boyne

Kevin Brackney, Water Resources Division - Nez Perce Tribe

Aaron Miles, Nez Perce Tribe

Dave Johnson, Nez Perce Tribe

Michael Lopez, Nez Perce Tribe

Jack Briggs

Andrea S. Burgemeister

Lowell Cerise

Lois Chynoweth

NathanSmall, Chairman - Shoshone Bannock Tribes

Mike Conner

Kent E. Crist

Jon D.Cummings, 100 Acre Wood B&B

Clifford O. Cummings

Michael C. Cummings

Clifford O. Cummings Jr

Jay Davis, Chairman - Transportation Committee

Stephen Ellis

Wayne C. England

Mike England

Margaret Mary et al. Norberg

Patrick J. Farrell Jr

Stuart Felton

Dean D. Fenhaus

Gene E. Fenhaus

Brad K. Froemke

Tim R. Garrett Sr

Bob Gervais

Glenn Goddard

John Goodman, Moose Creek Estates

Walter Haines

Flossie Hickinbothem

Kenneth Hill

Roy Hoffman

Jeffrey Howard

Jay Hart

Gerald Jayne, Idaho Environmental Council

Earl & Sue Ann Keating

Gorden R. Kirschenmann

Allen Kohen, Auk Investments LLC

Russ Kozack

E. Lanni

John McCarthy, The Wilderness Society

Ronald W. Meadville

Dave Melton, Big Horn Outfitters

Anita Merritt

Melvin J. Meyers

Timothy Patrick Mickey

McCoyOatman, Chairman - Nez Perce Tribe

John C. Miller

Hank Miller

Charles R. Morton

Barry & Jackie Naugle

Kenneth J. Nutt

William J. Nutt

Albert C. Ohl

Jerry & Virginia Perry

Vic Phillips, Forest Fuels Solutions

Bob Polk

Marsha Prestwich

Dick & Donna Rabe

B. Greer Radcliff

Wayne & Julia Randolph

Kent W. Raverty

Janis Richeson

Thomas B. Riley

Steve Robinson, Idaho DEQ

John Robison, Idaho Conservation League

Bob & Delores Rowe

Glenn A. Seaberg

William H. Shively

Beth A. Skoglund

Derrold Slavin

John McCarthy, Shoshone Bannock Tribes

Ronald W. Meadville

Dave Melton

Anita Merritt

Melvin J. Meyers

Timothy Patrick Mickey

C/O Wendy Gross Thurber

E. Lanni

John McCarthy

Ronald W. Meadville

Melvin J. Meyers, Meridian Gold Company

Timothy Patrick Mickey, Alliance For The Wild Rockies

Continental Divide Outfitters

Friends Of The Bitterroot Inc

Idaho Department Of Fish And Game - Salmon Regional Office

Idaho Rivers United

Idaho Sporting Congress

Lemhi County Commissioners

North Fork Community Church

Olson Family Trust

Pyramid Mountain Lumber

Rocky Mountain Log Homes

Salmon Valley Stewardship

Western Watersheds Project

Wild West Institute

Idaho Department of Transportation

This environmental impact statement has been distributed to individuals who specifically requested a copy of the document. In addition, copies have been sent to the following Federal agencies, federally recognized tribes, State and local governments, and organizations representing a wide range of views.

Advisory Council on Historic Preservation
Director, Planning and Review
1100 Pennsylvania Ave. NW, Suite 809
Washington, DC 20004

U.S. Department of Energy
Director, NEPA Policy & Compliance
1000 Independence Avenue, S.W.
Mail Code EH-42, Room 3E094
Washington, DC 20585

U.S. Department of the Interior
Office of Environmental Policy and Compliance
Director OEPC
Main Interior BLDG., MS-2340
1849 C Street, NW
Washington, DC 20240

Federal Aviation Administration
Northwest Mountain Region
Regional Director
1601 Lind Avenue, SW
Renton, WA 98055-4056

Federal Highway Administration
Idaho Division
3050 Lakeharbor Lane, Suite 126
Boise, ID 83703

U.S. Navy, Chief of Naval Operations (N45)
Energy and Environmental Readiness Division
2000 Navy Pentagon (Room 2D253)
Washington, DC 20350-2000

Northwest Power Planning Council
851 S.W. 6th Avenue
Suite 1100
Portland, OR 97204-1348

U.S. Army Corps of Engineers
Northwestern Division
1125 NW Couch Street
Portland, OR 97209

U.S. Coast Guard
Environmental Impact Branch
G-MEP
2100 2nd Street, SW
Washington, DC 20593

USDA Animal and Plant Health Inspection Service
Deputy Director APHIS PPD/EAD
4700 River Road, Unit 149
Riverdale, MD 20737-1238

USDA National Agricultural Library
Acquisitions & Serials Branch
National Agricultural Library
10301 Baltimore Blvd., Rm. 002
Beltsville, MD 20705

USDA Natural Resources Conservation Service
National Environmental Coordinator
PO Box 2890
Room 6158-S
Washington, DC 20013-2890

US Environmental Protection Agency
Office of Federal Activities
EIS Filing Section
Mail Code 2252-A
Ariel Rios Building (South Oval Lobby)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

U.S. Environmental Protection Agency, Region 10
EIS Review Coordinator
1200 Sixth Avenue
Seattle, WA 98101

References Cited

Silviculture

Adams, H.D.; Guardiola-Claramonte, M.; Barron-Gafford, G.A.; Villegas, J.C.; Breshears, D.D.; Zou, C.B.; Troch, P.A.; Huxman, T.E. 2009. Temperature sensitivity of drought-induced tree mortality portends increased regional die-off under global-change-type drought. Proceedings of the National Academy of Sciences. 106(17): 7063-7066.

Agee, J.K. 1996a. Fire in the Blue Mountains: a history, ecology, and research agenda. In: Jaindl, R.G.; Quigley, T.M., eds. Search for a solution: sustaining the land, people, and economy of the Blue Mountains. Washington, DC: American Forests in cooperation with the Blue Mountains Natural Resources Institute: 119-145.

Agee, J.K. 1996b. The influence of forest structure on fire behavior. In: Proceedings of the seventeenth annual forest vegetation management conference; 1996 January 16-18; Redding, CA: 52-68.

Agee, J.K. 1998. The landscape ecology of western forest fire regimes. Northwest Science. 72 (special issue): 24-34. http://www.vetmed.wsu.edu/org_NWS/NWSci%20journal%20articles/1998%20files/Special%20addition%201/v72%20p24%20Agee.PDF

Allen, C.D.; Savage, M.; Falk, D.A.; Suckling, K.F.; Swetnam, T.W.; Schulke, T.; Stacey, P.B.;Morgan, P.; Hoffman, M.; Klingel, J.T. 2002. Ecological restoration of southwestern ponderosa pine ecosystems: a broad perspective. Ecological Applications. 12(5), pp. 1418-1433.

Arkley, R.J. 1981. Soil moisture use by mixed conifer forest in a summer-dry climate. Soil Science Society of America Journal. 45: 423-427.

Arno, S.F. 1987. Fire Ecology and Its Management Implications in Ponderosa Pine Forests. Intermountain Research Station. USDA-Forest Service, Missoula, MT. 7 pp.

Arno, S.F. 1991. Ecological Relationships of Interior Douglas-fir. Interior Douglas-fir the Species and Its Management Symposium Proceedings. Compo and Ed. D.M. Baumgartner and J.E. Lotan. Spokane, WA. pp. 47-51.

Auclair, A.N.D.; Carter, T.B. 1993. Forest wildfires as a recent source of CO2 at northern latitudes. Canadian Journal of Forest Research. 23: 1528-1536.

Baron, J.S.; Julius, S.H.; West, J.M.; Joyce, L.A.; Blate, G.; Peterson, C.H.; Palmer, M.; Keller, B.D.; Kareiva, P.; Scott, J.M.; Griffith, B. 2008. Some guidelines for helping natural resources adapt to climate change. IHDP Update. 2: 46-52. http://www.treesearch.fs.fed.us/pubs/32465

Barrett, S.; Havlina, D.; Jones, J.; Hann, W.; Frame, C.; Hamilton, D.; Schon, K.; Demeo, T.; Hutter, L.; and Menakis, J. 2010. Interagency Fire Regime Condition Class Guidebook. Version 3.0 [Homepage of the Interagency Fire Regime Condition Class website, USDA Forest Service, US Department of the Interior, and The Nature Conservancy]. [Online], Available: www.frcc.gov

Bentz, B. J., J. Regniere, C. J. Fettig, E. M. Hansen, J. L. Hayes, J. A. Hicke, R. G. Kelsey, J. Lundquist, J. F. Negron, R. Progar, S. J. Seybold, and J. Vandygriff. 2010. Climate change and bark beetles of the western US: Direct and indirect effects. BioScience 60: 602-613.

Birdsey, R.A. 1992. Carbon storage and accumulation in United States forest ecosystems. General Technical Report WO-GTR-59. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office. 51 p.

Bonan, G.B. 2008. Forests and climate change: forcings, feedbacks, and the climate benefits of forests. Science. 320(5882): 1444-1449.

Bond, W.J.; Woodward, F.I.; Midgley, G.F. 2005. The global distribution of ecosystems in a world without fire. New Phytologist. 165(2): 525-538.

Bormann, B.T.; Homann, P.S.; Darbyshire, R.L.; Morrissette, B.A. 2008. Intense forest wildfire sharply reduces mineral soil C and N: the first direct evidence. Canadian Journal of Forest Research. 38(11): 2771-2783.

Bowman, D.M.J.S.; Balch, J.K.; Artaxo, P.; Bond, W.J.; Carlson, J.M.; Cochrane, M.A.; D'Antonio, C.M.; DeFries, R.S.; Doyle, J.C.; Harrison, S.P.; Johnston, F.H.; Keeley, J.E.; Krawchuk, M.A.; Kull, C.A.; Marston, J.B.; Moritz, M.A.; Prentice, I.C.; Roos, C.I.; Scott, A.C.; Swetnam, T.W.; van der Werf, G.R.; Pyne, S.J. 2009. Fire in the Earth system. Science. 324(5926): 481-484.

Breshears, D.D.; Cobb, N.S.; Rich, P.M.; Price, K.P.; Allen, C.D.; Balice, R.G.; Romme, W.H.; Kastens, J.H.; Floyd, M.L.; Belnap, J.; Anderson, J.J.; Myers, O.B.; Meyer, C.W. 2005. Regional vegetation die-off in response to global-change-type drought. Proceedings of the National Academy of Sciences of the United States of America. 102(42): 15144-15148.

Canadell, J.G.; Raupach, M.R. 2008. Managing forests for climate change mitigation. Science. 320(5882): 1456-1457. doi:10.1126/science.1155458

Carlson, C.E.; Wulf, N.W. 1989. Silvicultural strategies to reduce stand and forest susceptibility to the western spruce budworm. Agric. Hand. No. 676. Washington, DC: U.S. Department of Agriculture, Forest Service, Cooperative State Research Service. 31 p.

Carroll, A.L.; Taylor, S.W.; Régniere, J.; Safranyik, L. 2004. Effects of climate change on range expansion by the mountain pine beetle in British Columbia. In: Shore, T.L.; Brooks, J.E.; Stone, J.E., editors. Mountain pine beetle symposium: challenges and solutions. Information Report BC-X-399. Victoria, BC: Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre: 223-232.

Christiansen, E.; Waring, R.H.; Berryman, A.A. 1987. Resistance of conifers to bark beetle attack: searching for general relationships. Forest Ecology and Management. 22: 89-106. doi:10.1016/0378-1127(87)90098-3

Climate Change Resource Center (CCRC), http://www.fs.fed.us/ccrc/. U.S. Forest Service. Accessed August 2009.

Crane, M. F.; Habeck, J. R.; Fischer, W. C. 1983. Early postfire revegetation in a western Montana Douglas-fir forest. Research Paper INT-319. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1983. 32 p.

Crane, M.F. and W.C. Fischer. 1986. Fire Ecology of the Forest Habitat Types of Central Idaho. Intermountain Research Station General Technical Report INT -218. USDA-Forest Service, 86 pp.

Crookston, N.L.; Moeur, M.; Renner, D. 2002. Users guide to the most similar neighbor imputation program, version 2. Gen. Tech. Rep. RMRS-GTR-96. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 35 p. http://www.treesearch.fs.fed.us/pubs/4813

Dale, V.H.; Joyce, L.A.; McNulty, S.; Neilson, R.P.; Ayres, M.P.; Flannigan, M.D.; Hanson, P.J.; Irland, L.C.; Lugo, A.E.; Peterson, C.J.; Simberloff, D.; Swanson, F.J.; Stocks, B.J.; Wotton, B.M. 2001. Climate change and forest disturbances. BioScience. 51(9): 723-734. doi:10.1641/0006-3568(2001)051[0723:CCAFD]2.0.CO;2

DeLuca, T.H.; Aplet, G.H. 2008. Charcoal and carbon storage in forest soils of the Rocky Mountain west. Frontiers in Ecology and the Environment. 6(1): 18-24.

Depro, B.M., Murray, B.C., Alig, R.J., Shanks, A. 2008. Public land, timber harvests, and climate mitigation: Quantifying carbon sequestration potential on U.S. public timberlands. Forest Ecology and Management 255: 1122-1134.

Donovan, G.H.; Brown, T.C. 2005. An alternative incentive structure for wildfire management on national forest land. Forest Science. 51(5): 387-395.

Donovan, G.H.; Brown, T.C. 2007. Be careful what you wish for: the legacy of Smokey Bear. Frontiers in Ecology and the Environment. 5(2): 73-79.

Donovan, G.H.; Brown, T.C. 2008. Estimating the avoided fuel-treatment costs of wildfire. Western Journal of Applied Forestry. 23(4): 197-201.

Dore, S.; Kolb, T.E.; Montes-Helu, M.; Sullivan, B.W.; Winslow, W.D.; Hart, S.C.; Kaye, J.P.; Koch, G.W.; Hungate, B.A. 2008. Long-term impact of a stand-replacing fire on ecosystem CO2 exchange of a ponderosa pine forest. Global Change Biology. 14(8): 1801-1820. doi:10.1111/j.1365-2486.2008.01613.x

Eckberg, T.B.; Schmid, J.M.; Mata, S.A.; Lundquist, J.E. 1994. Primary focus trees for the mountain pine beetle in the Black Hills. Res. Note RM-RN-531. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 10 p.

Entry, J. A.; Cromack, K.; Kelsey, R.G.; Martin, N.E. 1991. Response of Douglas-fir to infection by Armillaria ostoyae after thinning or thinning plus fertilization. Phytopathology. 81(6): 682-689.

Eriksson, E.; Gillespie, A.R.; Gustavsson, L.; Langvall, O.; Olsson, M.; Sathre, R.; Stendahl, J. 2007. Integrated carbon analysis of forest management practices and wood substitution. Canadian Journal of Forest Research. 37(3): 671-681.

Fahey, T.J; Woodbury, P.B; Battles, J.J; Goodale, C.L; Hamburg, S.; Ollinger, S.; Woodall, C.W. 2009. Forest carbon storage: ecology, management, and policy. Frontiers in Ecology and the Environment. doi:10.1890/080169.

Fellows, A.W.; Goulden, M.L. 2008. Has fire suppression increased the amount of carbon stored in western U.S. forests? Geophysical Research Letters. 35: L12404.

Filip, Gregory M.; Goheen, Donald J.; Johnson, David W.; Thompson, John H. 1989c. Precommercial thinning in a ponderosa pine stand affected by Armillaria root disease: 20 years of growth and mortality in central Oregon. Western Journal of Applied Forestry. 4(2): 58-59.

Finkral, A.J.; Evans, A. M. 2008. The effects of a thinning treatment on carbon stocks in a northern Arizona ponderosa pine forest. Forest Ecology and Management. 255(7): 2743-2750. doi:10.1016/j.foreco.2008.01.041

Fleming, R.A.; Volney, W.J.A. 1995. Effects of climate change on insect defoliator population processes in Canada's boreal forest: some plausible scenarios. Water, Air, and Soil Pollution. 82(1): 445-454.

Franceschi, V.R.; Krokene, P.; Christiansen, E.; Krekling, T. 2005. Anatomical and chemical defenses of conifer bark against bark beetles and other pests. New Phytologist. 167(2): 353-376. doi:10.1111/j.1469-8137.2005.01436.x

Goetz, S.J., Bond-Lamberty, B., Law, B.E., Hicke, J.A., Huang, C., Houghton, R.A., McNulty, S., O'Halloran, T., Harmon, M., Meddens, A.J.H., Pfeifer, E.M., Mildrexler, D., and Kasischke, E.S. 2012. Observations and assessment of forest carbon dynamics following disturbance in North America. J.G.R. Biogeosciences. In press.

Graham, R.T.; Harvey, A.E.; Jain, T.B.; Tonn, J.R. 1999. The effects of thinning and similar stand treatments on fire behavior in western forests. Gen. Tech. Rep. PNW-GTR-463. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 27 p.

Graham, R.T.; McCaffrey, S.; Jain, T.B., technical editors. 2004. Science basis for changing forest structure to modify wildfire behavior and severity. Gen. Tech. Rep. RMRS-GTR-120. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 43 p. http://www.treesearch.fs.fed.us/pubs/6279

Gustavsson, L.; Madlener, R.; Hoen, H.-F.; Jungmeier, G.; Karjalainen, T.; Klöhn, S.; Mahapatra, K.; Pohjola, J.; Solberg, B.; Spelter, H. 2006. The role of wood material for greenhouse gas mitigation. Mitigation and Adaptation Strategies for Global Change. 11(5): 1097-1127.

Hamilton, R.H. 1993. Characteristics of Old-Growth Forests in the Intermountain West. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Region. 86 p.

Harmon, M.E. 2001. Carbon sequestration in forests: addressing the scale question. Journal of Forestry 99 (4): 24-29.

Harmon, M.E., Ferrell, W.K., Franklin, J.F. 1990. Effects on carbon storage of conversion of old-growth forests to young forests. Science 247 (4943): 699-702.

Harmon, M. E.; Marks, B. 2002. Effects of silvicultural practices on carbon stores in Douglas-fir / western hemlock forests in the Pacific Northwest, U.S.A.: results from a simulation model. Canadian Journal of Forest Research. 32(5): 863-877.

Harrington, M.G. 1990. Fire Management in Interior Douglas-fir Forests. Interior Douglas-fir the Species and Its Management Symposium Proceedings. Compo and Ed. D.M. Baumgartner and J.E. Lotan. Spokane, WA. pp. 47-51.

Harvey, Alan E. 1994. Integrated roles for insects, diseases and decomposers in fire dominated forests of the inland western United States: past, present and future forest health. Journal of Sustainable For-estry. 2(1/2): 211-220.

Havlina et al. 2010. Interagency Fire Regime Condition Class website. USDA Forest Service, USDA Department of the Interior, and The Nature Conservancy [www.frcc.gov].

Heller, R.C.; Sader, S.A. 1980. Rating the risk of tussock moth defoliation using aerial photographs. Agric. Handbook. 569. Washington, D.C.: U.S. Department of Agriculture, Forest Service.

Hessburg, P.F.; Smith, B.G.; Kreiter, S.D.; Miller, C.A.; Salter, R.B.; McNicholl, C.H.; Hann, W.J. 1999a. Historical and current forest and range landscapes in the interior Columbia River basin and portions of the Klamath and Great basins. Part 1: linking vegetation patterns and landscape vulnerability to potential insect and pathogen disturbances. Gen. Tech. Rep. PNW-GTR-458. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 357 p. http://www.treesearch.fs.fed.us/pubs/29638

Hessburg, P.F.; Smith, B.G.; Miller, C.A.; Kreiter, S.D.; Salter, R.B. 1999b. Modeling change in potential landscape vulnerability to forest insect and pathogen disturbances: methods for forested subwatersheds sampled in the midscale interior Columbia River basin assessment. Gen. Tech. Rep. PNW-GTR-454. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 56 p. http://www.treesearch.fs.fed.us/pubs/2987

Hicke, J. A., C. D. Allen, A. Desai, M. Dietze, R. J. Hall, E. T. Hogg, D. Kashian, D. Moore, K. Raffa, R. Sturrock, and J. Vogelmann. 2010. The effects of biotic disturbances on carbon budgets of North American forests, Global Change Biology, 18: 7-34.

Hillis, J. Michael, Thompson, Michael J., Canfield, Jodie E., Lyon, L Jack, Marcum, C. Les, Dolan, Patricia M., McCleerey, David W., 1991. Defining £IJ(Security: The Hillis Paradigm. Elk Vulnerability Symposium, MSU, Bozeman, MT, April 10-12, 1991. 6 pp.

Houghton, R.A.; Hackler, J.L.; Lawrence, K.T. 2000. Changes in terrestrial carbon storage in the United States. 2: The role of fire and fire management. Global Ecology & Biogeography. 9:145-170. http://www.treesearch.fs.fed.us/pubs/2979

Hudiburg, T.; Law, B.; Turner, D.P.; Campbell, J.; Donato, D.; Duane, M. 2009. Carbon dynamics of Oregon and Northern California forests and potential land-based carbon storage. Ecological Applications: Vol. 19, No. 1, pp. 163-180.

Hurteau, M.; Hungate, B.; Koch, G. 2009. Accounting for risk in valuing forest carbon offsets. Carbon Balance and Management. 4:1 doi:10.1186/1750-0680-4-1

Hurteau, M.; North, M. 2009. Fuel treatment effects on tree-based forest carbon storage and emissions under modeled wildfire scenarios. Frontiers in Ecology and the Environment. 7: doi:10.1890/080049.

Hurteau, M.D.; Koch, G.W.; Hungate, B.A. 2008. Carbon protection and fire risk reduction: toward a full accounting of forest carbon offsets. Frontiers in Ecology and the Environment. 6(9): 493-498.

Hurtt, G.C.; Pacala, S.W.; Moorcroft, P.R.; Caspersen, J.; Shevliakova, E.; Houghton, R.A.; Moore, B. 2002. Projecting the future of the U.S. carbon sink. Proceedings of the National Academy of Sciences of the United States of America. 99(3): 1389-1394.

IPCC 2000. Intergovernmental Panel on Climate Change (IPCC), Special Report on Land Use, Land Use Change and Forestry, Summary for Policy Makers, 2000. IPCC, Geneva, Switzerland. 20 pp.

IPCC. 2007. Climate change 2007: synthesis report. Contribution of working groups I, II and III to the fourth assessment report of the Intergovernmental Panel on Climate Change [IPCC]. Geneva, Switzerland: IPCC. 104 p. http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

Jenkins, J.C.; Chojnacky, D.C.; Heath, L.S.; Birdsey, R.A. 2003. National-scale biomass indicators for United States tree species. Forest Science. 49(1): 12-35.

Joyce, L.; Blate, G.; McNulty, S.; Millar, C.; Moser, S.; Neilson, R.; Peterson, D. 2009. Managing for multiple resources under climate change: national forests. Environmental Management. 44(6): 1022-1032. doi:10.1007/s00267-009-9324-6

Joyce, L.A.; Blate, G.M.; Littell, J.S.; McNulty, S.G.; Millar, C.I.; Moser, S.C.; Neilson, R.P.; O'Halloran, K.; Peterson, D.L. 2008. National forests. In: Julius, S.H.; West, J.M., editors. Preliminary review of adaptation options for climate-sensitive ecosystems and resources. Washington, DC: U.S. Environmental Protection Agency: 3-1 to 3-127. http://www.treesearch.fs.fed.us/pubs/30612

Kashian, D.M.; Romme, W.H.; Tinker, D.B.; Turner, M.G.; Ryan, M.G. 2006. Carbon storage on landscapes with stand-replacing fires. Bioscience. 56(7): 598-606. doi: http://dx.doi.org/10.1641/0006-3568(2006)56

Kene, R.E.: Arno, S.F. 1993. Rapid Decline of Whitebark Pine in Western Montana: Evidence from 20-Year Remeasurements. Western Journal of Applied Forestry 8(2): 44-47

Kene, R.E.; Hessburg, P.F.; Landres, P.B.; Swanson, F.J. 2009. The use of historical range and variability (HRV) in landscape management. Forest Ecology and Management. 258(7): 1025-1037. doi:10.1016/j.foreco.2009.05.035

Knutson, D.; Tinnin, R. 1986. Effects of dwarf mistletoe on the response of young Douglas-fir to thinning. Canadian Journal of Forest Research. 16(1): 30-35. doi:10.1139/x86-006

Kolb, T.E.; Holmberg, K.M.; Wagner, M.R.; Stone, J.E. 1998. Regulation of ponderosa pine foliar physiology and insect resistance mechanisms by basal area treatments. Tree Physiology. 18(6): 375-381. doi:10.1093/treephys/18.6.375

Krankina, Olga N.; Harmon, Mark E.; Cohen, Warren B.; Oetter, Doug R.; Zyrina, Olga; Duane, Maureen V. 2004. Carbon stores, sinks, and sources in forests of northwestern Russia: can we reconcile forest inventories with remote sensing results?. Climatic Change. 67: 257-272

Kurz, W.A.; Dymond, C.C.; Stinson, G.; Rampley, G.J.; Neilson, E.T.; Carroll, A.L.; Ebata, T.; Safranyik, L. 2008a. Mountain pine beetle and forest carbon feedback to climate change. Nature. 452(7190): 987-990. doi:10.1038/nature06777

Kurz, W.A.; Stinson, G.; Rampley, G.J.; Dymond, C.C.; Neilson, E.T. 2008b. Risk of natural disturbances makes future contribution of Canada’s forests to the global carbon cycle highly uncertain. Proceedings of the National Academy of Sciences. 105(5): 1551-1555. doi:10.1073/pnas.0708133105

Landres, P.B.; Morgan, P.; Swanson, F.J. 1999. Overview of the use of natural variability concepts in managing ecological systems. Ecological Applications. 9(4): 1179-1188. doi:10.1890/1051-0761(1999)009[1179:OOTUON]2.0.CO;2

Lesica, P. 1996. Using fire history models to estimate proportions of old growth forest in northwest Montana, USA. Biological Conservation. 77: 33-39.

Liu, S., B. Bond-Lamberty, J. A. Hicke, R. Vargas, S. Zhao, J. Chen, S. L. Edburg, J. Liu, A. D. McGuire, J. Xiao, R. Keane, W. Yuan, J. Tang, Y. Luo, C. Potter, and J. Oeding, Simulating the impacts of disturbances on forest carbon cycling in North America: Processes, data, models, and challenges, Journal of Geophysical Research-Biogeosciences, 116, G00K08, doi:10.1029/2010JG001585, 2011.

Logan, J.A.; Régniere, J.; Powell, J.A. 2003. Assessing the impacts of global warming on forest pest dynamics. Frontiers in Ecology and the Environment. 1(3): 130-137.

Lotan, J.E., J.K Brown, LF. Neuenschwander. 1984. Role of Fire in Lodgepole Pine Forests. Lodgepole Pine: The Species and Its Management: Symposium Proceedings. Compo and Ed. D.M. Baumgartner. Spokane, WA.

Luyssaert, S.; Schulze, E.D.; Borner, A.; Knohl, A.; Hessenmoller, D.; Law, B.E.; Ciais, P.; Grace, J. 2008. Old-growth forests as global carbon sinks. Nature. 455(7210): 213-215.

Macias Fauria, M.; Johnson, E.A. 2009. Large-scale climatic patterns and area affected by mountain pine beetle in British Columbia, Canada. Journal of Geophysical Research. 114: G01012.

McKenzie, D., Gedalof, Z., Peterson, D.L., Mote, P. 2004. Climatic change, wildfire, and conservation. Conservation Biology 18 (4): 890-902.

Millar, C.I.; Stephenson, N. L.; Stephens, S. L. 2007. Climate change and forests of the future: Managing in the face of uncertainty. Ecological Applications, 17(8). 7 p.

Millar, C.I.; Woolfenden, W.B. 1999. The role of climate change in interpreting historical variability. Ecological Applications. 9(4): 1207-1216.

Miller, J.; Safford, H.; Crimmins, M.; Thode, A. 2009. Quantitative evidence for increasing forest fire severity in the Sierra Nevada and southern Cascade Mountains, California and Nevada, USA. Ecosystems. 12:16-32.

Miner, R.; Perez-Garcia, J. 2007. The greenhouse gas and carbon profile of the global forest products industry. Forest Products Journal. 57(10): 80-90.

Mitchell, R.G.; Martin, R.E. 1980. Fire and insects in pine culture of the Pacific Northwest. In: Martin, R.E.; Edmonds, R.L.; Faulkner, D.A.; Harrington, J.B.; Fuquay, D.M.; Stocks, B.J.; Barr, S., eds. Proceedings: sixth conference on fire and forest meteorology. Washington, DC: Society of American Foresters: 182-190.

Mitchell, R.G.; Waring, R.H.; Pitman, G.B. 1983. Thinning lodgepole pine increases tree vigor and resistance to mountain pine beetle. Forest Science. 29(1): 204-211. http://www.ingentaconnect.com/content/saf/fs/1983/00000029/00000001/art00031

Mitchell, S. R.; Harmon, M. E.; O'Connell, K. E. B. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems. Ecological Applications 19(3) pages 643-655.

Morehouse, K.; Johns, T.; Kaye, J.; Kaye, M. 2008. Carbon and nitrogen cycling immediately following bark beetle outbreaks in southwestern ponderosa pine forests. Forest Ecology and Management. 255(7): 2698-2708.

Morgan, P.; Aplet, G.H.; Haufler, J.B.; Humphries, H.C.; Moore, M.M.; Wilson, W.D. 1994. Historical range of variability: a useful tool for evaluating ecosystem change. Journal of Sustainable Forestry. 2(1/2): 87-111. doi:10.1300/J091v02n01_04

Mutch, R.W.; Arno, S.F.; Brown, J.K.; Carlson, C.E.; Ottmar, R.D.; Peterson, J.L. 1993. Forest health in the Blue Mountains: a management strategy for fire-adapted ecosystems. Gen. Tech. Rep. PNW-GTR-310. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 14 p. http://www.fs.fed.us/pnw/pubs/pnw_gtr310.pdf

Myneni, R.B.; Keeling, C.D.; Tucker, C.J.; Asrar, G.; Nemani, R.R. 1997. Increased plant growth in the northern high latitudes from 1981 to 1991. Nature. 386(6626): 698-702.

Nabuurs, G.J.; Masera, O.; Andrasko, K.; Benitez-Ponce, P.; Boer, R.; Dutschke, M.; Elsiddig, E.; Ford-Robertson, J.; Frumhoff, P.; Karjalainen, T.; Krankina, O.; Kurz, W.A.; Matsumoto, M.; Oyhantcabal, W.; Ravindranath, N.H.; Sanz Sanchez, M.J.; Zhang, X. 2007. Forestry. In: Climate change 2007: mitigation. Contribution of Working Group III to the fourth assessment report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press: 541-584. http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter9.pdf

North, M.; Hurteau, M.; Innes, J. 2009. Fire suppression and fuels treatment effects on mixed-conifer carbon stocks and emissions. Ecological Applications. 19(6): 1385-1396.

O'Hara, K.L.; Latham, P.A.; Hessburg, P.; Smith, B.G. 1996. A structural classification for inland Northwest forest vegetation. Western Journal of Applied Forestry. 11(3): 97-102. http://www.treesearch.fs.fed.us/pubs/4746

Olsson, P.; Folke, C.; Berkes, F. 2004. Adaptive comanagement for building resilience in social-ecological systems. Environmental Management. 34(1): 75-90.

Parry, M.L.; Canziani, O.F.; Palutikof, J.P.; and others. 2007. Technical summary. In: Parry, M.L.; Canziani, O.F.; Palutikof, J.P.; van der Linden, P.J.; Hanson, C.E., editors. Climate change 2007: impacts, adaptation and vulnerability. Contribution of Working Group II to the fourth assessment report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press: 23-78. http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-ts.pdf

Perera, A.H.; Buse, L.J.; Weber, M.G., editors. 2004. Emulating natural forest landscape disturbances: concepts and applications. New York: Columbia University Press. 315 p. ISBN:0-231-12916-5

Perez-Garcia, J.; Lippke, B.; Comnick, J.; Manriquez, C. 2005. An assessment of carbon pools, storage, and wood products market substitution using life-cycle analysis results. Wood and Fiber Science. 37(Special Issue): 140-148.

Perry, D.A.; Hessburg, P.F.; Skinner, C.N.; Spies, T.A.; Stephens, S.L.; Taylor, A.H.; Franklin, J.F.; McComb, B.; Riegel, G. The ecology of mixed-severity fire regimes in Washington, Oregon, and Northern California. 2011. Forest Ecology and Management: 262, pp. 703-717.

Pfeifer, E. M., J. A. Hicke, and A. J. H. Meddens, Observations and modeling of aboveground tree carbon stocks and fluxes following a bark beetle outbreak in the western United States, Global Change Biology, 7, 339–350, 2011.

Pitman, G.B.; Perry, D.A.; Emmingham, W.H. 1982. Thinning to prevent mountain pine beetles in lodgepole and ponderosa pine. Exten. Circ. 1106. Corvallis, OR: Oregon State University, Extension Service. 4 p.

Powell, D.C. 1999. Suggested stocking levels for forest stands in northeastern Oregon and southeastern Washington: an implementation guide for the Umatilla National Forest. Tech. Pub. F14-SO-TP-03-99. Pen¬dle¬ton, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Umatilla National Forest. 300 p. http://www.fs.fed.us/r6/uma/nr/silv/stockingpub1.pdf

Powell, D.C. 2000. Potential vegetation, disturbance, plant succession, and other aspects of forest ecology. Tech. Pub. F14-SO-TP-09-00. Pendleton, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Umatilla National Forest. 88 p. http://www.fs.fed.us/r6/uma/nr/silv/Forest%20ecology%20pub.pdf

Powell, D.C. 2009a. Tree density protocol for mid-scale assessments. Unpub. Rep. Pendleton, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Umatilla National Forest. 45 p.

Powell, D.C. 2009b. A stage is a stage is a stage….or is it? Successional stages, structural stages, seral stages. Unpub. Rep. Pendleton, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Umatilla National Forest. 9 p.

Powell, D.C. 2010a. Estimating crown fire susceptibility for project planning. Fire Management Today. 70(3): 8-15. http://www.fs.fed.us/fire/fmt/fmt_pdfs/FMT70-3.pdf

Preisler, H.K.; Mitchell, R.G. 1993. Colonization patterns of the mountain pine beetle in thinned and unthinned lodgepole pine stands. Forest Science. 39(3): 528-545. http://www.ingentaconnect.com/content/saf/fs/1993/00000039/00000003/art00010

Price, C.; Rind, D. 1994. Possible implications of global climate change on global lightning distributions and frequencies. Journal of Geophysical Research. 99(D5): 10823-10831.

Raffa, K. F., B. H. Aukema, B. J. Bentz, A. L. Carroll, J. A. Hicke, M. G. Turner, and W. H. Romme. 2008. Cross-scale drivers of natural disturbances prone to anthropogenic amplification: The dynamics of bark beetle eruptions. BioScience.58. 501-517.

Reyer, C.; Guericke, M.; Ibisch, P. 2009. Climate change mitigation via afforestation, reforestation and deforestation avoidance: and what about adaptation to environmental change? New Forests. 38(1): 15-34. doi:10.1007/s11056-008-9129-0

Rhemtulla, J.M.; Mladenoff, D.J.; Clayton, M.K. 2009. Historical forest baselines reveal potential for continued carbon sequestration. Proceedings of the National Academy of Sciences. 106(15): 6082-6087.

Roth, Lewis F.; Barrett, James W. 1985. Response of dwarf mistletoe-infested ponderosa pine to thinning: 2. Dwarf mistletoe propagation. Res. Pap. PNW-RP-331. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 32 p

Running, S.W. 2008. Ecosystem disturbance, carbon, and climate. Science. 321(5889): 652-653.

Ryan, M. G.; Archer, S. R. Lead authors. 2008. The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity. In: Land Resources: Forests and Arid Lands. Final Report, synthesis and Assessment Product 4.3 U.S. Department of Agriculture, Office of the Chief Economist. 2009. Global Climate Change web site. http://www.usda.gov/oce/global)change/files/SAP4_3/Land.pdf

Safranyik, L.; Nevill, R.; Morrison, D. 1998. Effects of stand density management on forest insects and diseases. Tech. Tran. Note No. 12. Victoria, BC: Natural Resources Canada, Canadian Forest Service, Pacific Forestry Center. 4 p. http://bookstore.cfs.nrcan.gc.ca/detail_e.php?recid=35719

Salinger, M.; Sivakumar, M.; Motha, R. 2005. Reducing vulnerability of agriculture and forestry to climate variability and change: workshop summary and recommendations. Climatic Change. 70(1): 341-362. doi:10.1007/s10584-005-5954-8

Schmitt, C.L.; Powell, D.C. 2005. Rating forest stands for insect and disease susceptibility: a simplified approach (version 2.0). Pub. BMPMSC-05-01. La Grande, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Umatilla and Wallowa-Whitman National Forests, Blue Mountains Pest Management Service Center. 20 p. http://www.fs.fed.us/r6/uma/publications/SusceptibilityRatingV.2.pdf

Schmitt, Craig L. 1999. Effects of stocking level control on the occurrence and severity of conifer diseases in the Blue Mountains of northeastern Oregon and southeastern Washington. Publication BMZ-99-04. [La Grande, OR]: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest, Blue Mountains Pest Management Zone. 13 p.

Schmitz, R.F.; McGregor, M.D.; Amman, G.D.; Oakes, R.D. 1989. Effect of partial cutting treatments of lodgepole pine stands on the abundance and behavior of flying mountain pine beetles. Canadian Journal of Forest Research. 19(5): 566-574. doi:10.1139/x89-089

Shrimpton, D.M. 1978. Resistance of lodgepole pine to mountain pine beetle infestation. In: Berryman, A.A.; Amman, G.D.; Stark, R.W., tech. eds. Theory and practice of mountain pine beetle management in lodgepole pine forest. Moscow, ID: University of Idaho, Forest, Wildlife and Range Experiment Station: 64-76.

Sloan, John P. 1998. Interruption of the natural fire cycle in a grand fir forest of central Idaho: changes in stand structure and composition. In: Pruden, Teresa L.; Brennan, Leonard A., editors. Fire in ecosystem management: shifting the paradigm from suppression to prescription. Tallahassee, FL: Tall Timbers Research Station. Tall Timbers Fire Ecology Conference Proceedings. 20: 250-257.

Smith, J.E.; Heath, L.S.; Skog, K.E.; Birdsey, R.A. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. General Technical Report NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 216 p.

Sohngen, B.L.; Haynes, R.W. 1997. The potential for increasing carbon storage in United States unreserved timberlands by reducing forest fire frequency: an economic and ecological analysis. Climate Change. 35(2): 179-197.

Society of American Foresters. 1980. Cover Types of the United States and Canada. Washington D.C.

Spittlehouse, D. L.; Stewart, R.B. 2003. Adaptation to climate change in forest management. BC Journal of Ecosystems and Management. 4(1). 11p.

Spracklen, D.V.; Logan, J.A.; Mickley, L.J.; Park, R.J.; Yevich, R.; Westerling, A.L.; Jaffe, D.A. 2007. Wildfires drive interannual variability of organic carbon aerosol in the western U.S. in summer. Geophysical Research Letters. 34: L16816.

Steele, R.O., Pfiser, R.D. Ryker, R.A.,and Kittams, J.A. 1981. Forest Habitat Types of Central Idaho. USDA Forest Service Gen. Tech. Rep. INT-114, Intermountain Forest and Range Experiment Station, Ogden, UT. 138 p.

Steele, Robert; Williams, R.E.; Weatherby, J.C.; Reinhardt, E.D., Hoffman, J.T.; Their, R.W. 1996. Stand Hazard Rating for Central Idaho Forests. Gen. Tech. Rep. INT-GTR-332. Ogden, UT: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 80-94. http://treesearch.fs.fed.us/pubs/23915

Stephens, Scott L.; Boerner, Ralph E.J.; Moghaddas, Jason J.; Moghaddas, Emily E.Y.; Collins, Brandon M.; Dow, Christopher B.; Edminster, Carl; Fiedler, Carl E.; Fry, Danny L.; Hartsough, Bruce R.; Keeley, Jon E.; Knapp, Eric E.; McIver, James D.; Skinner, Carl N.; Youngblood, Andrew. 2012. Fuel treatment impacts on estimated wildfire carbon loss from forests in Montana, Oregon, California, and Arizona. Ecosphere. 3(5): 1-17, Article 38.

Turner, M.G.; Gardner, R.H.; O'Neill, R.V. 2001. Landscape ecology in theory and practice: Pattern and process. New York: Springer Science. 401 pp.

USDA Forest Service; US Department of the Interior; US Bureau of Land Management 2004. The Healthy Forests Initiative and Healthy Forests Restoration Act: Interim Field Guide. FS-799. 39 pp.

van Mantgem, P.J.; Stephenson, N.L.; Byrne, J.C.; Daniels, L.D.; Franklin, J.F.; Fulé, P.Z.; Harmon, M.E.; Larson, A.J.; Smith, J.M.; Taylor, A.H.; Veblen, T.T. 2009. Widespread increase of tree mortality rates in the western United States. Science. 323(5913): 521-524. doi: 10.1126/science.1165000

Waring, R.H.; Pitman, G.B. 1985. Modifying lodgepole pine stands to change susceptibility to mountain pine beetle attack. Ecology. 66(3): 889-897. doi:10.2307/1940551

Waring, R.H.; Running, S.W. 1998. Forest ecosystems: analysis at multiple scales. Second edition. San Diego, CA: Academic Press. 370 p. ISBN:0-12-735443-3

Weatherby, J.C.; Gardner, B.R.; Barbouletos, T.N. 1993. A Douglas-fir tussock moth hazard rating system for use in southern Idaho. Rep. R4-93-04. Ogden, UT: U.S.Department of Agriculture, Forest Service, Forest Pest Management, Intermountain Region. 14 p.

West, J.; Julius, S.; Kareiva, P.; Enquist, C.; Lawler, J.; Petersen, B.; Johnson, A.; Shaw, M. 2009. U.S. natural resources and climate change: concepts and approaches for management adaptation. Environmental Management. 44(6): 1001-1021. doi:10.1007/s00267-009-9345-1

Westerling, A.L.; Hidalgo, H.G.; Cayan, D.R.; Swetnam, T.W. 2006. Warming and earlier spring increase western U.S. forest wildfire activity. Science. 313(5789): 940-943. doi:10.1126/science.1128834

Whitehead, R.J.; Russo, G.L. 2005. “Beetle-proofed” lodgepole pine stands in interior British Columbia have less damage from mountain pine beetle. Infor. Rep. BC-X-402. Victoria, BC: Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre. 17 p. http://bookstore.cfs.nrcan.gc.ca/detail_e.php?recid=12584702

Wiedinmyer, C.; Neff, J.C. 2007. Estimates of CO2 from fires in the United States: implications for carbon management. Carbon Balance and Management. 2: 1-12.

Williams, D.W.; Liebhold, A.M. 1995. Herbivorous insects and global change: potential changes in the spatial distribution of forest defoliator outbreaks. Journal of Biogeography. 22(4/5): 665-671. http://www.jstor.org/stable/2845968

Williams, J.T. and R.C. Rothermel. 1992. Fire Dynamics in Northern Rocky Mountain Stand Types. Res. Note INT -405, Intermountain Research Station. USDA-Forest Service. 4 pp.

Winnett, S.M. 1998. Potential effects of climate change on U.S. forests: a review. Climate Research. 11: 39-49.

Witty, J.H.; Graham, R.C.; Hubbert, K.R.; Doolittle, J.A.; Wald, J.A. 2003. Contributions of water supply from the weathered bedrock zone to forest soil quality. Geoderma. 114(3-4): 389-400.

Woodbury, P.B.; Smith, J.E.; Heath, L.S. 2007. Carbon sequestration in the U.S. forest sector from 1990 to 2010. Forest Ecology and Management. 241(1-3): 14-27.

Fire and Fuels, Air Quality

Agee J.K. Fire ecology of Pacific Northwest Forests. Washington, D.C.: Island Press, 1993.

Agee, J.K. and Skinner, C.N. “Basic principles of forest fuels reduction treatments.” Forest Ecology and Management. 2005:211(2): 83-96.

Air Sciences Inc. 2003. “Users Guide: Smoke Impact Spreadsheet (SIS) Model”. Project No. 189-1. Missoula, MT: U.S. Department of Agriculture, Forest Service. 1,10.

Amman, G.D.; Logan, J.A. “Silvicultural control of the mountain pine beetle: prescriptions and the influence of microclimate.” American Entomologist. 1998: 44: 166-177.

Amman, G.D.; McGregor, M.D.; Cahill, D.B.; Klein, W.H. “Guidelines for reducing losses of lodgepole pine to the mountain pine beetle in unmanaged stands in the Rocky Mountains.” United States Department of Agriculture, Forest Service, General Technical Report INT-36. 1977. 19.

Arno, S. and S. Allison-Bunnell. Flames in our forest: Disaster or renewal? Washington, D.C.: Island Press, 2002.

Backus, Perry. “Ecologist question research on burns in bug killed forest after Montana fires.”

Bartos, D.L.; Amman, G.D.“Microclimate: an alternative to tree vigor as a basis for mountain pine beetle infestations.” United States Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, Utah. Research Paper INT-400. 1989. 10.

Bennett D.D.; McGregor M.D. “A demonstration of basal area cutting to manage mountain pine beetle in second growth ponderosa pine.” USDA Forest Service Northern Region, Forest Pest Management Report 88-16. 1980. 5.

Bennett, Dayle D. 2010. Insect and Disease Report for the Gibbonsville Timber Sale. Missoula, MT: Forest Health Protection; Trip ReportBFO-TR-2010-16. 6p.

Brown, J. K. 1995. "Fire Regimes and their relevance to ecosystem management." In Proceedings of Society of American Foresters National Convention, September 18-22, 1994, Anchorage, AK. Society of American Foresters, Wash. DC.

Brown, James K, Reinhardt, Elizabeth D, and Kramer, Kylie A. "Coarse Woody Debris: Managing Benefits and Fire Hazards in the Recovering Forest." USDA Forest Service Rocky Mountain Research Station, General Technical Report RMRS-GTR-105. 2003.

Busenberg, G. "Wildfire management in the United States: The evolution of a policy failure." Review of Policy Research, 21(2). 2004. 145-156.

Cahill, D.B. 1978. "Cutting strategies as control measures of the mountain pine beetle in lodgepole pine in Colorado." Pages 188-191 in A.A. Berryman, G.D. Amman and R.W. Stark, eds. "Theory and practice of mountain pine beetle management in lodgepole pine forests": Symposium proceedings; April 25-27, 1978, Pullman, WA. and Moscow, ID: University of Idaho, Forest, Wildlife and Range Experiment Station.

Calkin, D.E., et al. "Forest service large fire area burned and suppression expenditure trends, 1970-2002." 2005. Journal of Forestry Volume 103, Number 4. 179-183.

Cohen, Jack D. 1995. Structure Ignition Assessment Model (SIAM). IN The Biswell symposium: fire issues and solutions in urban interface and wildland ecosystems; February 15-17, 1994; Walnut Creek, California. Editors: Weise, David R.; Martin, Robert E. USDA Forest Service Gen. Tech. Rep. PSW-GTR-158. 1995.

Cohen, Jack D. 2000. "What is the Wildland Fire Threat to Homes?" Presented at the Thompson Memorial Lecture, Northern Arizona University, Flagstaff, AZ. April 10, 2000. Available on the World Wide Web at http://www.saveamericasforests.org/congress/Fire/Cohen.htm Accessed on September 6, 2011.

Cohen, Jack. 2008. "The wildland-urban interface fire problem: a consequence of the fire exclusion paradigm. Fire History Today." Accessed on the World Wide Web at http://www.foresthistory.org/publications/FHT/FHTFall2008/Cohen.pdf on August 19, 2011.

Cole, W.E.; Cahill, D.B. 1976. "Cutting strategies can reduce probabilities of mountain pine beetle epidem¬ics in lodgepole pine." Journal of Forestry 74(5): 1976. 294-297.

Core, J.E.; Peterson, J.L. 2001. "Public Health and Exposure to Smoke". In: Hardy, C. [and others]. Smoke Management Guide for Prescribed and Wildland Fire. Boise, ID: National Wildfire Coordination Group, Fire Use Working Team: 29 p.

Countryman, C. M. 1972. The fire environment concept (blue cover). Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station. Available on the World Wide Web at http://www.firemodels.org/index.php/behaveplus-introduction/behaveplus-publications. Accessed on September 6, 2011.

Covington, W. W. and Moore, M. M. 1994. "Southwestern ponderosa forest structure and resource conditions: Changes since Euro-American settlement" Journal of Forestry 92: 1994. 39-47.

Data for Fire and Fuels Planning". Available on the World Wide Web at http://www.fs.fed.us/rm/pubs/rmrs_p029/rmrs_p029_397_434.pdf. Accessed on December 1, 2011.

Finney, M.A.,et al. 2006. "Simulation of long-term landscape-level fuel treatment effects on large wildfires." USDA Forest Service, RMRS-P-41. Accessed on the world wide web at http://www.fs.fed.us/rm/pubs/rmrs_p041/rmrs_p041_125_147.pdf on July 18, 2011.

Graham, R.T., McCaffrey, S. and Jain, T. B. 2004. "Science basis for changing forest structure to modify wildfire behavior and severity." RMRS-GTR-120, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Accessed on the world wide web at http://www.fs.fed.us/rm/pubs/rmrs_gtr120.pdf on July 19, 2011.

Hann, Wendel J. and Strohm, Diane J. 2003. "Fire Regime Condition Class and Associated

LANDFIRE: LANDFIRE 1.1.0 Forest 40 Scott and Burgan Fire Behavior Fuel Models layer. U.S. Department of Interior, GeologicalSurvey. [Online]. Available:http://landfire.cr.usgs.gov/viewer/ [2011, November 04].

LANDFIRE: LANDFIRE 1.1.0 Forest Canopy Base Height layer. U.S. Department of Interior, GeologicalSurvey. [Online]. Available:http://landfire.cr.usgs.gov/viewer/ [2011, November 04].

LANDFIRE: LANDFIRE 1.1.0 Forest Canopy Bulk Density layer. U.S. Department of Interior, GeologicalSurvey. [Online]. Available:http://landfire.cr.usgs.gov/viewer/ [2011, November 04].

LANDFIRE: LANDFIRE 1.1.0 FRCC Departure Index layer. U.S. Department of Interior, GeologicalSurvey. [Online]. Available:http://landfire.cr.usgs.gov/viewer/ [2011, November 04].

LANDFIRE: LANDFIRE 1.1.0 Fuel Loading Models layer. U.S. Department of Interior, GeologicalSurvey. [Online]. Available:http://landfire.cr.usgs.gov/viewer/ [2011, November 04].

Lemhi County Wildfire Protection Plan. 2006. Available on the World Wide Web at http://www.idl.idaho.gov/nat_fire_plan/county_wui_plans/lemhi/lemhi_county_plan.htm. Accessed on December 1, 2011.

Martin, R.E. and D.B. Sapsis. 1991. "Fires as agents of biodiversity: pyrodiversity promotes biodiversity." Pages 150-157 in: R. Harris, D. Erman, and H. Kerner (Editors). Proceedings of the Symposium on Biodiversity of Northwestern California, Santa Rosa, CA. Available on the World Wide Web at http://www.sierraforestlegacy.org/Resources/Conservation/FireForestEcology/FireScienceResearch/FireEcology/FireEcology-Martin91.pdf Accessed on June 1, 2011

McGregor, M.D.; Amman, G.D.; Schmitz, R.F.; Oakes, R.D. "Partial cutting lodgepole pine stands to reduce losses to the mountain pine beetle." Canadian Journal of Forest Research 1987:17(10): 1234-1239.

Missoulian. 18 October 2011: Accessed on the World Wide Web at http://missoulian.com/news/state-and-regional/article_33e5c862-f930-11e0-9771-001cc4c03286.html#ixzz1nKEatnXM on February, 24, 2012.

Mitchell, R. G.; Waring, R. H.; Pitman, G. B. 1983. "Thinning lodgepole pine increases tree vigor and resistance to mountain pine beetle." Forest Science 1983:29(1): 204-211.

Montana/Idaho Airshed Group. 2010. "Operating Guide". Missoula, MT: 1p.

Morgan, Penelope. 2008. "Fire History on the Salmon-Challis National", Revised Final Report, FS Agreement No. Agreement #03CS11041330. 4.

NWCG. 2006. NWCG Fireline Handbook Appendix B Fire Behavior. 59.

Ottmar, R.D.; Reinhart, T.R. 2001. "Smoke Exposure Among Fireline Personnel". In: Hardy, C. [and others]. Smoke Management Guide for Prescribed and Wildland Fire. Boise, ID: National Wildfire Coordination Group, Fire Use Working Team: 51-57.

Peterson, Janice L. 2001. "Regulations for Smoke Management". In: Hardy, C. [and others]. Smoke Management Guide for Prescribed and Wildland Fire. Boise, ID: National Wildfire Coordination Group, Fire Use Working Team: 61-74.

Pyne, Stephen J. "Where Have All the Fires Gone?" Fire Management Today. 2000:60(3): 4-6.

Roe, A.L.; Amman, G.D. 1970. "The mountain pine beetle in lodgepole pine forests." USDA, Forest Service Intermountain Forest and Range Experiment Station, Research Paper INT-71. 23.

Rothermel, Richard C. 1983. "How to Predict the Spread and Intensity of Forest and Range Fires." Gen. Tech. Rep. INT-143. 161 p. Accessed on the World Wide Web at http://www.fs.fed.us/rm/pubs_int/int_gtr143.pdf on July 29, 2011.

Schmidt, W.C.; Alexander, R.R. 1985. Strategies for managing lodgepole pine. Pages 201-210 in Baumgartner, David M.; Krebill, Richard G.; Arnott, James T.; Weetman, Gordon F., compilers and editors. Lodgepole pine: The species and its management: Symposium proceedings; 1984 May 8-10; Spokane, WA; 1984 May 14-16; Vancouver, BC. Pullman, WA: Washington State University, Cooperative Extension.

Scott, J.H. and Reinhardt, E.D. 2001. Assessing crown fire potential by linking models of surface and crown fire behavior. RMRS-RP-29. Ogden, UT: USDA, Forest Service, Rocky Mountain Research Station. 59. Accessed on the World Wide Web at http://www.fire.org/downloads/nexus/2.0.0/rp29.pdf on July 25, 2011

Skinner, Carl N.; Taylor, Alan H. and Agee, James K. 2006. Klamath Mountains bioregion. In: Sugihara, Neil G.; Van Wagtendonk, Jan W.; Shaffer, Kevin E.; Fites-Kaufman, Joann and Thode, Andrea E. (eds.). Fire in California's ecosystems. 170-194.

State of Idaho. 2011. Homepage of Idaho Department of Environmental Quality, [Online]. Available: http://www.deq.idaho.gov/air-quality.aspx [January 26, 2012].

Stephens, S.L., et al. 2009. "Fire treatment effects on vegetation structure, fuels and potential fire severity in western U.S. forests." Ecological Applications, 19(2). Pg. 305-320.

USDA. 2006. Forest Service Large Fire Suppression Costs. Available on the World Wide Web at http://www.usda.gov/oig/webdocs/08601-44-SF.pdf. Accessed on January 16, 2012.

US Environmental Protection Agency. 2012. Homepage for Air Quality, [Online]. Available: http://www.epa.gov/air/criteria.html [January 23, 2012].

USDA Forest Service. 1988. Salmon National Forest Land and Resource Management Plan. U.S. Forest Service, Department of Agriculture. Intermountain Region. Pgs IV-17 to18, III-4, IV-69-70.

Van Wagner. C. E. 1977. “Conditions for the start and spread of crown fire.” Canadian Journal of Forest Research. 1977: 7(1): 23-34.

Waring, R.H.; Pitman, G.B. 1980. “A simple model of host resistance to bark beetles.” Oregon State University, School of Forestry, Forest Research Laboratory, Corvallis. Res. Note No. 65.

Westerling, A.L., Hildalgo, H.G, Cayan, D.R. and Swetnam, T.W. 2006. “Warming and earlier spring increase Western U.S. forest wildfire activity.” Pages 940-943. Science, Vol. 313. Accessed on the World Wide Web at http://www.treesearch.fs.fed.us/pubs/24813. Accessed on the world wide web on September 8, 2011.

Whitehead Roger J., Russo G.L.2005. “Beetle-Proofed” lodgepole pine stands in interior British Columbia have less damage from mountain pine beetle. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Center, Victoria, BC. Information Report, BC-X-402. 1.

Roadless and Unroaded

Campbell, R. B., Jr. and D. L. Bartos. 2001. Aspen ecosystems: objectives for sustaining biodiversity. In: Shepperd, W. D. and D. L. Bartos comps. Sustaining aspen in western landscapes: symposium proceedings; 2000 June 13-15; Grand Junction, Co. RMRS-P-18. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 299-307.

Code of Federal Regulations. 2011. 36 CFR Chapter II, Part 219, Subpart A – National Forest System Land and Resource Management Planning.

USDA Forest Service. 1988. Salmon National Forest Land and Resource Management Plan. U.S. Forest Service, Department of Agriculture. Intermountain Region.

USDA Forest Service. 2001. Guide to Noxious Weed Prevention Practices. USDA Forest Service. Washington D.C.

USDA Forest Service. 2007. Amendment 1909.12-2007-1. FSH 1909.12, - Land Management Planning Handbook. Chapter 70-Wilderness Evaluation. Washington, D.C.. 25 pp.

USDA Forest Service. 2008. Roadless Area Conservation, National Forest System Lands in Idaho, Final Environmental Impact Statement (FEIS), Appendix C- Idaho Roadless Areas, Volume 5.

USDA Forest Service. 2008. 36 CFR 294. Special Areas, Roadless Area Conservation; Applicability to the National Forests in Idaho; Final Rule. Federal Register (73 FR 61456), Volume 70, No. 201, October 16, 2008).

USDA Forest Service. 2011. R4 Interim Directive 1920-2011-1. FSM 1900, Chapter 1920 - Land and Resource Management Planning; Idaho Roadless Areas. Ogden, UT. 12 pp.

Soils and Hydrology

Abramovich, Ron.; Monalu, Myron.; and Katherine Craine. 1998. Climates of Idaho. University of Idaho College of Agriculture. University of Idaho, Moscow, ID 83844-2240.

Ager, Alan A.; Clifton, Caty. 2005. Software for calculating vegetation disturbance and recovery by using the equivalent clearcut area model. Gen. Tech. Rep. PNW-GTR-637. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

Clayton, James L. 1942. Soil Disturbance Caused by Clearcutting And Helicopter Yarding In the Idaho Batholith. [Ogden, Utah]: U.S. Dept. of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station, 1981.

DeBano, L.F. 1991. Effects of Fire on Soil Properties. US Department of Agriculture Forest Service General Technical Report, INT-280. US Department of Agriculture Forest Service, Berkeley, CA.

Elliot W.J. and D.E. Hall, 1997. Water Erosion Prediction Project forest applications: General Technical Report INT-GTR-365. USDA Forest Service. Rocky Mountain Research Station, Ogden UT.

Elliot, William J.; Hall, David E.; Scheele, Dayna L.; February 2000. Disturbed WEPP (draft) http://forest.moscowfsl.wsu.edu/fswepp/docs/fswepping.html

Farnes, P, W. McCaughey, and K. Hansen. 2000. Role of Fire in Determining Annual Water Yield in Mountain Watersheds. Proposed as After the Fires: The Ecology of Change in Yellowstone National Park. L. Wallace (Ed). Yale University Press.

Flanagan, D.C., and S.J. Livingston. 1995. WEPP user summary. NSERL http://topsoil.nserl.purdue.edu/nserlweb/weppmain/

Galbraith, Alan F. 1975. Method for Predicting Increases in Water Yield Related to Timber Harvesting and Site Conditions. Watershed Management Symposium, Logan, Utah.

Ice, G.G., Neary, D.G. & Adams, P.W. (2004) Effects of wildfire on soils and watershed processes. Journal of Forestry, 16-20

Idaho Department of Environmental Quality (IDEQ). 2005. 2010 Integrated 303(d)/305(b) Report. http://www.deq.state.id.us/water/data_reports/surface_water/monitoring/integrated_report.cfm

Idaho Department of Lands. July 2005. Rules Pertaining to the Idaho Forest Practices Act,(Title 38, Chapter 13, Idaho Code. [IDAPA 20.02.01000]

McCaughey W.W and P.E. Farnes, 2001. Swnowpack Comparison Between an Opening and a Lodgepole Pine Stand.

Napper, Carolyn; Page-Dumroese, Deborah ; Howes, Steven . 2009. Soil-Disturbance Field Guide. 0819 1815P. San Dimas, CA: U.S. Department of Agriculture, Forest Service, San Dimas Technology and Development Center. 112 p.

Neary, Daniel G.; Ryan, Kevin C.; DeBano, Leonard F., eds. 2005. (revised 2008). Wildland fire in ecosystems: effects of fire on soils and water. Gen. Tech. Rep. RMRS-GTR-42-vol.4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 250 p.

Pannkuk, C.D., Robichaud, P.R., Brown, R.E. 2000. "Effectiveness of Needle Cast from Burnt Conifer Trees on Reducing Erosion." USDA Forest Service, Rocky Mountain Research Station.

Powers, R.F., Sanchez, F.G., Scott, D.A., Page-Dumroese, D. 2004. The North American long-term soil productivity experiment: coast to coast findings from the first decade. In: Shepperd, W.D., Eskew, L.G. (compilers), Silviculture in Special Places. Proceedings of the National Silviculture Workshop. RMRS-P-34. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Robichaud, Peter R.; Beyers, Jan L.; Neary, Daniel G. 2000. Evaluating the effectiveness of postfire rehabilitation treatments. Gen. Tech. Rep. RMRS-GTR-63. Fort Collins: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 85 p.

Rosgen, D. 1994. A classification of Natural Rivers. Catena, Vol 22: 169-199 Elsevier Science, B.V. Amsterdam.

Stednick, John D. 1996. Monitoring the Effects of Timber Harvest on Annual Water Yield. Journal of Hydrology, Vol. 176(1-4) (1996) pp. 79-95

Stednick, John D. 2010. Ch. 8: Effects of Fuel Management Practices on Water Quality. Cumulative Watershed Effects of Fuel Management in the Western Unites States. Rocky Mountain research Station General Technical Report RMRS-GTR-231.

Tiedemann, Arthur R.; Conrad, Carol E.; Dieterich, John H.; Hornbeck, James W.; Megahan,Walter F.; Viereck, Leslie A. and Dale D. Wade. 1979. Effects of fire on water: a state-of-knowledge review. USDA, Forest Service General Technical Report WO-10. Washington, D.C.

Troendle, C.A and W.K. Olsen, 1994. Potential Effects of Timber Harvest and Water Management on Streamflow Dynamics and Sediment Transport.

Troendle, C. A. and G. S. Bevenger. 1996. Effect of fire on stream flow and sediment transport, Shoshone National Forest, Wyoming. In: Ecological Implications of Fire in Greater Yellowstone. JasonGreenlee, Ed. International Assoc. of Wild Land Fire, Fairfield, VA.43-45.

USDA Forest Service. 1993. Determining the Risk of Cumulative Watershed Effects Resulting from Multiple Activities, Endangered Species Act, Section 7. February, 1993.

USDA Forest Service. 1995. Goals, objectives, and standard/guidelines as described in the EA and subsequent FONSI and DN/DR for the Interim Strategies for Managing Anadromous Fish Producing Watersheds on Federal Lands in eastern Oregon, Washington, Idaho, and Portions of California, PACFISH (February 24, 1995).

USDA Forest Service, 1997. An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins. Pacific North West Research Station. PNW-GTR-385. Portland, OR.

USDA Forest Service. 2002. Programmatic Biological Assessment: Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest

USDA Forest Service 2005. PACFISH/INFISH Biological Opinion (PIBO): Effectiveness Monitoring Program seven-year status report 1998 through 2004. Henderson, Richard C.; Archer, Eric K.; Bouwes, Boyd A; Coles-Ritchie, Marc S.; Kershner, Jeffrey L. Gen. Tech. Rep. RMRS-GTR-162. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 16 p.

Fish and Aquatic Resources

Ager, Alan A. and Clifton, Caty. 2005. Software for calculating vegetation disturbance and recovery by using the equivalent clearcut area model. Gen. Tech. Rep. PNW-GTR-637. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

Baker, M.B. 1990. Hydrologic and water quality effects of fire. General Technical Report RM-191, pp. 31-42. USDA Forest Service Rocky Mountain Forest and Range Experiment Station.

Beche, L. A., S.L. Stephens, V.H. Resh. 2005. Effects of prescribed fire on a Sierra Nevada (California, USA) stream and its riparian zone. Department of Environmental Science, Policy and Management, University of California, Berkeley. Forest Ecology and Management 218:37-59.

Ford, MJ (ed.) 2011 This is in draft BA as NMFS 2011b. Status review update for Pacific salmon and steelhead listed under the endangered species act: Pacific Northwest. US Department of Commerce, National Oceanic and Atmospheric Administration. NOAA Technical Memorandum NMFS-NWFSC-113

Havlina et al. 2010. Interagency Fire Regime Condition Class website. USDA Forest Service, USDA Department of the Interior, and The Nature Conservancy [www.frcc.gov].

Idaho Department of Environmental Quality (IDEQ). 2011. 2010 Integrated Report Final. State of Idaho Department of Environmental Quality, Boise, ID. August 2011

Larson, A.J. and D. Churchill. 2012. Tree spatial patterns in fire-frequent forests of western North America, including mechanisms of pattern formation and implications for designing fuel reduction and restoration treatments. Forest Ecology and Management 267: 74-92.

Monlux, Steve; Mitchell, Michael R. 2006. Surface-Aggregate Stabilization with Chloride Materials. U.S. Department of Agriculture Forest Service National Technology and Development Program. 0677 1805-SDTDC

Overton, Kerry C.; McIntyre, John D.; Armstrong, Robyn; Whitwell, Shari L.; Duncan, Kell A. 1995. User's Guide to Fish Habitat: Descriptions that Represent Natural Conditions in the Salmon River Basin, Idaho. INT-GTR-322 Intermountain Research Station. pages 23-27

Overton, Kerry C.; Wollrab, Sherry P.; Roberts, Bruce C.; Radko, Michael A. 1997. R1/R4 (Northern/Intermountain Regions) Fish and Fish Habitat Standard Inventory Procedures Handbook. INT-GTR-346 Intermountain Research Station. pages 65 & 67

Page-Dumroese, D.S.; Jurgensen, M.F.; Tiarks, A.E.; Ponder, F., Jr.; Sanchez, F.G.; Fleming, R.L.; Kranabetter, J.M.; Powers, R.F.; Stone, D.M.; Elioff, J.D.; Scott, D.A. 2006. Soil physical property changes at the North American Long-Term Soil Productivity study sites: 1 and 5 years after compaction. Canadian Journal of Forest Research 36, 551-564.

Platts, W.S. 1991. Livestock Grazing. In: Influence of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society, Special Publication 19:389-423.

Powers, R.F., Sanchez, F.G., Scott, D.A., Page-Dumroese, D. 2004. The North American long-term soil productivity experiment: coast to coast findings from the first decade. In: Shepperd, W.D., Eskew, L.G. (compilers), Silviculture in Special Places. Proceedings of the National Silviculture Workshop. RMRS-P-34. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Robichaud, Peter R.; Beyers, Jan L.; Neary, Daniel G. 2000. Evaluating the effectiveness of postfire rehabilitation treatments. Gen. Tech. Rep. RMRS-GTR-63. Fort Collins: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 85 p.

Stowell, Rick.; Espinosa, Al.; Bjornn, Ted C.; Platts, William S.; Burns, Dave C.; Irving, John S. 1983. Guide for Predicting Salmonid Response to Sediment Yields in Idaho Batholith Watersheds. U.S. Department of Agriculture, Forest Service, Northern Region, Missoula, MT, and Intermountain Region, Ogden, UT.

USDA Forest Service. 1988. Region 4, Salmon National Forest 1988 Land and Resource Management Plan.

USDA Forest Service. 1995. Goals, objectives, and standard/guidelines as described in the EA and subsequent FONSI and DN/DR for the Interim Strategies for Managing Anadromous Fish Producing Watersheds on Federal Lands in eastern Oregon, Washington, Idaho, and Portions of California, PACFISH (February 24, 1995).

USDA Forest Service. 2002a. Programmatic Biological Assessment for Fire Suppression and Prescribed Natural Fire Activities in the Upper Salmon River Sub-Basin (March 21, 2002).

USDA Forest Service. 2002b. Programmatic Biological Assessment For Road Maintenance On Public Lands Administered by: Salmon-Challis National Forest & Bureau of Land Management Salmon, Challis & Idaho Falls Field Offices In the Upper Salmon River Basin & Lost River Subbasin (May 24, 2002).

USDA Forest Service. 2003. Supplement to the 2002 Programmatic Biological Assessment For Road Maintenance On Public Lands Administered by: Salmon-Challis National Forest & Bureau of Land Management Salmon, Challis & Idaho Falls Field Offices In the Upper Salmon River Basin & Lost River Subbasin (May 29, 2003).

USDA Forest Service. 2004. Amendments to the Management Indicator Species List for the Salmon and Challis Land and Resource Management Plans (February 3, 2004).

USDA Forest Service. 2005a. Programmatic Biological Assessment for Stream Crossing Structure Replacement and Removal Activities Affecting ESA-Listed Species (June 9, 2005).

USDA Forest Service. 2005b. National Inventory and Assessment Procedure for Identifying Barriers to Aquatic Organism Passage at Road-Stream Crossings. USDA, Forest Service, National Technology and Development Program, 7700 -Transportation Mgmt November 2005

USDA Forest Service, 2009. Forest Service Manual, National Headquarters, Washington DC. FSM 2600 – Wildlife, Fish and Sensitive Plant Habitat Management.

USDA Forest Service. 2011. Biological Assessment For Restoration Activities at Stream Crossings Affecting the Habitat of ESA-listed Fish Species On National Forests and Bureau of Land Management Public Lands in Idaho. USDA Forest Service and USDI Bureau of Land Management (November 5, 2011).

USDA Forest Service. 2012. Fire/fuels specialist report. Upper North Fork Ecosystem Restoration Project. North Fork Ranger District, Salmon-Challis National Forest. February 2012.

USDA Forest Service. 2012. Upper North Fork HFRA Ecosystem Restoration Project Silviculture Report. North Fork Ranger District, Salmon-Challis National Forest. May 2012.

USDA Forest Service. 2013. Upper North Fork Draft Environmental Impact Statement. Hydrology/soils specialist technical report. North Fork Ranger District, Salmon-Challis National Forest

USDC National Marine Fisheries Service. 1995a. Conservation Recommendations as described in the Endangered Species Act - Section 7 Consultation Biological Opinion for the Interim Strategies for Managing Anadromous Fish Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho, and portions of California, PACFISH (January 23, 1995).

USDC National Marine Fisheries Service. 1995b. NMFS concurrence letter for the 1994 North Fork Salmon River Section 7 Watershed BA Package for Sockeye and Chinook Salmon (July 31, 1995).

USDC National Marine Fisheries Service. 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. The National Marine Fisheries Service Environmental and Technical Services Division, Habitat Conservation Branch. August 1996.

USDC National Marine Fisheries Service. 1996. NMFS Juvenile Fish Screen Criteria for Pump Intakes Addendum. Environmental and Technical Services Division. Portland, Oregon. May 9, 1996.

USDC National Marine Fisheries Service. 2002. Concurrence Letter (May 3, 2002) for the March 21, 2002 US Forest Service Programmatic Biological Assessment for Fire Suppression and Prescribed Natural Fire Activities in the Upper Salmon River Sub-Basin.

USDC National Marine Fisheries Service. 2003. Concurrence Letter (July 17, 2003) for the May 29, 2003 Supplement to the 2002 Programmatic Biological Assessment For Road Maintenance On Public Lands Administered by: Salmon-Challis National Forest & Bureau of Land Management Salmon, Challis & Idaho Falls Field Offices In the Upper Salmon River Basin & Lost River Subbasin.

USDC National Marine Fisheries Service. 2006. Biological Opinion for the Programmatic Biological Assessment for Stream Crossing Structure Replacement and Removal Activities Affecting ESA-Listed Species (August 8, 2006)

USDC National Marine Fisheries Service 2011. 5-Year review: Summary and evaluation of Snake River sockeye, Snake River spring-summer Chinook, Snake River fall-run Chinook, Snake River Basin steelhead. National Marine Fisheries Service, Northwest Region Portland, OR

USDC National Marine Fisheries Service 2012. Biological Opinion for Restoration activities at stream crossings on National Forests and Bureau of Land Management public lands in Idaho (10 year programmatic with numerous projects), Snake, Salmon and Clearwater River basins. (June 4, 2012).

USDI US Fish and Wildlife Service. 1998b. Endangered Species Consultation Handbook – Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act - U.S. Fish and Wildlife Service and National Marine Fisheries Service (March 1998).

USDI US Fish and Wildlife Service. 1998c. The Reasonable and Prudent Measures, Terms and Conditions, and Conservation Recommendations as described in the USF&WS Final Biological Opinion's consultation on effects to bull trout from continued implementation of USDA Forest Service Land and Resource Management Plans and BLM Resource Management Plans, as amended by PACFISH (August 14, 1998).

USDI US Fish and Wildlife Service. 2002. Concurrence Letter (April 17, 2002) for the March 21, 2002 US Forest Service Programmatic Biological Assessment for Fire Suppression and Prescribed Natural Fire Activities in the Upper Salmon River Sub-Basin.

USDI US Fish and Wildlife Service. 2002. Chapter 17, Salmon River Recovery Unit, Idaho. 194 p. In: U.S. Fish and Wildlife Service. Bull Trout (Salvelinus confluentus) Draft Recovery Plan. Portland Oregon.

USDI US Fish and Wildlife Service. 2003. Concurrence Letter (July 29, 2003) for the May 29, 2003 Supplement to the 2002 Programmatic Biological Assessment For Road Maintenance On Public Lands Administered by: Salmon-Challis National Forest & Bureau of Land Management Salmon, Challis & Idaho Falls Field Offices In the Upper Salmon River Basin & Lost River Subbasin.

USDI US Fish and Wildlife Service. 2006. Biological Opinion for the Programmatic Biological Assessment for Stream Crossing Structure Replacement and Removal Activities Affecting ESA-Listed Species (August 14, 2006).

USDI US Fish and Wildlife Service. 2012 Biological Opinion for the restoration activities at stream crossings (stream crossing programmatic). U.S. Fish and Wildlife Service, Idaho Fish and Wildlife Office, Boise, ID. (June 15, 2012).

Wohlgemuth, P.M. 2001. Prescribed fire as a sediment management tool in Southern California chaparral watersheds. In Proceedings of the Seventh Federal Interagency Sedimentation Conference, Reno, NV. March 25-29, 2001.

Wildlife

Anderson, D., S. Stephano, M. Goldstein, K. Titus, C. Crocker-Bedford, J. Keane, R. Anthony, R, Rosenfield. 2003. The status of northern goshawks in the western United States. Wildlife Society Technical Review 04-1. The Wildlife Society, Bethesda, MD USa. 24 PP.

Bull, E., and J. Hohmann. 1992. Northern goshawks in northeastern Oregon. Final report. USDA-FS Pacific Northwest Research Station, La Grande, OR.

Barbour, R.W. and W.H. Davis. 1969. Bats of America. University Press of Kentucky. 283 pp.

Burt, W., and R. Grossenheider. 1980. Mammals, third edition. Peterson Field Guide. Houghton-Mifflin Company. Boston, Massachusetts.

Copeland, J., K. McKelvey, K. Aubry, A. Landa, J. Persson, R. Inman, J. Krebs, E. Lofroth, H. Golden, J. Squires, A. Magoun, M. Schwartz, J. Wilmot, C. Copeland, R. Yates, I. Kojola, and R. May. 2010. The bioclimatic envelope of the wolverine (Gulo gulo): do climatic constraints limit its geographic distribution? Canadian Journal of Zoology. 88: 233-246.

Gruver, J.C. and D.A. Keinath. 2006. Townsend's Big-eared Bat (Corynorhinus townsendii): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/townsendsbigearedbat.pdf.

Haggas, L. 2014. Personal communication with L. Haggas, North Zone wildlife biologist for the Salmon-Challis National Forest. January 2014.

Hayward,G. 1994. Review of Technical Knowledge Boreal Owls. In: Flammulated, Boreal, and Great Gray Owls in the United States: A Technical Conservation Assessment. Haywayrd, G. and J. Verner, tech. eds. Ge. Tech. Report RM-253. Fort Collins, CO. USDA-Forest Service, Rocky Mountain Forest and Range Experiment Station. 214 p. 3 maps.

Idaho Department of Fish and Game. 2005. Comprehensive Wildlife Conservation Strategy. Boise, ID. Available online at < http://fishandgame.idaho.gov/public/wildlife/cwcs/ >

Idaho Department of Fish and Game. 2008. Nadeau M. S. (ed). Idaho Wolf Management Plan 2008-2012. Idaho Department of Fish and Game, Boise, ID. 85pp.

Idaho Department of Fish and Game. 2014. Comments regarding wildlife records in the state database IFWIS.

Idaho Department of Fish and Game. 2014. Idaho Elk Management Plan 2014-2024. Idaho Department of Fish and Game, Boise, ID. 201 pp.

Idaho Fish and Wildlife Information System. February 2010. Animal Conservation Database. Idaho Department of Fish and Game, Boise, ID.

Jameson, E.W. Jr. and Hans J. Peeters. 1988. California Mammals. University of California Press. Berkeley, California.

Jones. J. 1991. Habitat use of fisher in northcentral Idaho. Masters thesis. University of Idaho. Moscow, Idaho.

Kunz, T.H. and R.A. Martin. 1990. Plecotus townsendii. Mammalian Species. No. 175. pp 1-6. Published by the American Society of Mammalogists.

Leonard, Jr., David L. 2001. American Three-toed Woodpecker (Picoides dorsalis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/588.

Larson, A. and D. Churchill. 2012. Tree spatial patterns in fire-frequent forests of western North America, including mechanisms of pattern formation and implications for designing fuel reduction and restoration treatments. Forest Ecology and Management, 267: 74-92.

Lofroth, E. C., C. M. Raley, J. M. Higley, R. L. Truex, J. S. Yaeger, J. C. Lewis, P. J. Happe, L. L. Finley, R. H. Naney, L. J. Hale, A. L. Krause, S. A. Livingston, A. M. Myers, and R. N. Brown. 2010. Conservation of Fishers (Martes pennanti) in South-Central British Columbia, Western Washington, Western Oregon, and California–Volume I: Conservation Assessment. USDI Bureau of Land Management, Denver, Colorado, USA.

Lofroth, E. C., J. M. Higley, R. H. Naney, C. M. Raley, J. S. Yaeger, S. A. Livingston, and R. L. Truex. 2011. Conservation of Fishers (Martes pennanti) in South-Central British Columbia, Western Washington, Western Oregon, and California–Volume II: Key Findings From Fisher Habitat Studies in British Columbia, Montana, Idaho, Oregon, and California. USDI Bureau of Land Management, Denver, Colorado, USA.

Lyon, L. 1983. Road density models for describing habitat effectiveness for elk. Journal of Forestry 81:592–595.

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: December 01, 2013).

Pasitschniak-Arts, M., and S. Lariviere. 1995. Gulo gulo. Mamm. Species, 499: 1–10.

Piaggio, A. 2005. Species account for the Townsend's big-eared bat (2005 update on the 1998 account by R. Sherwin). Western Bat Working Group.

Pierson, E.D., and W.E. Rainey. 1998. Distribution, status, and management of Townsend's big-eared bat (Corynorhinus townsendii) in California. California Department of Fish and Game, The Resources Agency, Sacramento, California.

Pierson, E., M. Wackenhut, J. Altenbach, P. Bradley, P. Call, D. Genter, C.. Harris, B. Keller, B. Lengus, L. Lewis, B. Luce, K. Navo, J. Perkins, S. Smith, and L. Welch. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (Corynorhinus townsendii townsendii and Corynorhinus townsendii pallescens). Idaho Conservation Effort, Idaho Department of Fish and Game, Boise, ID.

Public Law 94-588. 1976. United States of America 94th Congress. (Available at http://www.gpo.gov/fdsys/pkg/STATUTE-90/pdf/STATUTE-90-Pg2949.pdf.

Reynolds, R., R. Graham, M. Reiser, R. Bassett, P. Kennedy, D. Boyce, G, Goodwin, R. Smith, and E. Fisher. 1992. Management recommendations for the northern goshawk in the southwestern United States. Gen. Tech. Rep. RM-217, Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 90 p.

Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Iñigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, T. C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY.

Ruediger, Bill, Jim Claar, Steve Gniadek, Bryon Holt, Lyle Lewis, Steve Mighton, Bob Naney, Gary Patton, Tony Rinaldi, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. Canada lynx conservation assessment and strategy, as amended. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp. Available electronically at http://www.fs.fed.us/r1/planning/lynx/lynx.html.

Samson, F. 2005 (amended March 6, 2006). A Conservation assessment of the northern goshawk, blacked-backed woodpecker, flammulated owl, and pileated woodpecker in the Northern Region, USDA Forest Service. Unpublished report on file, Northern Region, Missoula, Montana, USA.

Samson, F. 2006. Habitat estimates for maintaining viable populations of the northern goshawk, black-backed woodpecker, flammulated owl, pileated woodpecker, American marten, and fisher. USDA Forest Service. Unpublished report on file, Northern Region, Missoula, Montana, USA.

Squires, John R. and Richard T. Reynolds. 1997. Northern Goshawk (Accipiter gentilis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/298 doi:10.2173/bna.298

Thomas, J., H. Black, R. Scherzinger, and R. Pecersen. 1979. Deer and Elk. Chapter 8 in: Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington. USDA -Forest Service, Agriculture Handbook #553.

USDA Forest Service. 1988. Land and Resource Management Plan. Salmon National Forest. Salmon, Idaho.

USDA Forest Service. 2000. Landbird Strategic Plan, FS-648. Washington, D.C.

USDA Forest Service. 2004. Status of the Amended Salmon-Challis National Forest Plans Management Indicator Species Spotted Frog and Pileated Woodpecker. November 2004. Report on file at the Salmon-Challis National Forest, Salmon, ID.

USDA Forest Service. 2007. Northern Rockies Lynx Management Direction. Record of Decision. Missoula, Montana.

USDA Forest Service. 2012. Upper North Fork HFRA Ecosystem Restoration Project silviculture specialist's report. Unpublished report on file at the Salmon-Challis National Forest. Salmon, Idaho.

USDA Forest Service. 2013. Natural Resource Manager, wildlife observation records database application.

USDA Forest Service and Idaho Department of Fish and Game (Idaho Department of Fish and Game). 1997. Interagency Guidelines for Evaluating and Managing Elk Habitats and Populations in Central Idaho. Wildlife Bulletin No. 11. Boise, ID. 67 p.

USDA Forest Service and US Fish and Wildlife Service. 2006. Occupied mapped lynx habitat amendment to the Canada Lynx conservation Agreement and Canada Lynx conservation agreement. USDA Forest Service Agreement #00-MU-110115600-013. Missoula, MT. Unpublished. 18 pp.

USDA Forest Service and US Fish and Wildlife Service (US Department of the Interior Fish and Wildlife Service) . 2008. Memorandum of Understanding between the US Department of Agriculture Forest Service and the US Fish and Wildlife Service to promote the conservation of migratory birds. FS Agreement #08-MU-1113-2400-264. Washington, D.C.

US Fish and Wildlife Service .1987. Northern Rocky Mountain Wolf Recovery Plan. US Fish and Wildlife Service, Denver, Colorado. 119 pp.

US Fish and Wildlife Service. 2000. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Related Rule. Federal Register. Vol. 68, No. 128, 40076-40101.

US Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Notice of Remanded Determination of Status for the Contiguous United States Distinct Population Segment of the Canada Lynx; Clarification of Findings; Final Rule. Federal Register. Vol. 65, No. 58, 16052-16086.

US Fish and Wildlife Service. 2007. Biological opinion on the effects of the Northern Rocky Mountains Lynx Amendment on the Distinct Population Segment (DPS) of Canada lynx (Lynx canadensis)(lynx) in the contiguous United States. USDI Fish and Wildlife Service. Helena, Montana. 85 pages.

US Fish and Wildlife Service. 2009. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx. Federal Register. Vol. 74, No. 36, 8616-8702.

US Fish and Wildlife Service. 2011a. Endangered and threatened wildlife and plants; Reissuance of final rule to identify the Northern Rocky Mountain population of gray wolf as a distinct population segment and to revise the list of endangered and threatened wildlife. Federal Register, Vol. 76, No. 87, 25590-25592.

US Fish and Wildlife Service 2011b. 12-Month Finding on a Petition to List a Distinct Population Segment of the Fisher in Its United States Northern Rocky Mountain Range as Endangered or Threatened With Critical Habitat, 50 CFR Part 17, Vol. 76, No. 126. 118 pp.

US Fish and Wildlife Service. 2012. Species profile: Canada lynx (Lynx Canadensis). Environmental Conservation Online System. Available at: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A073.

US Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Threatened Status for the Distinct Population Segment of the North American Wolverine Occurring in the Contiguous United States. Federal Register. Vol. 78 7863-7890. (Extended comment periods announced in October 2013 and February 2014.)

US Fish and Wildlife Service. 2014a. General use list of threatened, endangered, proposed, and candidate species, by county. US Fish and Wildlife Service, Idaho Field Office. Available at < http://www.fws.gov/idaho/pdf/IdahoSpeciesList102313List.pdf>

US Fish and Wildlife Service. 2014b. Columbia spotted frog (Rana luteiventris). Species profile. Available online at < http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=D027>.

Botany

Conservation Data Center. 2011. Computerized data base regarding rare, threatened and endangered plants and animals. On File at the Lost River Ranger Station. Mackay, ID.

Janetos, A.; Hansen, D.; Inouye, D.; Kelly B. P.; Meyerson, B. 2008. Biodiversity. In: The effects of climate change on agriculture, land resources, water resources, and biodiversity in the United States. A report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. Washington, DC. 362 pp.

Mosely, R.K. 1988. Field investigations of three sensitive plant species endemic to Stanley Basin areas, Sawtooth National Forest; Draba trichocarpa Rollins, Thlaspi aileeniae Rollins, Eriogonum meledonum sp. Idaho Department of Fish and Game, Conservation Data Center digital data base. Boise, ID.

Mosely, R.K. 1989. Field investigations of four Astragali, all Region 4 sensitive species on the Salmon National forest with notes on two others. Idaho Department of Fish and Game, Conservation Data Center digital data base. Boise, ID.

Muphy, C. 2002. The status of Welsh's Buckwheat (Eriogonum capistratum var. welshii) in Idaho. Challenge cost share project between Upper Snake River District of the Bureau of Land Management and Conservation Data Center, Idaho Department of Fish and Game, Conservation Data Center digital data base. Boise, ID.

Stephenson, John R.; Calcarone, Gena M. 1999. Southern California mountains and foothills assessment: habitat and species conservation issues. General Technical Report GTR-PSW-172. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculutre; 402p.

USDA Forest Service. 1987. Analysis of management situation, final environment impact statement for the Challis National Forest land and resource management plan. Mackay, ID.

USDA Forest Service, 1987. Land and resource management plan for the Challis National Forest. Mackay, ID .

USDA Forest Service. 1990. Idaho and Wyoming: endangered and sensitive plant field guide. Intermountain Region, USDA, Forest Service. Ogden, Utah. 192 p.

US Fish and Wildlife Service. List of endangered, threatened, and candidate species within Idaho by county, located at www.fws.gov/idaho/species/Idaho/SpeciesList.pdf.

Noxious Weeds

Asher, Jerry E., Steve Dewey, Curt Johnson and Jim Olivarez. 2002. Reducing the Spread of Invasive Exotic Plants Following Fire in Western Forests, Deserts and Grasslands. IN Proceedings of the Invasive Species Workshop: The Role of Fire in the Control and Spread of Invasive Species. 11/27-12/1/2000. Tall Timbers Research Station, Miscellaneous Publication Number 11.

Bais, Harsh P., Ramarao Vepachedu, Simon Gilroy, Ragan M. Callaway and Jorge M. Vivanco. 2003. Allelopathy and Exotic Plant Invasion: From Molecules and Genes to Species Interactions. Science, Vol. 301, No. 5638, 09/2003.

Boggs, K.W., and J.M. Story. 1987. The population age structure of spotted knapweed (Centaurea maculosa) in Montana. Weed Sci. 35:194-98.

Chornesky, Elizabeth A., Ann M. Bartuska, Gregory H. Aplet, Kerry O. Britton, Jane Cummings Carlson, Frank W. Davis, Jessica Eskow, Doria R. Gordon, Kurt W. Gottschalk, Robert A. Haack, Andrew J. Hansen, Richard N. Mack, Frank J. Rahel, Margaret A. Shannon, Lisa A. Wainger and T. Bently Wigley. 2005. Science Priorities for Reducing the Threat of Invasive Species to Sustainable Forestry. BioScience April 2005 / Vol. 55 No. 4.

Davis, M.A.; Grime, J.P.; Thompson, K. 2000. Fluctuating resources in plant communities: a general theory of invasibility. Journal of Ecology 88: 528-534.

DiTomaso, Joseph M.. Invasive Weeds in Rangelands: Species, Impacts, and Management. Weed Science, Vol. 48, No. 2, (Mar. - Apr., 2000), pp. 255-265.

Dukes, J.S. and H.A. Mooney. 1999. Does global change increase the success of biological invaders? TREE 14(4): 135-139.

Ehrenfeld, J.G. 2003. Effects of exotic plant invasions on soil nutrient cycling processes. Ecosystems 6: 503−523.

Executive Order 13112 - Invasive Species. 2/3/1999. Washington D.C.

Ferguson, Leslie, Celestine L. Duncan and Kathleen Snodgrass. 2003. Backcountry Road Maintenance and Weed Management. USDA Forest Service Technology and Development Program. 7100 Engineering, 0371-2811-MTDC. July 2003.

Fitter, Alastair. 2003. Making Allelopathy Respectable. Science, Vol. 301, No. 5638, 09/2003. pp. 1337-1338.

Gelbard, Jonathon L. and Jayne Belnap. 2003. Roads as Conduits for Exotic Plant Invasions in a Semiarid Landscape. Conservation Biology, Pages 420-432. Volume 17, No 2, April 2003. Collins, CO.

Goodwin, Kim, Roger Sheley and Janet Clark. 2002. Integrated Noxious Weed Management after Wildfire. Montana State University, Department of Land Resources and Environmental Sciences.

Harrod, Richy J. 2001. The Effect of Invasive and Noxious Plants on Land Management in Eastern Oregon and Washington. Northwest Science, Vol. 75, Special Issue.

Harrod, Richy J. and Sarah Reichard. 2002. Fire and Invasive Species within the Temperate and Boreal Coniferous Forests of Western North America. IN Proceedings of the Invasive Species Workshop: The Role of Fire in the Control and Spread of Invasive Species. 11/27-12/1/2000. Tall Timbers Research Station, Miscellaneous Publication Number 11.

Idaho State Department of Agriculture. 1999. Idaho's Strategic Plan for Managing Noxious Weeds. Boise, ID. http://www.agri.state.id.us/Categories/PlantsInsects/NoxiousWeeds/Documents/general/stratplan.pdf.

Idaho Statutes, Title 22 Agriculture and Horticulture, Chapter 24 Noxious Weeds. Idaho State Legislature. Boise, ID.

Korb, J.E.; Johnson, N.C.; Covington, W.W. 2004. Slash pile burning effects on soil biotic and chemical properties and plant establishment: Recommendations for amelioration. Restoration Ecology 12: 25−62.

Lacey, John R., Clayton B. Marlow, John R. Lane. 1989. Influence of Spotted Knapweed (Centaurea maculosa) on Surface Runoff and Sediment Yield. Source: Weed Technology, Vol. 3, No. 4, (Oct. - Dec., 1989), pp. 627-631.

Land and Resource Management Plan for the Salmon National Forest. 1988. Noxious weed management, pages II-85, III-4. USDA Forest Service Salmon-Challis National Forest. Salmon, ID.

Mack, M.C.; Chapin, F.S.; Zavaleta, E.S.; [and others]. 2000. Consequences of changing biodiversity. Nature 405: 234−242.

Mankowski, Anne and Connie Carroll. 2000. Spotted Knapweed Vegetation Management Guideliness. Illinois Nature Preserves Commission, Vol.1, No. 37. Available: http://www.dnr.state.il.us/INPC/Management_guidelines/.htm.

Metlen, K.L.; Fiedler, C.D. 2006. Restoration treatment effects on the understory of ponderosa pine/Douglas-fir forest in western Montana, USA. Forest Ecology and Management 222: 355−369.

NAIP 2011. USDA Farm Service Agency National Agricultural Imagery Program. Available: http://datagateway.nrcs.usda.gov/

Neary, Daniel G., Steven T. Overby, and Will H. Moir. 2002. Role of Soil Disturbances in Determining Post-Harvest Plant Biodiversity and Invasive Weed Distributions. USDA Forest Service, Rocky Mountain Research Station.

Parendes, Laurie A. and Julia A. Jones. 2000. The Role of Light Availability and Dispersal in Exotic Plant Invasion along Roads and Streams in the H.J. Andrews Experimental Forest, Oregon. Conservation Biology, Pages 64-75. Volume 14, No 1, February 2000.

Prather, T.S., S.S. Robins, D.W. Morishita, L.W. Lass, R.H. Callihan, and T.W. Miller. 2002. Idaho's Noxious Weeds. University of Idaho College of Agricultural and Life Sciences. Boise, Idaho. 76 pgs.

Salmon Challis National Forest Natural Resource Information System Terra noxious weeds inventory database. 1/12/2012. USDA Forest Service Salmon-Challis National Forest Supervisor's Office. Salmon, ID.

Sheley, Roger L. and Janet K. Petroff. 1999. Biology and Management of Noxious Rangeland Weeds. Oregon State University Press, Corvallis, OR.

Techline – Information about Invasive/Exotic Plant Management. December 2000. AgWest Communications. Granby, CO.

Tyser, R.W., Key, C.H., 1988. Spotted knapweed in natural area fescue grasslands: an ecological assessment. Northwest Sci. 62, 151–160.

United States Code. 7 U.S.C. 2801 et seq.; 88 Stat 2148. Public Law 93-629, Federal Noxious Weed Act, as amended. 1974.

United States Code. 118 Stat 2320. Public Law 108-412, Noxious Weed Control and Eradication Act. 2004.

United States Code. 104 Stat. 3359. Public Law 101-624, Title XIV, Subtitle D, Section 1453, Food, Agriculture, Conservation and Trade Act: Management of Undesirable Plants on Federal Lands. 1990.

USDA Forest Service. 1998. Stemming the Invasive Tide: Forest Service Strategy for Noxious and Nonnative Invasive Plant Management. Washington D.C.

USDA Forest Service Guide to Noxious Weed Prevention Practices. 2001. USDA Forest Service. Washington D.C.

USDA Forest Service 2004. HFRA Field Guide, 2004

USDA Forest Service. National Strategy and Implementation Plan for Invasive Species Management. 2004. USDA Forest Service. Washington D.C.

Westbrooks, Randy G. 1998. Invasive Plants: Changing the Landscape of America - Factbook. Federal Interagency Committee for the Management of Noxious and Exotic Weeds. Washington, D.C.

Zouhar, Kris. (2001, July). Centaurea maculosa. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/.

Zouhar, Kris 2002. Cynoglossum officinale. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/.

Zouhar, Kris. 2003b. Chondrilla juncea. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/.

Zouhar, Kris. 2003a. Potentilla recta. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/.

Recreation

USDA Forest Service. 1988. Salmon National Forest Land and Resource Management Plan Final Environmental Impact Statement. Salmon National Forest. Intermountain Region.

USDA Forest Service. 1982. ROS Users Guide.

USDA Forest Service. 2010. Visitor Use Report. National Visitor Use Monitoring Data Collected FY 2009. Salmon/Challis National Forest. Region 4.

USDA Forest Service. 2009. Continental Divide National Scenic Trail Comprehensive Plan.

USDA Forest Service. 2011. Salmon-Challis Motor Vehicle Use Map

Visual Resources

Colorado State Forest Service, Dennis, Frank C., Fuelbreak Guidelines for Forested Subdivisions & Communities

http://en.wikipedia.org/wiki/Lost_Trail_Pass, accessed on 3/9/11.

http://en.wikipedia.org/wiki/Gibbonsville,_Idaho, accessed on 3/9/11.

Salmon River Scenic Byway Advisory Committee, 2007, Salmon River Scenic Byway Corridor Management Plan

National Forest Landscape Management Volume 2, Chapter 1, Visual Management System, Agricultural Handbook 462, 1974

USDA Forest Service. National Forest Landscape Management Volume 2, Chapter 4, Roads, Agriculture Handbook 483

USDA Forest Service. National Forest Landscape Management Volume 2, Chapter 5, Timber, Agriculture Handbook 559

USDA Forest Service, Salmon-Challis National Forest; Upper North Fork HFRA Ecosystem Restoration Project Silviculture Report

USDA Forest Service, Salmon-Challis National Forest; Upper North Fork HFRA Ecosystem Restoration Project Fire and Fuels Specialist Report

USDA Forest Service, North Central Research Station, General Technical Report NC-261, Ryan, Robert L.; 2005

USDI National Park Service, Lewis and Clark National Historic Trail Comprehensive Plan for Management and Use, 1982

Heritage Resources

Adkins, Elsie n.d. Lower Gibbonsville: An Overview of its Economy and Culture. Manuscript on file at Salmon-Challis National Forest Headquarters, Salmon, Idaho.

Anderson, Harold E. 1968 The Travels of Reverend Samuel Parker Over the South Nez Perce Trail in 1835 on the Salmon and Bitterroot National Forests.

Heidt, Lena Dellen n.d. The Ghost Town That Will Not Die: Early Days of Gibbonsville, Idaho. Manuscript on file at Salmon-Challis National Forest Headquarters, Salmon, Idaho. Idaho Historical Library, Boise.

Kresek, Ray 1998 Fire Lookouts of the Northwest, Third Edition, American Resources.

Lorain, S. H. and O. H. Metzger 1939 Reconnaissance of Placer Mining Districts in Lemhi County, Idaho. U. S. Bureau of Mines Information Circular 7082, U. S. Department of Interior.

Magoon, Terry 1994 Trails, Roads, and Bridges: A History of Transportation in Lemhi County Idaho.

Matz, Stephen 1992 Salmon National Forest Research Design Methodology. U.S. Forest Service, Salmon, Idaho.

Moulton, Gary, editor 1988. The Journals of the Lewis and Clark Expedition, Volume 5. University of Nebraska Press, Lincoln.

The Gibbonsville Miner 1977 Gibbonsville History. Centennial Edition, Gibbonsville Idaho.

Umpleby, Joseph B. 1913 Geology and Ore Deposits of Lemhi County, Idaho. U. S. Geological Survey Bulletin 528.

Walker, Deward E., Jr., 1993 Lemhi Shoshone-Bannock Reliance on Anadromous and Other Fish Resources. Idaho Bureau of Land Management Technical Bulletin No. 94-4.

Appendix A – Integrated Design Features and Monitoring Requirements

We developed design features based on standard operating procedures, best management practices, Forest Plan standards and guides, and other procedural direction to eliminate or mitigate potential impacts during project implementation. We also developed specific monitoring requirements to address nonroutine information needs in the project area.

We are currently involved with the Lemhi County Forest Restoration Group in developing a monitoring plan to assess key ecological effects of this project with its implementation. Section 102(g)(5) of the Healthy Forest Restoration Act provides for establishment of multiparty monitoring, evaluation and accountability processes where significant interest is expressed.

Unit cards for this project will include detailed entries and maps of each treatment unit with a comprehensive description of acres involved, activities, design, and other features. These entries provide the primary guidance for project layout and implementation.

Design Features

During the development phase of the project, various design measures were incorporated to address specific resource needs and opportunities, lessen potential impacts and to avoid potential resource damage. Measures include using best management practices (all applicable IDAPA 20.02.01 Rules Pertaining to the Idaho Forest Practices Act will be followed. These are enumerated in a separate document.), standard timber sale contract provisions, regular operational procedures, and other measures developed through resource specialist input and Interdisciplinary Team interactions. Design features of particular importance to this project include:

Forested Vegetation

Please see the Visual Resources section of this appendix (page 385) for additional design features related to mechanical treatments for managing visual impacts.

4. Emphasis on large tree retention. Priority for leave trees would be largest diameter ponderosa pine and largest diameter Douglas-fir, then largest diameter lodgepole pine, insect and disease free, largest crown, trees with tallest height, straightest stem. Favor ponderosa pine over Douglas-fir where characteristics are similar, favor Douglas-fir over lodgepole pine where characteristics are similar and favor/enhance aspen wherever it occurs. Trees greater than 7.0 inches dbh would be considered commercial size. There would be no harvest in designated old growth retention stands.
5. Whole tree skidding in tractor units and yarding of top slash in cable units (some exceptions) during commercial thinning to designated landings to facilitate biomass utilization of slash remaining on landings for both economic opportunity, reduction of material to be burned and subsequent smoke emissions. Delay handpile/slash pile burning and/or underburning until October 1 the year following thinning to allow chance for removal/use.
6. The normal operating season for commercial thinning would be from July 1 to November 30 (inclusive) to minimize Ips beetle buildup in slash then spread to residual/adjacent stands (Contract Provision RO-CT6.45 Protection from Ips Buildup (11/98)).

Fire and Fuels

7. Up to 80 percent of the project area will be prescribed burned. Areas that are mechanically thinned/harvested will be will receive a low intensity underburn (Low<25 percent); areas not mechanically thinned will receive a mixed to high severity burn (Mixed 25-75 percent, High > 75 percent top kill).
8. Filter strips are areas immediately adjacent to streams where no ground disturbing activities are permitted. They are designed to reduce sediment delivery from harvest units and other surface disturbances. Width recommendations for filter strips are dependent on the type of parent material, percent slope and percent ground cover and may range from 20 to 345 feet wide based on site conditions. Guidelines for filter strip width recommendations are presented on Pages IV-58 and IV-59 of the Salmon Forest Plan. Backing fire would be allowed into the filter strips as recommended by the fisheries biologist to the prescribed fire burn boss. To maintain water quality no ignition material; such as helitorch gel, drip torch fuel, or plastic spheres would be allowed in filter strips but fire would be allowed to back into these areas.
9. All piles regardless of construction type will be left on site for one year for both biomass utilization and drying.
10. Hand piles would be at least 4 feet by 4 feet by 5 feet tall and include at least one 3x3 foot piece of kraft paper in the pile. Parameters for hand piles are as follows:
    - Hand piles shall be at least 4 feet by 4 feet by 5 feet tall measured from high ground;
    - The diameter of the pile shall not exceed twice the height;
    - Piles shall be compact to facilitate burning;
    - All piles shall have a solid base to prevent the pile from toppling;
    - At least one 3 foot x 3 foot piece of 50# poly coated Kraft paper shall be placed in piles;
    - The paper shall cover an area containing small slash – small branches less than ¼ inch in diameter to ½ inch in diameter and small branches with needles attached that form a part of the bottom pile layer;
    - The paper shall not be less than 2 feet from the pile bottom, and located in the center of the pile;
    - Piles shall be oriented on the slope to prevent material from rolling downhill;
    - Piles shall be constructed in suitable locations for their individual size to prevent heat damage to residual trees;
    - Piles shall be at least ten (10) feet from the bole of any standing tree or snag;
    - Piles shall not be constructed on scree slopes;
    - Piles shall not be constructed within 1 chain of private property lines or fence;
11. Travel routes to be used during prescribed burning would be the existing road system as managed for access for mechanical thinning. No additional routes would be developed or opened for burning or other noncommercial activities.

Air Quality

12. Ensure that all prescribed burns are coordinated with the Montana/Idaho Airshed group.
13. Ensure that all activities conform to the State Implementation Plan.

14. Employ avoidance techniques such as burning on cloudy days when the plume and residual smoke cannot be seen, burning during periods of atmospheric instability for better smoke dispersal, and burning during periods of low visitor use.
15. Consider stopping ignitions early enough in the day to allow ventilation of smoke to avoid smoke settling into areas for the night.
16. Employ commonly used reduction techniques such as burning units after harvest before new live fuels appear; burning in the springtime prior to "green-up," burning when 1,000-hour fuels (woody debris larger than 3 inches in diameter) moistures are high, and burning when the duff is wet (after fall precipitation, or during winter and spring).
17. Employ techniques to optimize flaming combustion, including burning piled fuels rather than broadcast burning, reducing the amount of soil in piles, and employing rapid ignition to create a high intensity fire.
18. Idaho/Montana Airshed Group operational plan would guide smoke management.

Transportation

19. Pre-haul maintenance would be conducted to restore roads to a suitable condition for the proposed activity and use objectives for the roads. Work may include opening of closed roads, brushing and limbing encroaching vegetation, restoration or replacement of damaged running surface, and maintenance of the drainage system, including ditches, rubber water deflectors, drain dips and template crowns or cross slopes. Slash from clearing of encroaching vegetation would be piled on the road or on a landing to avoid adverse effects from burning.
20. Post-activity maintenance would remove traffic related defects, restore drainage and traffic control features modified to accommodate project traffic and comply with the established road management objectives. The intent is to close roads that were only to be opened for timber hauling and associated fuels reduction activities and to correct any problems that result from the use of the road by the commercial user (i.e. ruts, wheel depressions, damaged structures etc.).
21. Identify all unauthorized roads to be used in this project to facilitate prescribed mechanical treatments. Treat roads as temporary roads and decommission on completion of the treatment activities. (See also #28).
22. Utilize existing traffic control features such as gates to control public access in the project area and in accordance with the Forest Travel Plan. Where earthen barriers are removed to access treatment areas, utilize a combination of temporary traffic control devices such as signs, temporary gates, portable barricades or other means to eliminate unauthorized traffic. All temporary traffic control devices must both meet and be installed in accordance with applicable standards in the latest edition of the Manual of Uniform Traffic Control Devices. Replace earthen barriers during extended periods of inactivity.
23. Maintain standard clearing widths and sight distances on open roads and remove any trees on or above the cut slope that have been destabilized by construction, reconstruction or maintenance. Minimize general clearing widths on temporary roads to the limits of the cut and fill to help screen the road, while removing unstable or hazardous trees.
24. Chemical dust palliative applications would be applied annually as needed during haul periods to some open road systems following standard operating procedures identified in Appendix J of the Roads Programmatic BA (USDA, Forest Service, 2002b) and the Monitoring Report for Salmon-Challis National Forest Dust Abatement Operations (USDA, Forest Service, 2008).

Noxious Weeds

25. Include contract provisions for timber sale and road construction activities mandating equipment cleaning and inspection prior to use on or off-roads to prevent the introduction or spread of noxious weeds through their seeds, vegetative propagules, or plant parts. This applies to rental equipment as well as contractor equipment.
26. For prescribed fire actions, use staging areas and helibases that are maintained in a weed free condition.
27. Clean all equipment before leaving the project site if operating in areas infested with weeds. Determine the need for and when appropriate identify sites where equipment can be cleaned. Adjacent units infested with weeds should be treated before moving to weed free units. Seeds and plant parts need to be collected when practical and incinerated.
28. Retain as much shade and ground cover to the extent possible in forested types to suppress weeds and to prevent weed establishment, growth and spread. Minimize soil disturbance to the extent practical, consistent with project objectives as described in design features numbered 20, 21, 35, 118, and 120.
29. Retain desirable vegetation and ground cover in and around project activity areas to the maximum extent possible consistent with project objectives.
30. Reestablish desirable vegetation to prevent bare ground conditions that favor weed establishment and spread (see design feature 78 for mixes).
    - Disturbed sites (areas made bare and compacted during project implementation) would have seedbeds prepared for reestablishing desirable vegetation. Site preparation would consist of one or more of the following actions: contouring, terracing, ripping, and scarifying; and integrate with design feature number 123.
    - For currently closed roads that have been reopened for the project and temporary roads in heavily weed infested areas; revegetate road surfaces with a seed mix that competes well with noxious weeds as a last project implementation action in those areas..
31. Monitor project area regularly using early detection/rapid response strategies to detect, control and eradicate weed species, infestations introduced into the project area, and new invaders. Establish permanent monitoring transects in harvest units, burn units and control units to assess soil erosion indicators, vegetation composition and cover, and shrub and weed density. These data would be sampled from transects located within areas most susceptible to ecological effects of noxious weed invasion.
32. Where possible, avoid or protect release sites of insects for biological control of noxious weeds.
33. Minimize fireline construction to prevent spread of noxious weeds.
34. Use staging areas and helibases maintained in weed free condition.
35. Inventory roads and schedule noxious weed infested roads for weed treatment prior to commencement of project activities. (See also #28).
36. For currently closed roads that have been reopened for the project and temporary roads in heavily weed infested areas; revegetate road surfaces with a seed mix that competes well with noxious weeds. (See design feature 78 for appropriate seed mixtures).

Visual Resources

Project design feature numbers 37 through 45 are general to the project as a whole.

37. Blend units including fuel breaks with natural landscape features such as natural openings, and rock outcrops. Harvest units should be shaped to mimic natural patterns found in the landscape. Do not use straight lines or geometric shapes for unit design. Unit edges should be natural appearing, to mimic the adjacent natural landscape character (uneven/feathered).
38. Do not locate landings perpendicular to the road. Landings should be located so the forest visitor cannot look up a road and see right into the landing. Landing needs to be set off from the main road at an angle whenever possible.
39. Thin forest vegetation to achieve a more attractive, open and diverse condition consistent with the historic range of the project area scenery, emphasizing the long-term presence of aspen and the larger conifers in a clumpy and irregular distribution.
40. Unit boundary marking on trees would be done on the opposite side of the tree from where it is seen from trails, roads, dispersed and developed sites.
41. Involve a Landscape Architect with initial layout strategy with other resource specialist including timber and fuels layout crews. A portion of the project area that is representative of the whole project area may be used to convey specific resource prescriptions and overall marking strategies.
42. Identify “buffer” trees along the skid trails to decrease the potential damage to the remaining trees. Remove the buffer trees that are severely damaged after hauling on the skid trail is completed.
43. No skid trails would be located parallel to system roads within 100 feet where practical.
44. Whenever possible and when skid trails would still function properly, locate skid trails so they are not perpendicular where they meet the highway or other main roads. This would avoid a direct line of sight into the skid trail.
45. Temporary road construction would be designed to meet the visual quality objective. The location of the road should fit the landscape with a minimum degree of landform alteration limiting the amount of earthwork. Planning the design of alignments and reseeding of cut and fill slopes needs to consider minimizing impacts to scenic resources. Avoid excessive cut and fill slopes for road construction.

Project design features number 46 through 54 apply to the immediate foreground within 300 feet of sensitivity Level 1 road and trail corridors, developed sites (trailheads), dwellings and private land.

This applies to the following trails: Twin Creek and Twin Creek Ridge, Divide National Recreation Trail, Powder Gulch, Pierce Creek, and the Continental Divide National Scenic Trail. Recreation areas include Twin Creek Campground, Chief Joseph Ski Area and Highway 93.

46. Flush cut stumps within 4” of the uphill side of the stump where practicable. Stumps would be cut within 4” of the uphill side of the stump using B6.412 (provision B6.412 allows to determine stump height AT8-contract CA standard height is 12”). Where cutting to 4” is not practicable, flush cut stump no higher than 12 inches on uphill side of the slope. (Covered in normal contract clauses).
47. Where skid trails are readily visible to concentrations of recreational users, leave natural features (trees, shrubs, logs, rocks, etc.) that would aid in blocking/closing these trails to unauthorized motorized use.
48. Tree prune heights would not exceed 6-8 feet.

49. Remove slash within 300' buffer when timber harvesting activities are within sensitivity level one corridors.
50. Areas where slash would be burned: Remove slash within 300 feet from sensitive area. Pile and burn the slash at least 300 feet away from sensitivity level 1 corridor or use area.
51. After burning is complete, burn sites that are visible from roads, trails, developed sites, or private dwellings would be covered with natural duff to a minimum of 3 inches to minimize visibility of the burned area.
52. Areas where burning would not occur until after 2 growing seasons: Remove slash within 150 feet from sensitive area. In the 150-200 feet zone lop and scatter slash to 18" or less in depth. (C-6.7).
53. Minimize the amount of skyline corridors that are visible from sensitivity level 1 areas by locating them so that forest visitors won't have direct views looking up or down the corridors.
54. Avoid locating landings in the immediate foreground of all sensitivity level 1 areas.

Project design feature numbers 55 through 62 apply to Retention Visual Quality Objective units:

55. Slash, consisting of trees and limbs, would be randomly lopped and scattered over the disturbed areas to a depth no higher than 18". The effect of scattering the slash should mimic the adjacent natural environment. If the area is adjacent to a sensitivity level 1 corridor or use area, the slash would have to be located a minimum of 300 feet away from those areas.
56. To minimize the evidence of treatments by reducing the buildup of slash, tree felling would be directed away from the direction of sensitivity level 1 areas.
57. In order to meet retention and make prescribed fire areas appear more natural by blending them in with existing vegetation, burned areas in the foreground should be small (0 to ½ mile), and have a mosaic of burned and unburned islands. (Agriculture Handbook # 608, Pg. 28 and 29.)
58. Slash piles would be burned to achieve 95 percent or more consumption. Following burning, concentrations of unconsumed slash would be scattered.
59. The burning of piles created between June and September of any year should be burned in September through November, unless fuel or weather conditions are not conducive for attaining the 95 percent consumption objective. If this occurs, slash piles would be burned the following spring as soon as weather conditions permit.
60. Slash piles created during a winter harvest operation should be burned by the following September through November period, or whenever possible after the piles have cured.
61. Minimize the amount of skyline corridors that are visible in retention visual quality objective by locating them so that forest visitors won't have direct views looking up or down the corridors. When corridors would be located in retention feather the edges of the corridors to avoid straight lines.
62. Avoid locating landings in retention visual quality objective to the extent possible.

Soils, Water and Fisheries

63. "Treat disturbed areas resulting from management activities in the shortest time possible to meet water quality objectives." (Forest Plan, pg. IV-46)
64. Select for each harvesting operation the logging method and type of equipment adapted to the given slope, landscape and soil properties in order to minimize soil erosion. (IDAPA 20.02.01.030.03)

65. Ground based skidding shall not be conducted if it will cause rutting (four inch rut depth is the trigger point for severe rutting), deep soil disturbance, or accelerated erosion. On slopes exceeding 45 percent (45 percent) gradient, ground based skidding shall not be conducted except with an approved variance (IDAPA 20.02.01.30.03a).
66. Limit the grade of constructed skid trails on geologically unstable, saturated, or highly erodible or easily compacted soils to a maximum of 30 percent (30 percent). (IDAPA 20.02.01.30.03b)
67. In accordance with appropriate silvicultural prescriptions, skid trails shall be kept to the minimum feasible width and number. Tractors used for skidding shall be limited to the size appropriate for the job. (IDAPA 20.02.01.30.03c)
68. Uphill cable yarding is preferred. Where downhill yarding is used, reasonable care shall be taken to lift the leading end of the log to minimize downhill movement of slash and soils. (IDAPA 20.02.01.30.03d)
69. "Stabilize landings, skid trails and fire lines whenever they are subject to erosion, by water barring, cross draining, outsloping, scarifying, seeding or other suitable means. This work shall be kept current to prevent erosion prior to fall and spring runoff." (Forest Plan, pg IV-34)
70. "Ephemeral draws should have minimal disturbance from timber harvest equipment. Crossings and skid trails should be at right angles to draws. (Forest Plan, pg IV-34)
71. Locate landings, skid trails, and fire lines on stable areas to prevent the risk of material entering streams. (IDAPA 20.02.01.30.04)
72. All new or reconstructed landings, skid trails, and fire lines shall be located on stable areas outside the appropriate Pacfish buffers. Locate fire and skid trails where sidecasting is held to a minimum. (IDAPA 20.02.01.30.04a)
73. To prevent landslides, fill material used in landing construction shall be free of loose stumps and excessive accumulations of slash. On slopes where sidecasting is necessary, landings shall be stabilized by use of seeding, compaction, riprapping, benching, mulching or other suitable means. (IDAPA 20.02.01.30.04c)
74. For each landing, skid trail or fire lines a drainage system shall be provided and maintained that will control the dispersal of surface water to minimize erosion. (IDAPA 20.02.01.30.05c)
75. Reshape landings as needed to facilitate drainage prior to fall and spring runoff. Stabilize all landings by establishing ground cover or by some other means within one (1) year after harvesting is completed. (IDAPA 20.02.01.30.05b)
76. Recommended spacing distances for water bars on tractor skid trails would be:

Table 105. Recommended spacing distances for water bars on tractor skid trails

Skid Trail Water Bar Spacing (In Feet)			
Gradient (%)	**Sediments and Quartzite**	**Volcanics**	**Granitics**
0-10	200	80	75
10-20	160	70	65
20-30	110	55	50
30-40	80	40	35
40-50	60	35	20
50-60	45	--	--

(Forest Plan, pg IV-34)

77. Soil disturbing projects with moderate or higher erosion potential would be seeded with protective vegetation unless the following conditions exist (Forest Plan, pg IV-44):
    b. Natural revegetation is expected to provide ground cover within one year of project completion; or
    c. Project objectives require minimum ground cover, in which case other erosion control procedures would be applied.
78. Use appropriate seed mix as identified in the unit cards.

Table 106. Appropriate seed mixes

Road Mix	Mesic Mix	Xeric Mix
Orchard Grass (*Dactylis glomerata*) Recommended Rate: 1 lb PLS/acre. Variety: Paiute Seeds/Lb : 654,000 Seeds/Ft2: 15	June grass (*Koehleria macrantha*) Recommended Rate: 0.5 lbs PLS/acre. Variety: NA Seeds/Lb : 2,315,400 Seeds/Ft2: 27	Bluebunch Wheatgrass (coated seed) (*Pseudoroegneria spicata*) Recommended Rate: 10 lbs PLS/acre. Variety: P-7 Seeds/Lb : 140,000 Seeds/Ft2: 32
Timothy (*Phleum pretense*) Recommended Rate: 1 lb PLS/acre. Variety: Climax Seeds/Lb: 1,300,000 Seeds/Ft2: 30	Idaho fescue (*Festuca idahoensis*) Recommended Rate: 2 lbs PLS/acre. Variety: Winchester Seeds/Lb : 450,000 Seeds/Ft2: 21	Sandberg Bluegrass (*Poa secunda ssp. sanbergii*) Recommended Rate: 2 lbs PLS/acre. Variety: High Plains Seeds/Lb : 1,047,000 Seeds/Ft2: 48
Basin Wildrye (*Leyymus cinereus*) Recommended Rate: 2 lbs PLS/acre. Variety: Trailhead Seeds/Lb: 130,000 seeds/lb Seeds/Ft2: 6	Mountain brome (*Bromus marginatus*) Recommended Rate: 5 lbs PLS/acre. Variety: Garnet Seeds/Lb : 64,000 Seeds/Ft2: 7	Needle and Thread (*Hesperostipa comata*) Recommended Rate: 10 lbs PLS/acre. Variety: NA Seeds/Lb : 115,000 Seeds/Ft2: 26
Intermediate Wheatgrass (*Thinopyrum intermedium*) Recommended Rate: 5 lbs PLS/acre. Variety: Oahe Seeds/Lb: 88,000 Seeds/Ft2: 10	Western wheatgrass (*Pascopyrum smithii*) Recommended Rate: 5 lbs PLS/acre. Variety: Walsh Seeds/Lb : 110,000 Seeds/Ft2: 13	Lupine, Silky OR Silverleaf (*Lupinus sericeusI OR Lupinus argenteus*) Recommended Rate: 20 lbs PLS/acre. MUST have stratification. Variety: NA Seeds/Lb : 12,900 Seeds/Ft2: 6
Meadow Brome (*Bromus biebersteinii*) Recommended Rate: 5 lbs PLS/acre. Variety: Paddock Seeds/Lb: 80,000 Seeds/Ft2: 9	Lupine, Silky (*Lupinus sericeus*) Recommended Rate: 20 lbs PLS/acre. MUST have stratification. Variety: NA Seeds/Lb : 12,900 Seeds/Ft2: 6	Sulfur Buckwheat (*Eriogonum umbellatum*) Recommended Rate: 4 lbs PLS per acre. Variety: NA Seeds/Lb : 209,000 Seeds/Ft2: 19
Western wheatgrass (*Pascopyrum smithii*) Recommended Rate: 5 lbs PLS/acre. Variety: Walsh Seeds/Lb: 110,000 Seeds/Ft2: 13	Fireweed (*Epilobium angustifolium*) Recommended Rate: 0.1 lbs PLS/acre. Variety: NA Seeds/Lb : 8,500,000 Seeds/Ft2: 20	Prairie Sage (*Artemisia ludoviciana*) Recommended Rate: 0.25 lbs PLS/acre, note that germination is often low. Variety: Summit Seeds/Lb : 4,500,000 Seeds/Ft2: 26
Yarrow (*Achillea millefolium*) Recommended Rate: 0.25 lb PLS/acre. Variety: NA Seeds/Lb: 2,770,000 Seeds/Ft2: 16	Sticky Geranium (*Geranium viscosissimum*) Recommended Rate: 6 lbs PLS/ acre (due to sporadic germination) Variety: NA Seeds/Lb : 52,000 Seeds/Ft2: 7	

Road Mix	Mesic Mix	Xeric Mix
Annual Sunflower (*Helianthus annuus*) Recommended Rate: 0.5 lb PLS/acre. Variety: NA Seeds/Lb: 58,500 Seeds/Ft2: 1		
Prairie Sage (*Artemisia ludoviciana*) Recommended Rate: 0.25 lb PLS/acre, note that germination is often low. Variety: Summit Seeds/Lb: 4,500,000 Seeds/Ft2: 26		
TOTALS:	**TOTALS:**	**TOTALS:**
Species in Seed Mix: 9	Species in Seed Mix: 7	Species in Seed Mix: 6
Seeds/Acre: 6,575,750	Seeds/Acre: 4,347,700	Seeds/Acre: 6,863,000
Seeds/Ft2: 125	Seeds/Ft2: 100	Seeds/Ft2: 158

Other requirements:

- All species and cultivars shall be purchased as “Certified Seed” and “Source Identified Seed” unless
  - No cultivar exists (e.g. native forbs for which no cultivated variety exists (see table 106 above).
  - otherwise approved by the Salmon-Challis National Forest timber sale administrator or Contracting Officer’s Representative.
- No seed may be purchase that contains Idaho listed Noxious Weed Species or Salmon-Challis National Forest Watch List species.
- Bluebunch Wheatgrass (*Pseudoroegneria spicata*) shall be purchased as a coated seed to improve germination.
- Silky Lupine (*Lupinus sericeus*) must be planted in the fall to ensure stratification from freeze and thaw cycles.
- Ask the supplier and purchase the correct inoculum for silky lupine.
- **NO substitution** of species or cultivars without prior written consent of the Salmon-Challis National Forest timber sale administrator or Contracting Officer’s Representative.

79. Deposit waste material from construction or maintenance of landings and skid and fire trails in geologically stable locations outside of the appropriate Pacific Anadromous Fish Strategy buffers. (IDAPA 20.02.01.30.06c)
80. During and after forest practice operations, stream beds and streamside vegetation shall be protected to leave them in the most natural condition as possible to maintain water quality and aquatic habitat. (IDAPA 20.02.01.30.07)
81. Avoid conducting operations along bogs, swamps, wet meadows, springs, seeps, wet draws or other sources where the presence of water is indicated, protect soil and vegetation from disturbance which

would cause adverse effects on water quality, quantity and wildlife and aquatic habitat. (IDAPA 20.02.01.30.07c)

82. No commercial harvest within Pacific Anadromous Fish Strategy or modified Pacific Anadromous Fish Strategy riparian habitat conservation areas. (Forest Plan Amendment#3)

Aquatic Habitat Improvements and Culvert Replacements

83. All necessary permits would be obtained from the COE/IDWR/DEQ.
84. All construction actions would meet Pacific Anadromous Fish Strategy standards and guidelines.
85. Materials to be used (equipment, erosion control materials, vegetation) would be approved by the contracting officer's representative or inspector.
86. All equipment used would be inspected prior to its arrival on the site. The equipment must be free of oil, fuel, or toxic leaks that would wash off into water. (See also #27 under noxious weeds).
87. No blasting would be conducted in association with project activities.
88. Instream activities shall not occur when listed fish are spawning or redds are present immediately downstream of the project area. Surveys would be conducted by fisheries staff to ensure that this criterion is met.
89. Sediment control measures would be employed to ensure that sediment delivery to live waters is minimized both temporally and spatially to minimize effects to listed species within or downstream of the project area.
90. Construction work would be put on hold during any intense seasonal storms, to reduce surface runoff and sediment input to streams.
91. Erosion control practices would be implemented concurrently with the associated activity and in place at the end of each day.
92. The contracting officer's representative or appointed inspector would follow the erosion control plan and would be onsite daily for culvert replacements.
93. All design features as described in the Erosion Control and Revegetation Plan would be applied. These features are presented to clarify activities related to potential sediment delivery.
94. All construction activities shall be conducted in such a manner so as to minimize turbidity and comply with Idaho water quality standards. If these standards cannot be maintained, the applicant shall contact the Idaho Falls office of the Division of Environmental Quality.
95. The work window for instream restoration work in the North Fork Salmon River would be July 7 through August 15 to avoid or minimize impacts to spawning and incubating salmonids.
96. The work window for culvert restoration work in three tributaries to the North Fork Salmon River would be during low water after July 31st to avoid or minimize impacts to spawning and incubating westslope cutthroat trout.
97. The J-hook rock structures shall be constructed of rocks and boulders placed within a stream channel to act as a low level dam. Placement of these structures perpendicular to stream flow will decrease the stream gradient, dissipate stream energy and decrease stream velocity through an increase in water surface elevation immediately above the structure. Instream structures shall comply with the following criteria: (IDAPA 37.03.07 Rule 059). (An illustration of the J-hook design is located in the Fish and aquatic resources report, located in the project record.)

98. Maximum water surface differential across (upstream water surface elevation minus downstream water surface elevation) a drop structure shall not exceed two (2) feet. The Department of Environmental Quality shall approve the final elevation of any structure. (IDAPA 37.03.07 Rule 059)

99. Rock drop structures shall be constructed of clean, sound, dense, durable, angular rock fragments, and/or boulders of size and gradation, such that the stream is incapable of moving the material during peak flows. Where applicable, rocks shall be keyed into the stream banks to minimize the likelihood of bank erosion, (IDAPA 37.03.07 Rule 059).

100. National Marine Fisheries Service and U.S. Fish and Wildlife Service will be contacted if instream structure placement standards of the proposed action cannot be maintained or if effects not previously considered under the existing consultation occur.

101. All instream structures shall be constructed to facilitate fish passage and centralized scour pool development (IDAPA 37.03.07 Rule 059).

102. No construction equipment shall be operated below the existing water surface without specific approval from the Director except as follows: Fording the stream at one (1) location only will be permitted unless otherwise specified; however, vehicles and equipment will not be permitted to push or pull material along the streambed below the existing water level. Work below the water which is essential for preparation of culvert bedding or approved footing installations shall be permitted to the extent that it does not create unnecessary turbidity or stream channel disturbance. Frequent fording will not be permitted in areas where extensive turbidity will be created. (IDAPA 37.03.07 Rule 056)

103. When implementing noncommercial thinning activities within a Pacific Anadromous Fish Strategy riparian habitat conservation area, fall trees that will be left on the ground towards the stream channel to provide large woody debris in the stream channel.

104. Down woody material retention: Where possible, retain 15 tons/acre, but no less than 5 tons/acre; where feasible, retain an average length per acre of down-dead logs of the following diameters: ponderosa pine, Douglas-fir and spruce 12 inches dbh 50 linear feet per acre to meet Salmon National Forest Coarse Woody Debris (Forest Plan pg. IV-17 to18) requirements for site productivity.

105. No commercial harvest within Pacific Anadromous Fish Strategy riparian habitat conservation areas per Pacific Anadromous Fish Strategy guidelines.

106. Commercial logging camps, helicopter log landings/refueling sites/staging areas only to be allowed in locations preapproved by a contracting officer’s representative, in coordination with the respective interdisciplinary team members and are located outside of Pacific Anadromous Fish Strategy riparian habitat conservation areas. Commercial logging camps and helicopter log landings/refueling sites/staging areas would have a developed site plan, in coordination with the respective interdisciplinary team members, to ensure all resources are protected on lands within the project area.

107. Fueling operations/storage would be governed by USDA Forest Service Timber Sale Special Contract Provision CT6.344 Prevention of Oil Spills (Idaho Forests)(01/2001).

108. Impact by skid trails on thinning units harvested during this project with conventional tractor/forwarder operations would be limited to less than 10 percent of the area. Skid trail gradient would be limited to a maximum 45 percent slope unless site specific analysis shows otherwise (Forest Plan pg. IV-34). Skid trails rehabilitation and water-bar spacing would use the guidelines in the Forest Plan (pg. IV-35). Water bar skyline corridors in units with erosive soils.

109. Revegetation may include, but would not be limited to seeding grasses, legumes, wildflowers and spruce seedlings. Planting and seeding should be dispersed to mimic existing patterns of the vegetative mosaic. Aspen regeneration would be encouraged. (See #78 for appropriate seed mixes).

110. When implementing noncommercial thinning activities within Pacific Anadromous Fish Strategy riparian habitat conservation areas felled trees will be left on the ground towards the stream channel to provide large woody debris in the stream channel.

111. Dozer constructed firelines would not be used. Existing roads within and between treatment areas would be used for containment lines as much as possible. Other containment lines as needed may be constructed. These lines may consist of fuel breaks with no traditional fire line construction, or traditional fire line construction approximately 18 inches wide that includes removal of all vegetation and other fuel down to mineral soil. Fireline constructed parallel to water courses would be avoided. Hose lays and wet line are the preferred containment method. If traditional fire line construction is used, Minimum Impact Suppression Techniques would be used. All firelines would be rehabilitated by water barring and pulling in debris as available.

112. Prescribed burn plans and water source use would follow mitigation measures stated in the Biological Assessment / Biological Evaluation of Effects to Threatened, Endangered, Proposed and Sensitive Aquatic Species Programmatic for Wildfire Suppression on the Salmon-Challis National Forest (December, 2010).

113. No mechanical piling of slash or natural forest fuels is allowed in Pacific Anadromous Fish Strategy buffers.

114. Piles shall be constructed by hand and piles shall be burned at least 20 feet from the ordinary high water mark of live streams.

115. Machine piling will not be allowed in riparian habitat conservation areas.

116. Deep Creek, Hammerean Creek and Johnson Gulch culvert installations would follow design features as stated in the December 1, 2011 Biological Assessment for Restoration Activities at Stream Crossings Affecting the Habitat of ESA-listed Fish Species on National Forests and Bureau of Land Management Public Lands in Idaho and will meet associated requirements as stated in US Fish and Wildlife Service June 15, 2012 (US Fish and Wildlife Service 2012) and the National Marine Fisheries Service June 4, 2012 (USDC National Marine Fisheries Service 2012) Biological Opinions. These culverts will be designed to pass 100-year flood flow and bank full heights without constriction and provide aquatic species passage.

- For unoccupied habitat in perennial and intermittent channels:
  - Simulate bankfull cross-section and slope of the natural channel;
  - Design project to accommodate valley and floodplain processes;
  - For all crossings, design project to accommodate 100-year flows or, alternatively, provide for site-specifically analyzed recurrence flows;
  - For crossings determined to pose a substantial risk, design project to accommodate 100-year flows and associated sediment and debris movement; and
  - Provide for ecological connectivity.

117. Level 1 roads remaining on the Forest Service system would receive the following treatments upon completion of activities: Compaction of the road surface would be relieved and a seed bed prepared through either ripping or scarifying the road surface depending on the level of compaction.. (See also #28).

118. Do not blade or pull roadsides and ditches unless absolutely necessary. Minimize soil surface disturbance and contain bladed material on the roadway. (See also #28).

119. Disturbed sites would be prepared to provide a seedbed for reestablishment of desirable vegetation. Practices may include contouring, terracing, ripping, and scarifying.

120. Stop hauling logs or other forest products to protect road investments and adjacent resources when:

- Visible rutting (4 inches deep) occurs in placed aggregate surfaces.
- Rut depth in native surfaced road compromises effective drainage.

Rutting is defined as the displacement of road surface materials resulting from the material in the surface or base course being saturated. A four inch rut depth is the trigger point for severe rutting. (See also #28).

121. On system roads, remove and pile or scatter all slash greater than 1 inch in diameter and 2 feet in length outside the established clearing limits of the road. On temporary roads, conserve slash for use in reclamation of the roadway by storing along the roadway in a manner that does not interfere with the use of the road.

122. All water drafting sites will be approved by the District Ranger in coordination with the fishery biologist and the sale administrator and/or Forest roads engineer. Temporary Water rights would be obtained by the Forest before any water drafting for dust abatement occurs. These drafting sites will be located in streams so as not to disturb spawning fish and their redds. Water drafting activities will not physically block fish migration or reduce streamflows to the point of preventing fish migration Pump intake screens shall have openings not exceeding 3/32-inch diameter and a surface area proportionate to the pump intake capacity. The objective is to provide a positive barrier to fish entrainment and maintain a velocity of no more than 0.2 feet per second at the surface of the intake screen to avoid impingement for fingerling-sized fish (USDC National Marine Fisheries Service 1996). Intake screens should be submerged to a depth of at least one screen radius (USDC National Marine Fisheries Service 1996). All pumps in waters within the Salmon-Challis National Forest will have these screens attached even if listed fish are not believed to be present.

123. All newly constructed temporary roads will be decommissioned by fully recontouring the road template and stabilizing with native vegetation (seeding) the disturbed area during the appropriate time of the year after the decommissioning. Monitoring of the decommissioned temporary roads will occur the year after seeding to determine if additional revegetation work is required. (See also #30).

124. Activities associated with decommissioning non-system roads and closed system roads may include decommissioning roads by recontouring road templates and stabilizing with native vegetation (seeding) and reducing traffic or maintenance on roads adjacent to streams. If the roads identified for decommissioning are well vegetated and closed to traffic, a less ground disturbing method of decommissioning will be used that only treats the beginning of the road so as not to encourage unwanted motorized use. The decommissioning activities of non-system roads and closed roads will be closely coordinated by the appropriate interdisciplinary team members and agreed to by a Forest Service Hydrologist. Monitoring of the decommissioned non-system roads and closed roads will occur the year after seeding to determine if additional revegetation work is required.

125. Due to risk of erosion and damage from roads and constructed skid trails inherent in winter logging, at a minimum the following shall apply: (4-21-92)

- Roads to be used for winter operations must have adequate surface and cross drainage installed prior to winter operations. Drain winter roads by installing rolling dips, drivable cross ditches, open top culverts, outsloping, or by other suitable means. (4-21-92)
- During winter operations, roads will be maintained as needed to keep the road surface drained during thaws or break up. This may include active maintenance of existing drainage structures, opening of drainage holes in snow berms and installation of additional cross drainage on road surfaces by ripping, placement of native material or other suitable means. (4-21-92)

Heritage Resources

126. Avoid and/or protect heritage sites identified as eligible to the National Register of Historic Places.

127. If unanticipated heritage resources are discovered during project implementation, all work in that area will cease and the North Zone Archaeologist will be notified within 24 hours to assess the significance of the find and the need for further consultation with the State Historic Preservation Office and appropriate tribal parties.

128. To minimize the potential effect of actions related to road maintenance, use, reopening, and closure during the project, the following protection measures for heritage resources must be followed. All ground disturbing activities such as vegetation removal, scarification, grading, and berming would be carried out entirely within the existing road footprint. Material for road closure berms must be taken from the existing roadbed or a predesignated area and have no effect on known historic properties. All vehicles must remain on the road at all times. If any staging or storage areas must be established outside the existing roadbed, these areas would be situated within existing heritage inventory areas and the action must be determined through consultation with the North Zone Archaeologist to have no effect on known historic properties. Depending on the context of these locations and the scale of the proposed work, an on-site archaeologist may also be required to monitor the work.

Recreation

129. Where temporary roads, fireline, skid trails, etc., cross or are concurrent with the trails, the cut and fill prism of the trail would be restored to its original profile. Rehabilitate any damage to trail from implementation of project activities.

130. For the safety of the public, temporarily close roads and trails when project activities are taking place within the road and trail corridors.

131. Signs will be placed in key locations to provide information to recreationists about reducing the risk of fire and other project objectives.

132. Do not use developed recreation sites including campgrounds and trailheads for landings or staging areas to prevent displacement of recreationists and potential damage to site facilities.

133. Do not perform project activities during the winter within or immediately adjacent to the Chief Joseph Cross Country Ski Area, the Anderson Mountain Road, or the Lost Trail Ski Area.

134. The Lost Trail Ski Area and Chief Joseph Cross Country Ski Area would be advised of the project implementation schedule prior to initiation of project activities that would be done in and around the special-use permit boundary.

Wildlife

135. Forest Plan wildlife standards and guides for Management Areas 3A-4A (pg. IV-110 to 112) and 5A (pg. IV-121) would be incorporated in thinning and prescribed burn prescriptions with emphasis on big game security displacement areas and cover requirements, designated big game winter range, unique habitats, ridgetop ecotones, and habitats for special status species and other forest associated wildlife species.

- Manage key big game winter ranges to achieve and maintain big game population objectives.
  - See "Elk Habitat Relationships for Central Idaho" for partial list.
  - Do not eliminate presence of any desirable browse species.
- Wildlife Standards and Guidelines for 5A, 5B, and 5C
  - Manage big game summer ranges to support target populations on each game management unit.
  - Manage long narrow stringers (less than 1/4 mile wide) and natural forested islands (less than 25 acres) on big game summer and winter ranges to support target* populations of big game.
  - Manage abrupt ridgetop ecotones to maintain the integrity of at least 75 percent of the natural linear distance. Individual cutting unit boundaries will not exceed 1,000 feet along the ecotone, "Wolfy"-type trees will be left along ridgetops even within the cutting units. Unless the tree is mistletoed.
  - Design first entry cutting units within cover blocks so that no point within the harvest area is more than 800 feet from cover.

    Cover patches will be designed to be at least 600 feet wide and should be at least 25 acre Even-age harvest units (clearcuts and seed cuts of a shelterwood system) will no longer be considered forage areas when regeneration reaches the stage of growth and density such that at a distance of 200 feet 90 percent of an adult elk is hidden from view. On the average, this condition would be met when regeneration is 8 feet tall with a minimum stocking of 200 trees per acre, but may vary on a site specific basis depending on slope, terrain, species, and uniformity of stocking in size if silviculturally and economically feasible.
  - Plan logging and road building activities to provide suitable displacement areas for big game.
  - When roads to be left open traverse cover blocks. Where logging systems permit, and as needed to meet habitat capability objectives. Provide cover for big game at least two sight distances wide along one half of the length of road through the cover block.
  - Target populations are the State goal populations within game management units as established in the 1986-1990 big game management plans developed by the Idaho Department of Fish and Game.

136. Restrict harvest and human disturbance activities within ½ mile radius of active Great gray owl, Northern goshawk, Coopers Hawk and Sharp-shinned hawk nests and 1/8 mile radius of all other active raptor nests (except kestrel)(Forest Plan p. IV-20).

- In the event a goshawk territory is located, appropriate management prescriptions would be used to maintain the nesting habitat characteristics (see Squires and Kennedy 2006) of the stands

surrounding nest sites and alternate nest sites (i.e., 6 nest sites where each site is 30ac, for a total of 180ac). These include:

- Within the nest core area, no treatment activity should occur;
- Within the post-fledging area (radius equals 0.3 miles) surrounding an active nest site, treatments may occur outside the breeding and post-fledging season (March 1st through August 31st) and should maintain canopy closure at or above 60 percent, where available, or at the canopy closure available if less than 60 percent.
- Within the larger home range centered on a nest site, maintain a canopy closure at or above 40 percent, where available.

137. Meadow restoration activities are as follows:

- Prescribe burn meadows during dormant period (August thru March) to retain grasses.
- Do not cut down standing snags and girdled trees during fuels treatments or treatment preparation. If there is a concern about forest fuels at tree bases, dig a fireline around the tree. The goal is to provide the largest-diameter standing snags available for the long term in and near meadows.

138. Manage aspen for perpetuity wherever stands occur within the project area (p. IV-18 Forest Plan). In upland areas, remove of all conifers within aspen stands and within 100-150ft of stands. Coordinate with hydrology and fisheries resource specialists for any proposed treatment in riparian zones or in riparian habitat conservation areas.

139. Snag retention guidelines as specified in the Forest Plan (pg. IV-17) for harvest units and in untreated areas within the project boundary would be met through contractual provisions. (NOTE that the Forest has followed revised snag guidelines which allow for minimum numbers of snags by species and size class; see attached dated 16 July 1991)

- Provide at a minimum, an average of 20-30 hard snags per 10 acres of the following minimum diameters in harvest units (where feasible).
  - Douglas-fir, ponderosa pine, and spruce/fir: 10 inches dbh
  - Aspen and lodgepole pine: 8 inches dbh.
- Leave groups of snags where appropriate.

140. Log debris retention as follows (Forest Plan (pg IV-17,18) or may be substituted as indicated in design criteria 5 above:

- Douglas-fir, ponderosa pine, or spruce/fir - 12 inch diameter, 50 linear ft/acre.
- Aspen and lodgepole pine - 10 inch diameter, 33 linear ft/acre.

141. Recommend retaining two slash handpile per acre for habitat diversity in select units. Identify retention piles at edges of units to provide for habitat connectivity. This requirement does not apply to fuels reduction units adjacent to private property.

142. Identify patches of mountain mahogany during the analysis process. Avoid ignition in mahogany stands and piling fuels in and near mahogany, to the extent possible. Consider placing a fireline or otherwise protecting mahogany stands from burning if they are small inclusions in a larger vegetation type. Avoid prescribed fire in identifiable patches of mountain mahogany. Avoid direct fire ignitions in mountain mahogany.

143. Designated old growth

- Existing roads in designated stands should be used only to facilitate treatments designed to maintain/enhance old growth characteristics
- Existing closed or non-system roads will not be opened nor used for vehicle access;
- Recommended burn plan objectives for old growth stands include:
  - maintain large diameter ponderosa pine and Douglas-fir (use dbh classes from Hamilton 1993);
  - maintain decadent component of existing stands;
  - maintain log debris and snags;
  - maintain shrub understory;
  - include treatments such as ladder and tree-well fuel reduction for each old growth unit only if needed prior to prescribed burning so that the risk of an old growth stand being consumed by fire in its entirety is reduced.
  - prescribed fire should not be initiated within old growth stands, but may be allowed to back down in to stands.

- Winter range design criteria for MA 4A:
  - Retain desirable browse species (Forest Plan IV-111) (i.e., mountain mahogany, sagebrush, or bitterbrush, especially on upper third of slopes);
  - Restrict aerial/motorized use from December 1st - April 15th except upon site-specific clearance with wildlife biologist.

144. Elk security: During the general elk and deer rifle season (currently October 10th – November 8th; future dates are subject to change) no commercial or precommercial thinning activities would occur within 0.5 mi from elk security areas. In addition, no permitted or administrative use of vehicles would be allowed on these gated roads (i.e., Hammerean Rd (Rd#2001), Upper Lick Cr Rd (Rd#318), and Vine Cr Rd (Rd#157) during general hunting season. Restriction of vehicle use also applies to prescribed burning during general hunting season.

145. Sensitive plants/Lemhi penstemon: Avoid burning during the flowering period (May 15 to June 30) in all mechanical and prescribed fire treatment units from Votler Creek north to Johnson Gulch all west of Highway 93, except upon site specific discussion with qualified specialist.

146. Ridgetop habitat: retain mature, large diameter (>18in dbh) conifers for sensitive species/flammulated and boreal owls. Modify prescription for thinning to SDI 100 within 200ft of edge of units along ecotones.

147. Sensitive species/great gray owl: Retain all large diameter (>18in dbh) broken top snags as feasible within one tenth (0.1) mile of meadows along the Anderson Mountain Road (Rd#600081), Pierce Creek Rd (Rd#600081A) and the Saddle Mountain Road (Rd#60703).

148. Fall prescribed burning is encouraged, if burn objectives can be met, to avoid reproductive seasons for resident and migratory birds.

Other Resources

149. Avoid or protect special use water pipelines, phone lines and other utilities.

150. Thinning and prescribed burn activities would be coordinated in the advance of each operating season with private land holders, concerned residents, Idaho Fish and Game – avoidance of wolf den sites and management activities (trapping); Outfitter/Guides – spring and fall activities.

151. Coordinate activities with companion treatments that may occur on private lands. Post signs and use other public media such as local newspapers and radio stations advising the public when project activities are going to take place. Notify fire departments, sheriff's department, outfitter-guides and concerned residents when prescribed burning occurs.

Monitoring

Information gathered before, during and after implementation of activities is used to determine the effectiveness of the project's design and associated design features. This establishes a feedback mechanism so management can develop and employ an adaptive learning curve.

Monitoring Upper North Fork Project activities would consist of several types of monitoring – implementation monitoring and effectiveness monitoring. Implementation monitoring would measure whether applicable design criteria, best management practices and Forest Plan standard and guidelines are correctly implemented. Effectiveness monitoring measures whether the treatments implemented with the design criteria, best management practices and Forest Plan standards and guidelines are achieving the desired out comes. Effectiveness monitoring would measure how implemented treatments are effective at protecting as well as achieving the project goals.

A sample of each type of treatments in the Upper North Fork Project would be selected each year for monitoring and evaluation. Monitoring would occur through prefield review and field visits by forest personnel and collaborative members. The prefield review would include reviewing implementation notes and applicable standards, guidelines, design criteria and best management practices. Field visits would be accomplished in an interdisciplinary fashion to facilitate cross-sharing of effectiveness and identification of needed changes to project activities. The monitoring information collected would be evaluated and documented along with any recommended changes in an annual report.

In addition, the Lemhi County Forest Restoration Group plans to conduct third party monitoring. Third party monitoring is an ongoing and successful component of the local collaborative efforts and will continue to be a vital component for the Upper North Fork Project. Examples of monitoring efforts that may be completed include pre and post implementation photo points, vegetation transects in designated old growth stands, and noxious weed inventories.

Appendix B – Site-specific Forest Plan Amendments

Amendment 1: Forest Plan amendment to utilize wildfire for multiple objectives in the project area

Background

The Salmon National Forest Land Management Plan was approved in December 1988. The Plan was written to provide the Forest with management directions for the next 10-15 years. Goals and objectives for management of the natural resources were identified along with scheduled projects to achieve them. These schedules were made with the best current information available and with the knowledge that they would be altered as management situations changed, as new issues and concerns surfaced and better predictions for future needs and demands were made. The Plan was designed to be changing and dynamic document that is responsive to the current trends and demands of the public we serve.

The Plan provided direction and guidance that reflected federal fire management policies in place at that time. It described fire suppression strategies as the primary response strategy available to Forest Service managers, thus limiting the flexibility of managers to consider more appropriate options to manage unplanned wildland fire.

The 1995 Federal Wildland Fire Management Policy and Program Review (USDA Dec 1995) recognized that the exclusion of fire has resulted in dramatic changes in expected fire behavior in rangeland and forested ecosystems. It emphasized the need for integration of fire into land management planning and implementation, as well as the involvement of all affected landowners and stakeholders. Federal land management agencies have operated within this policy since its adoption. Operational clarification and continuing guidance supporting implementation of this policy was issued in 2003, 2008 and 2009.

Proposed Action

The deciding Official proposes to amend the Salmon Land and Resource Management Plan Forest-wide standards and guides by an standard and guide addition to Fire Planning and Suppression management activities and replacement of three standards and guides for management activity Escaped Fire Suppression for the Upper North Fork HFRA Ecosystem Project area as follows:

Fire Planning and Suppression – Addition of standard and guide:

> Manage lightning caused fires to play, as nearly as possible, their natural ecological role within the Upper North Fork HFRA Ecosystem Project boundary.

Escaped Fire Suppression – Replace standards and guides a through c (of General Direction 1) with:

> One or more fire management strategies may be considered and implemented for any unplanned wildland fire to achieve a variety of project management objectives, while minimizing negative effects to life, investments and valuable resources.

This amendment only applies to National Forest System lands under the management of the Salmon-Challis National Forest within the Upper North Fork HFRA Ecosystem Project boundary for the time period of implementation of the project, but excluding the Allan Mountain Research Natural Area. Language within the 1988 Establishment Record for the research natural area determined that a.) A high level of fire protection will be maintained. Fire will not be used as a tool to induce or maintain seral

species. Wildfires that originate within the area will be suppressed as soon as practicable by methods that will cause least disturbance; and b.) Neither livestock grazing nor prescribed burning will be used in the Allan Mountain Research Natural Area to induce or maintain seral species.

This proposed site specific Forest Plan amendment constitutes an effort to readjust and clarify standards and guides to reach the goals and objectives of the Plan. It would allow the line officer to manage unplanned wildland fire to play a natural role in the Upper North Fork Ecosystem Restoration Project Area. It applies to unplanned, naturally-ignited (lightning-caused) wildland fire. Actions allowed under the amendment would continue to be constrained by federal wildland fire management policy directions and implementation compliance processes already in place.

This amendment responds to recent changes in national fire management policies with recognition of the role of wildland fire as an essential ecological process and natural change agent on the landscape. Fire activity has increased in recent years on the Salmon-Challis National Forest as well as many areas of the western United States. This amendment provides opportunities to reduce costs associated with wildland fire management by not implementing full fire perimeter control tactics where it is not needed.

The amended fire management direction applies to the management of unplanned, naturally-caused fires only. There will be no change to the management of unauthorized human-caused fire. In compliance with the Federal Wildland Fire Management Policy (Ibid.), all human-caused wildland fires would continue to be suppressed at the lowest costs, with the fewest negative consequences with respect to firefighter and public safety.

Table 107 summarizes current Forest-wide Direction (pp IV-68-70) and the recommended changes for wildfire in the project area.

Table 107. Current Forest wide Direction and the recommended changes for wildfire in the project area

Management Activity	General Direction	Existing Standards and Guidelines	Proposed Amended Standards an Guidelines
Fire Planning and Suppression (pp. IV-68, 69)	1. Provide a level of protection from wildfire that is cost efficient and that will meet management objectives for the area considering the following: A. The values of the resources that are threatened by fire; B. The probability of fire occurrence; C. The fuelbed that fires will probably occur in; D. The weather conditions that will probably influence fires that occur; E. The costs of fire protection programs (FFP and FFF). F. The social, economic, political, cultural, environmental, life and property concerns; and, G. Management objectives for the area. H. Use the fire management analysis process (FSH 5109.19) for this analysis.	None	a. Manage lightning caused fires to play, as nearly as possible, their natural ecological role within the Upper North Fork project boundary.
Escaped Fire Suppression (pp. IV-69, 70)	1. Take suppression action on all escaped fires considering the following: A. The values of the resources threatened by the fire (both positive and negative); B. Management objectives for the threatened areas; C. The fuel beds the fire may burn in; D. The current and projected weather conditions that will influence fire behavior; E. Natural barriers and fuel breaks; F. Social, economic, political, cultural and environmental concerns; G. Public safety; H. Firefighter safety; and, I. Costs of alternative suppression strategies. Use the escaped fire situation analysis to make this determination (FSM 5130.31). J. Private property values.	a. Control will be the suppression strategy during fire season on all fires that occur below 8000 feet, outside the Frank Church – River of No Return Wilderness. b. Containment or confinement strategies may be chosen for pre and post season fires and those above 7000 feet. The general fire season is May 10 through October 20 with the primary fire season from June 15 through September 30. c. The Wilderness Fire Management Plan for the Frank Church – River of No Return Wilderness will be used for fire management strategies in wilderness.	a. One or more fire management strategies may be considered and implemented for any unplanned wildland fire to achieve a variety of project management objectives, while minimizing negative effects to life, investments and valuable resources.

Management Activity	General Direction	Existing Standards and Guidelines	Proposed Amended Standards an Guidelines
	2. Although tractor line construction is often prudent for cost, speed, and safety reasons, suppression actions can sometimes pose a greater threat to resource values than does the fire itself. The use of tractors for fireline construction may sign1ficantly affect watershed, fisheries, wildlife, visual, and recreational values. 3. The incident commander is responsible for consulting the resource advisor whenever tractor line construction is being considered and/or planned. The resource advisor will keep the Forest Supervisor and the incident commander informed of all tactical proposals which have a potential for significant resource impacts.	a. Tractor line width must be commensurate with the situation at hand. Lines in excess of one blade wide are rarely needed and will not be permitted without prior approval of the Forest Supervisor, expect in emergency situations. Safety Zones up to 300 feet wide and vehicle turnouts may be constructed as necessary. b. Every effort will be made to perform rehabilitation work concurrently with line construction. Wildlife openings, at intervals no greater than 200 feet, will be built into slash windrows during construction. Water bars will be constructed as soon as possible after construction, based on intended use of the line, equipment availability, and safety considerations.	No Change

Amendment 2: Forest Plan Amendment to change big game winter range direction would be changed for hiding and/or thermal cover, and habitat capability for Management Prescription 4A in order to achieve fuels reduction objectives in the project area

Background

The North Fork drainage contains areas suitable as big game winter range and these areas usually receive considerable use by wintering big game, primarily mule deer and elk. Winter range as defined by a consortium of central Idaho wildlife professionals extends to approximately 6,500 feet along the Salmon River (Ralphs et al. 1981). Of particular mention are abrupt east-west ridges that separate Douglas-fir from grassland habitats which receive the most extensive winter range use. These areas provide important thermal cover habitat for elk, deer, and other wintering wildlife. Optimum thermal cover areas are defined as having at least 70 percent canopy cover (Ralphs et al. 1981, Lyon and Christensen 1992) but big game are known to use areas with less crown closure on winter ranges. Multi-storied stands are better thermal cover than single-storied stands; however, any cover is better than no cover (Thomas et al. 1979).

Areas defined as winter range in the Salmon, Forest Plan are identified as Management Prescription 3A/4A and overlap 3,978 acres of the proposed project area. Management Prescription 3A/4A generally extends from Hull Creek and Bills Canyon on the west and east sides of the North Fork River, respectively, north to Deep Creek and Elk Creek on the west and east sides of the North Fork River, respectively. Much of this defined winter range is visible from Highway #93 that traverses the area from south to north.

Due to several past mechanical treatment projects that have focused on fuels reduction activities adjacent to private lands, current levels of available hiding cover in Management Prescription 3A/4A are reduced from levels of several decades ago. Much of the private lands have been cleared of vegetation and now support community residences and pastoral activities such as maintaining irrigated pasture for livestock, any hiding and/or thermal cover areas that may have existed have been largely replaced by settlement. However, National Forest System lands with the project area contained in thermal cover have been assessed as 31 percent which exceed the Forest Plan standard of 25 percent.

Proposed Action

Implementation of proposed mechanical thinning treatments in big game winter range portion of the project area would remove conifers and thin from below resulting in reduced overstory cover and direct more light to the ground to stimulate shrub regeneration. Prescribed burning in the understory following mechanical thinning could further change the cover characteristics of the big game winter range. Completion of these proposed fuels reduction treatments would potentially result in the remaining thermal cover being less than the current Forest Plan standard of 25 percent based on preliminary analyses. Factoring in that elk commonly winter on private lands in the North Fork drainage and it is important to recognize the cumulative effects of potential losses of wildlife cover values on the entire landscape used by elk.

The primary objective of this project is hazardous fuels reduction. The amount of fuel loading that is characteristic of hiding and/or thermal cover conflicts with the primary objective of this project. The Proposed site specific Forest Plan Amendment #2 for the Upper North Fork HFRA Ecosystem Restoration Project would be to exempt the project area from standards and guidelines 4A c) and d). This amendment only applies to National Forest System lands under the management of the Salmon-Challis

National Forest within the Upper North Fork HFRA Ecosystem Project boundary for the time period of implementation of the project.

Table 108 summarizes current Forest wide Direction and Standards and Guides (pp IV-110-111) and the recommend changes to big game winter range standards and guidelines.

Table 108. Big game winter range Forest Plan Direction and Proposed amendment changes

General Direction	Existing Standards & Guidelines	Proposed Amended Standards & Guidelines and Rationale for Change
Managememt Prescription 4A Big game winter range (page 110): Management emphasis is on providing required forage and cover on big game winter ranges. 1. Manage key big game winter ranges to achieve and maintain big game population objectives (page IV-111).	c.) Maintain hiding and/or thermal cover on at least 25% of the area (where land types are capable). Maintain at least 90% of potential cover on land types that are not capable of reaching 25% cover. d.) Maintain big game habitat capability at 80% or more of winter range potential.	Delete Standard and Guidelines 4A c) and d) Rationale: • Treatments are likely to have negligible effects on wintering elk because elk do not appear to concentrate in the vicinity of these proposed treatment areas • The combination of mechanical treatments coupled with the regenerating effects of prescribed fire is likely to increase the value of available forage species. Because prescribed fire is designed to occur under conditions that will produce a mosaic effect, subsequent increases in overall habitat diversity may be expected to occur which can be beneficial to elk. • Prescribed burning is planned to occur during appropriate weather conditions that will maintain low to moderate burning intensities, low flame heights and low rates of spread. These conditions will favor the retention of large diameter ponderosa pine and/or Douglas-fir that occur as single and often isolated trees in those areas that are not capable of achieving 25% cover levels. Tall crowns are likely to have better insulating properties than short crowns and insulation against winter cold is an important factor in elk selection of thermal cover on winter range (Thomas et al. 1979). These situations can provide thermal cover on winter ranges where tree size and location can be more important than canopy cover (Ralphs et al. 1981). It is anticipated that prescribed fire will occur under conditions where at least 90% of these large diameter trees will be retained

Amendment 3: Forest Plan amendment to modify Pacific Anadromous Fish Strategy riparian habitat conservation areas to achieve fuels reduction objectives in the project area

Background

The Salmon National Forest Land Management Plan was approved in December 1988 and amended in 1995 by the Pacific Anadromous Fish Strategy Environmental Assessment (Interim Strategies for Managing Anadromous Fish Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho, and portions of California) which provides directions for riparian habitat conservation areas for anadromous streams. This direction prohibits commercial timber harvest within Pacific Anadromous Fish Strategy riparian habitat conservation areas. Within the project area there are currently; 37.5 stream miles with a 300 foot riparian habitat conservation area buffer, 47.5 stream miles with a 150 foot riparian habitat conservation area buffer and 57.6 stream miles with a 100 foot riparian habitat conservation area buffer. The Pacific Anadromous Fish Strategy standard widths defining riparian habitat conservation areas are as follows (Appendix C: pp C6-C-9):

a. 300 feet on either side of fish bearing streams,

b. 150 feet on either side of permanently flowing non-fish bearing streams,

c. 150 feet around the outer edges from riparian vegetation for ponds, lakes, reservoirs and wetlands greater than 1 acre,

d. 100 feet on either side of seasonally flowing or intermittent streams and around the outer edges from riparian vegetation for wetlands less than 1 acre, landslides and landslide prone areas.

Proposed Action

Commercial thinning (timber harvest) is one of the proposed vegetation management tools that are being utilized for decreasing tree density, ladder fuels and increasing crown spacing in order to achieve the fuels reduction objective in this Healthy Forest Restoration Act project. The above Pacific Anadromous Fish Strategy riparian habitat conservation area widths would be modified (reduced in width) to existing roads in specific treatment units allowing commercial thinning (timber harvest) above the edge of the road prism outside of the modified riparian habitat conservation area. This modification would only take place where there is a road within the riparian habitat conservation area buffer between the unit boundary and the stream channel. Riparian management objectives defined in the Pacific Anadromous Fish Strategy would be attained in these modified riparian habitat conservation areas as directed in appendix C (pp C4 - C6). Riparian habitat conservation area modifications would only apply for approved project activities listed in the eleven treatment units below for the term of the Upper North Fork HFRA Ecosystem Restoration Project. This amendment only applies to National Forest System lands under the management of the Salmon-Challis National Forest within the Upper North Fork HFRA Ecosystem Project boundary for the time period of implementation of the project.

Table 109 summarizes Pacific Anadromous Fish Strategy direction for riparian habitat conservation areas (C9-C18) and the recommend units where modification of riparian habitat conservation area buffer widths are needed for fuels reduction commercial thinning in the project area.

Table 109. Units with proposed modified riparian habitat conservation areas

PACFISH Direction, Standards & Guidelines	Unit Number, Treatment Type, Vicinity Location			Acres added by RHCA Modification
Timber Management TM-1; page C-10 Prohibit timber, including fuelwood cutting, in riparian habitat conservation areas, except as described below. Do not include riparian habitat conservation areas in the land base used to determine the allowable sale quantity, but any volume harvested can contribute to the timer sale program. Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in riparian habitat conservation areas only where present and future woody debris needs are met, where cutting would not retard or adverse effects on listed anadromous fish can be avoided. For watersheds with listed salmon or designated critical habitat, complete watershed analysis prior to salvage cutting in riparian habitat conservation areas. Apply silvicultural practices for riparian habitat conservation areas to acquire desired vegetation characteristics where needed to attain riparian management objectives. Apply silvicultural practices in a manner that does not retard attainment of riparian management objectives and that avoids adverse effects on listed anadromous fish.	16	shaded fuel break	Ridgeline SW of Lost Trail Pass ski area	1.3
	17b	shaded fuel break	East of Moose Cr Estates	1
	85	skyline com. thin	N of Votler Cr, SW of Gibbonsville	0.1
	87	skyline com. thin	N of Votler Cr, W of Gibbonsville	0.2
	112	tractor com. thin	W Hammerean Rd by Twin & Deep Creeks	2.3
	121	tractor com. thin	W of Hwy 93 & Royal Elk Ranch	2.5
	122	skyline com. thin	W of Hwy 93 & Royal Elk Ranch	4.3
	185	tractor com. thin	N Granite Mtn by Johnson Cr	1.7
	196	skyline com. thin	W of Hwy 93, N Friedorf Crk	1.9
	203	skyline com. thin	N of Votler Cr, SW of Gibbonsville	0.5
	227	shaded fuel break	Hwy 93 corridor south of Twin Creek	58.9
	Total			**74.7**
	Rationale			
• Interim Riparian Management Objectives (RMOs); page C-6 • Pool Frequency – varies by channel width 96-9 pools per mile with wetted with of 10 to 200 feet; • Water Temperature – No measureable increase in maximum; 64F migration/rearing; 60F spawning • Large Woody Debris – (Idaho) >20 pieces/mi; >12 in dia.; >35 ft. length • Width/Depth Ration - <10, mean wetted width divided by mean depth	The proposed modified riparian habitat conservation area buffer widths are not expected to allow any additional sediment delivery to streams in the project area. There would be no change in sediment risk from modifying riparian habitat conservation area buffers in the listed 11 units. Thinning treatments were designed to maximize the maintenance and enhancement of the Riparian Management Objectives by maintaining riparian function in the short term and through protecting riparian habitat conservation area from high severity fire, improve riparian function over the long term. The project's proposed activities and objectives are consistent with the Pacific Anadromous Fish Strategy Timber Management standards/guidelines			

Appendix C – Past, Present and Reasonably Foreseeable Activities

Activities and Actions	Past	Present	Reasonable Foreseeable
Timber Harvest (last 50 years) - Acres by decade Logging activity dates back to settlement years in late 1800s; %basal area removal available in meta data; clear cut and heavy overstory removal. 100% basal area was typical practice from 1960-90s; limited helicopter logging in 1970s of select overstory	Pre 1950 5 ac 1950s: 713 ac 1960s: 1932 ac 1970s: 2938 ac 1980s: 1989 ac 1990s: 125 ac 2000s: 0 ac	None currently	Lost Trail Pass Sanitation Salvage Project located within Lost Trail Pass Ski area on the Salmon-Challis National Forest within special use permit (SUP) area; Bitterroot NF (lead FS unit for SUP administration and proposing sanitation/salvage for hazard tree removal and sanitation of forest stands with heavy insect infestation
Vegetation Management	Reforestation, thinning acres included in harvest info above.	None currently	Pre-commercial thinning in approx. 20 years;
Mining	Late 1800s-1940s Placer and hydraulic mining in North Fork Salmon River, Dehlonega and Pierce Creeks; Small scale mineral explorations in last 10-30 yrs.	47 claims recently staked in Johnson, Friedorf, Vineyard Gulch area; inactive agate operation in Grouse Gulch, Votler material pit recently expanded-used by FS, county and community for road surfacing.	Small scale exploration operations likely, i.e. Votler pit area; mineral potential moderate. Abandon Mine Land (AML) project to be implemented to close, barricade abandoned adits, openings for public safety.
Grazing	Unregulated and regulated (since 1906) grazing of horses, cattle and sheep since early settlement of area in 1870 in accessible areas (primarily adjacent to townsites and private lands along North Fork)	No domestic livestock grazing currently permitted in project area	None anticipated.
Resource Inventory & Monitoring	Plant communities, wildlife & fish habitat/populations, soil/water/air resources, human uses, etc.	Ongoing by federal, state management or regulatory agencies; non-governmental individuals/organizations	Continued activity based on information needs and/or requirements

Activities and Actions	Past	Present	Reasonable Foreseeable
Transportation System-Road/Trail Construction, Maintenance, Use	Roads to townsites, homesteads, logging areas and mining properties throughout the project area with most in the lower one half (North Fork corridor and Gibbonsville); developed since late 1800s; U.S. Highway 93 bisects length of project area; short segment of Montana Highway 43;trails to Allan Mt, along Continental Divide, Montana/Idaho Divide, Twin and Pierce Creeks	Currently 185 total miles of system and unauthorized roads in the Upper North Fork project area with road density of 1.4 mi/mi2 in the Upper North Fork subwatershed and 5.0 mi/mi2 in the Middle North Fork subwatershed, 15.7 miles of motorized, 5.2 miles nonmotorized trail in the Upper North Fork subwatershed, 2.2 miles motorized trail in the Middle North Fork subwatershed. Routine maintenance of main arterial roads, trails as needed; Seasonal & yearlong closure of select road segments for big game security.	Continued management of existing road/trail system. Routine maintenance of main arterial roads, trails as needed.
Special Uses	Similar to present activities in recent decades. Lost Trail Pass Ski Area-SUP for private downhill ski development/facility/area located on National Forest at divide between Montana/Idaho	3 Outfitter & Guide permits for hunting, fishing, trail uses; domestic waterlines to private residence; buried phone lines; powerlines; road right-of-ways for U.S. Highway 93 and arterial routes under county maintenance; Lost Trail Pass Ski Area SUP	Continued use under permit
Lands	Small Tract Act Exchanges for minor property boundary adjustments, Hwy 93 corridor		No lands activities anticipated
Dispersed Recreation	Backcountry use, horseback riding, fishing, hunting, backpacking, camping, sightseeing, antler gathering, mountain biking, rock-hounding, sledding, ski touring, snow machining, mushroom harvesting	Activities ongoing, current use considered light. Portion of Chief Joseph Pass x-country ski trail system within project area north of Highway 43	Activities would continue
Developed Recreation	Twin Creek campground with initial development in 1930s	Twin Creek campground currently has picnic area, 40 camping units, 6 outhouses, potable water system	No additional developed sites anticipated

Activities and Actions	Past	Present	Reasonable Foreseeable
OHV Use and Management	Limited regulation prior to 1988 Salmon NF Travel Plan except for road closures and other use restrictions controlled by gates and/or physical road closures.	Motorcycling, ATV, 4WD use on Forest lands according to new 2009 Travel Plan which allows access on designated routes only. Some additional routes closed seasonally; snow machine use according to 2008 Plan	Travel Plan subject to annual adjustments (as needed) to designated open routes; Subpart A analysis (minimum economical road system) and court ordered Supplemental EIS to address Travel Plan deficiencies may result in additional minor adjustments to designated routes.
Fuelwood Gathering	National Forest lands where accessible by transportation system and on private lands by landowners or by permission; fuelwood supply abundant, but limited availability based on roads open to travel; approx. 55% of subwatershed is roadless and inaccessible.	Continued use dependent on seasonal access and other available fuelwood sources in proximity to communities.	Continued use in accessible areas.
Fire Suppression	The USDA Forest Service has primary responsibility on public and private lands for fire suppression except for private lands in Gibbonsville and North Fork corridor within NFFPD. Approx. 146 fires have been suppressed in the past 85 years. Six lightning fires occur for every one human-caused fire. Large fire history in the project area includes 730 ac in 1919, 178 ac in 1985, 1085 ac in 2000, 1752 ac in 2003. Most forest stands have been fire free since 1919. Within the North Fork Salmon River drainage the Mustang Complex burned approx. 23,400 ac (48% of 48,400 perimeter ac) in 2012. Only 15 ac occurred within the project area. Another fire in 2013 burned 320 ac in Dahlonega Creek outside the project area.	Current fires would be suppressed according to strategies determined through application of Appropriate Management Response. The fire occurrence rate for the area averages about two fires per year. The fire rate within and around the project area has varied from eight to twenty five fires per decade.	Wildland fires will continue to occur in the area and suppression efforts would be made to control those fires. Suppression related activities would continue to be repaired. It is anticipated that fires would continue to occur at this frequency for the reasonably foreseeable future.

Activities and Actions	Past	Present	Reasonable Foreseeable
Prescribed Burning and Fuels Reduction	Fuels reduction thinning and ladder fuel reduction on 800 acres and underburning on 2500 acres have been accomplished in the Gibbonsville vicinity in the last decade. Records of past burning activities are limited. Common practices and on-site evidence indicates that jackpot and pile burning of logging slash likely occurred on portions of approximately 4,500 acres where timber harvest occurred in the last 50 years.	None currently.	Maintenance prescribed burning in 10-15 years on key locations of the Upper North Fork fuels reduction units.
Insects & Disease	Endemic to epidemic levels of forest pests, disease depending on weather cycles, forest stand conditions, past harvest and fire cycles. 1930s pine beetle loss in lodgepole. Recent losses to mature Douglas-fir, ponderosa pine, lodgepole, whitebark pine from beetle activity, especially in roadless areas; limited sanitation harvest conducted for conifer protection.	Current epidemic activity from Douglas-fir beetle, western spruce budworm, western and mountain pine beetle, blister rust and dwarf mistletoe due to stand density, age and diversity conditions and recent drought. Project area susceptible to continued insect & disease spread. Fire is increasing risk, but minimal factor due to suppression actions for 75+ yr; limited carbaryl applications in campgrounds for tree protection.	Continued outbreak and cycles of pest and disease based on forest health, weather and fire cycles especially in roadless parts of the project area where there is no active forest management. Endemic levels expected in areas receiving hazardous fuels reduction treatments. Limited carbaryl insecticide applications in campgrounds for tree protection
Noxious Weed Management	Limited hand, mechanical, chemical treatment since 1960s	Hand, mechanical, chemical, biological control methods; Cooperative Weed Management group is established locally for integrated management approach; BMP's are SOP with other resource activities; 100-150 ac/year recently treated by FS, State and County roads, private owners.	Continued integrated management with emphasis on preventative measures, actions; treatment dependent on available funding. FS, State, and County efforts on priority areas, roadways. Lemhi Co. Weeds Dept cost-share program with landowners, enrolled for treatments on private lands
Wildlife Habitat/Riparian Enhancement	Instream structure placements/modifications to improve fish habitats, i.e. log drop structures, root wads, boulder placement; activities primarily in North Fork Salmon River over last 15-20 years; Hwy 93 reconstruction project in 1996 replaced three culverts on North Fork Salmon River, one each culverts on Twin Crk and Moose Crk with fish passable structures.	None currently	None currently

Activities and Actions	Past	Present	Reasonable Foreseeable
Management of Inventoried Roadless Area (Allan Mtn IRA); Allan Mtn Research Natural Area (RNA) (1700 acres total all within IRA)	Roadless areas evaluated under RARE II processes. Areas not recommended as wilderness in Salmon Forest Plan in 1988. Limited roading, timber harvest, mining have occurred within IRAs. 2001 Roadless Rule restricted potential development (roading and timber harvest). Part of RNA in project area; protection mgmt prescription.	Forest Plan emphasis on semi-primitive motorized and nonmotorized recreation and the retention of undeveloped environment. Final Idaho Roadless Rule 2008 classified areas as Backcountry-Restoration theme; manage to maintain or improve roadless characteristics, permissions for hazardous fuels reduction, ecosystem or TEPS habitat restoration.	Continued management under Final Idaho Roadless Rule 2008. Allan Mtn RNA continued management of area under protection emphasis for southern-most occurrence of stands of subalpine larch and other values in RNA.
State (IDFG) Management of Wildlife & Fish Resources	Preserve, protect, perpetuate & manage “wildlife” resources that are property of the State	Continued management of big game, small game, game birds, non-game, fur-bearers, predators, fisheries-management and harvest according to state regulations. Fish stocking in Allan Lake	Continued management including fish stocking
Private Land Uses & Activities	Surface stream flow diversions groundwater wells; domestic water use, pasture irrigation for homeowner livestock; residential houses, out buildings; limited commercial businesses; access bridges; utilities/septic systems; bottom lands fenced maintained in pasture for horses; most parcels logged in past; recent in Moose Creek Estates	Activities ongoing; recent landowner actions near residences to create defensible space (proximity fuels reduction) in the North Fork corridor surrounding Hwy 93 in Gibbonsville area; Moose Creek Estates has status as Fire-Wise community; lots currently purchased with intent of residential housing development	Activities ongoing with likely expansion of defensible space treatments by residents. Residential housing building anticipated in Moose Creek Estates in next 5-10 years; potential for other similar residential construction on other Hwy 93 corridor private properties.
Traditional Uses-American Indian Tribes	Hunting, gathering and other activities such as landscape burning.	Hunting of game and fish, gathering of natural resources, and religious practices according to Tribal customs on non-ceded lands provided for in Treaty rights.	Continued activity according to Treaty rights.

Appendix D –Wildland Urban Interface Zone and Community Protection Zone in the Upper North Fork of the Salmon River

Wildland-Urban Interface

September 22, 2010

Lemhi Count WUI Zone committee meeting to modify the WUI Zone for the Upper North Fork of the Salmon river, Lemhi County. The proposed boundary modifications were analyzed per the process explained at the bottom of this page.

The WUI Boundary was expanded beyond the HFRA default 1.5 miles. The boundary is now located in locations that meet the intent of HFRA Act and are in locations that have a higher probability of allowing successful fire control and management activities. In general the boundary was moved to the ridge top location above sustained steep slopes, most of which contained forest fuels with high risk for crown fire. Ridge tops generally are much safer and provide a location that is more defendable from fire movement compared to a position on the mid-slope.

The zone modifications were discussed and approved in a collaborative setting with Dr. Robert Cope - Lemhi County Commissioner, Karin D. of Lemhi County Emergency Services, Salmon City Council and Salmon City Planner, Mike England -North Fork Rural Fire Captain, and Mike Smith (USDA- Fuels Planner) and Lynn Bennett (USDA-FS Fuels Program Manager and Fire Ecologist).

Of special note, Mike England requested that the east boundary be modified so as to use the Continental Divide north of Dahlonega Creek and follow the main ridge to Eagle Mountain, then down into Sheep Creek and up the ridge east of Shewag Creek to join into Road 256, and follow Road 256 east for about half a mile to join into the “current” WUI Zone 1.5 mile default boundary. This will result in including into the WUI Zone all of the area south of Stein Mountain, providing for opportunity to do priority fuels treatment to protect the Stein Mountain radio repeater, which is critical to the functioning of the EMS communications system for Lemhi County and the other agencies.

Notes by Lynn Bennett.

Lemhi County WUI Zone Mapping Criteria
Lemhi County Fuels Committee

A. Geospatial Data:

1. Topography/terrain features (steep slopes, ridges, benches, valley bottoms).

2. Fire Regime Condition Class map layers.

3. Existing vegetation structural stage (provides information on fuel profiles).

4. Crown Fire Risk Spatial Data (GIS data layer built on actual burn severity/fire behavior data linked to analysis of fire behavior trends related to: terrain aspect, vegetation structural stage (fuel profile), and occurrence of high severity fire mapped to a 30 meter pixel resolution from recent large fires within Lemhi County.

5. Infrastructure, including egress routes for public and firefighter safety, utility services, community support or cultural values (historic sites, recreation sites, cemeteries, etc. …).

6. Flammability of fuel profiles (both live and dead vegetation). Recent trends (multiple years) for live and dead fuel moisture content and Energy Release Component values of Lemhi County.

7. A geographical width for wildland-urban interface zone of 1.5 miles as based upon Healthy Forest Restoration Act standards for communities surrounded by steep slopes was used as a starting value and then modified (both increased and decreased (1/4 mile)) to reflect actual needs of a given area.

8. Fire history from 1919 to 2005.

9. Existing access for fire suppression forces (transportation GIS layer).

10. Insect and disease activity as depicted in Forest Service aerial detection surveys flights.

11. Post fire effects to resources and infrastructure from recent large wildfires in Lemhi County. For example, the large debris flows which completely block access for long periods of time on the Panther Creek and Main Salmon River roads, as well as the damming of Panther Creek and the Salmon River due to debris slides across the channel.

B. Accepted Fire Suppression Tactic:

1. Consider large fires in Lemhi County and the long distances that firebrands spotted ahead of the fires. Crown fires in conifer forests have produced fire brand spotting distances over two miles.

2. Consider the effects of fire-run distances in one burn period (one afternoon) from recent large fires within Lemhi County. Multiple fires have exceeded five mile runs in one afternoon in conifer forest fuel conditions.

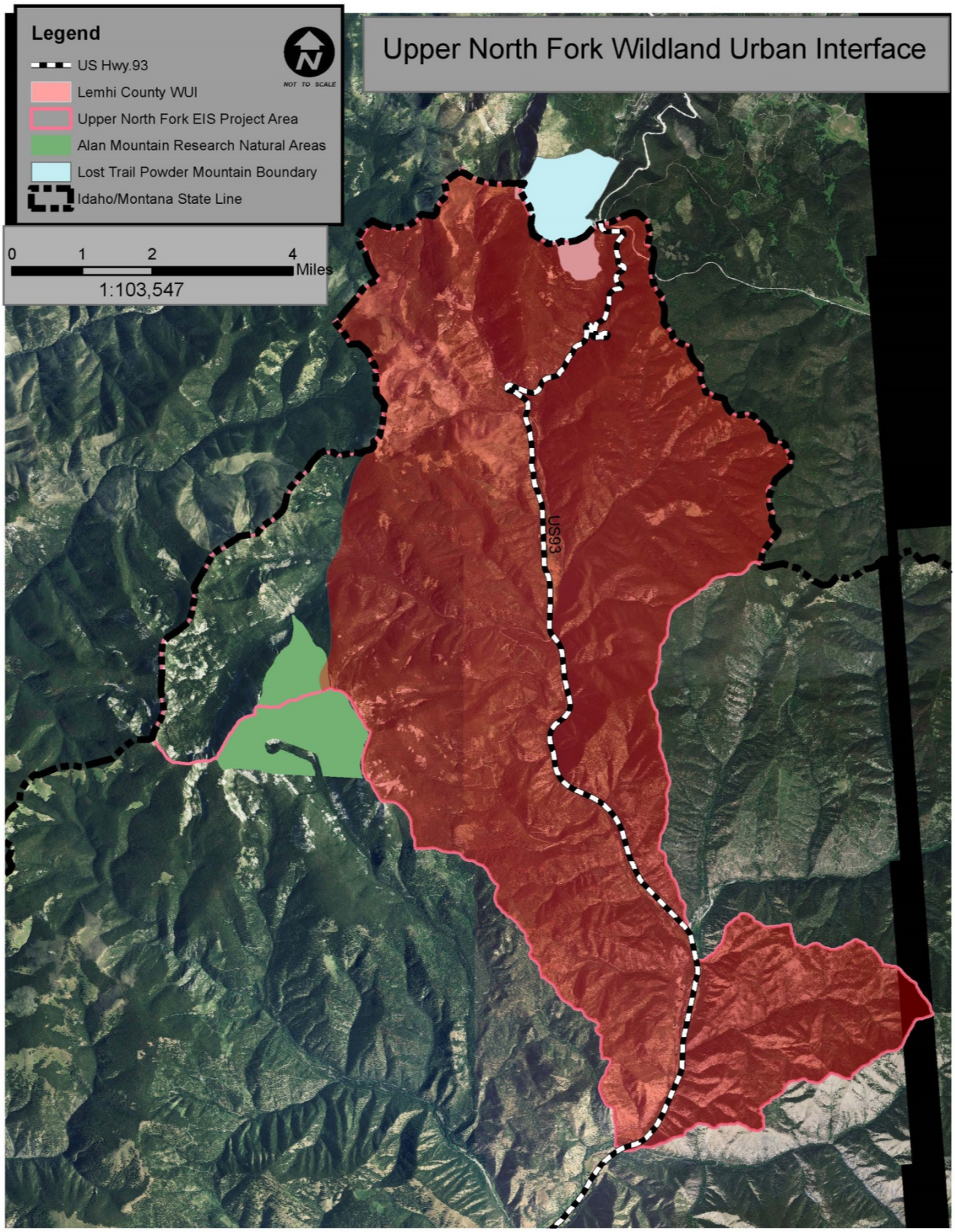
3. Mid-slope fire control lines have been identified as a risk to fire fighter safety and are to be avoided in steep terrain. Control lines should be located on ridges or valley bottoms.

C. Values at Risk:

1. Firefighter safety, including local wildfire events within the last 30 years that resulted in reportable compromised safety standards for fire fighters, including entrapments (206), shelter deployments (154), and fatalities (3).

2. Private property values other than building structures; forage, timber values, fences, scenic views, water for domestic uses, etc….

3. Important wildlife habitat and ecosystems (terrestrial, riparian, and aquatic).


Upper North Fork Wildland Urban Interface
Legend
US Hwy.93
Lemhi County WUI
Upper North Fork EIS Project Area
Alan Mountain Research Natural Areas
Lost Trail Powder Mountain Boundary
Idaho/Montana State Line
NOT TO SCALE
0
1
2
4
Miles
1:103,547
US93

Community Protection Zone

How the community protection zone was delineated for the Upper North Fork Project under the Idaho Roadless Rule

Introduction

The Idaho Roadless Rule permits temporary road construction, road reconstruction and associated timber cutting, sale, and removal in the Backcountry Restoration theme if the activity is within a community protection zone. A community protection zone is defined by the rule as:

1. an area extending ½ mile from the boundary of an at-risk community[7] ;
2. an area within 1 ½ miles of the boundary of an at-risk community, including any land that –
    a. has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community;
    b. has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or
    c. is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; and

The purpose of this paper is to document the process for determining (1) is there a community (Steps 1, 2, or 3); (2) is the community at risk (Steps 1, 2, or 4); (3) what are the boundaries of the community (Step 5); and (4) what are the outer boundaries of the community protection zone (Step 6). Specifically the analysis evaluated whether or not Moose Creek Estates and Lookout Ski area qualify as a community under HFRA; and if so whether or not those communities were at-risk.

Step 1. Is the community on the list of at-risk communities? If so go to Step 5, if not go to step 3.

See if the community is located in either of the following documents. If the community is on either list, the community has been designated an at-risk community.

a. Any community found on the Urban Wildland Community List (Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire [66 Fed. Reg. 753, January 4, 2001]). http://www.forestsandrangelands.gov/resources/documents/423-437-en.pdf

Moose Creek Estates and Lost Trail Ski Area are not on the list.

a. Any community found on the Community in the Vicinity of Federal Lands at Risk From Wildfire. (Urban Wildland Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire [66 FR 160, August 17, 2001]) http://www.forestsandrangelands.gov/resources/documents/351-358-en.pdf

Moose Creek Estates and Lost Trail Ski Area are not on the list.

---

[7] An at-risk community means an area:
(a) that is comprised of:
i. an **interface community** as defined in the notice entitled "Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire" issued by the Secretary of Agriculture and the Secretary of the Interior in accordance with Title IV of the Department of the Interior and Related Agencies Appropriations Act, 2001 (114 Stat. 1009) (66 Fed. Reg. 753, January 4, 2001); or
ii. a **group of homes and other structures with basic infrastructure** and services (such as utilities and collectively maintained transportation routes) within or adjacent to Federal land;
(b) in which conditions are conducive to a large-scale wildland fire disturbance event; and
(c) for which a significant threat to human life or property exists as a result of a wildland fire disturbance event.

Step 2. Is the community identified as an at-risk community in a Community Wildfire Protection Plan? If so go to step 5, if not go to Step 3.

Communities may identify themselves as at risk based on an analysis following the National Association of State Foresters Field Guidance on Identifying and Prioritizing Communities At Risk (June 27, 2003), or during development of their Community Wildfire Protection Plans (HFRA Interim Field Guide). The State Foresters' guide is available at:
http://www.forestsandrangelands.gov/resources/documents/nasffieldguidancecommunities.pdf

Moose Creek Estates and Lost Trail Ski Area are not specifically mentioned in Lemhi County's CWPP.

Step 3. Does the area qualify as a "community"? If so go to Step 4. If not then the permissions associated with a community protection zone do not apply.

If the area of concern is not on the federal register lists or in a community wildfire protection plan see if the area qualifies as a community. An interface and intermix community as defined below meet the definition of a community under the Healthy Forest Restoration Act (66 Fed. Reg. 753, January 4, 2001).

Category 1. Interface Community

The Interface Community exists where structures[8] directly abut wildland fuels. There is a clear line of demarcation between residential, business, and public structures and wildland fuels. Wildland fuels do not generally continue into the developed area. **The development density for an interface community is usually 3 or more structures per acre, with shared municipal services**. Fire protection is generally provided by a local government fire department with the responsibility to protect the structure from both an interior fire and an advancing wildland fire. An alternative definition of the interface community emphasizes a population density of 250 or more people per square mile.

Moose Creek Estates and Lost Trail Ski Area do not meet the definition of an interface community.

Category 2. Intermix Community

The Intermix Community exists where structures are scattered throughout a wildland area. There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area**. The development density in the intermix ranges from structures very close together to one structure per 40 acres**. Fire protection districts funded by various taxing authorities normally provide life and property fire protection and may also have wildland fire protection responsibilities. An alternative definition of intermix community emphasizes a population density of between 28–250 people per square mile.

1. **Moose Creek Estates meets this in the following ways:**
    a. Multiple structures.
    b. Shared road access.
    c. The area is within the National Forest fire protection district.
    d. Currently there are 3 or more structures. Approximately 13 lots have been sold for development out of 30 lots total.
2. **Lost Trail Ski Area and State Visitor Center meet this in the following ways:**
    a. Multiple structures.
    b. Shared road access.
    c. Rural fire department provides wildfire protection.

[8] A structure is understood to be either a residence or a business facility, including Federal, State, and local government facilities (66 Fed. Reg. 753, January 4, 2001).

d. There are 3 or more structures existing.
e. Shared power service
f. (Note other ski areas were listed in the federal register lists of communities).

Step 4. Determine if the community is at risk. If so go to Step 5. If not then the community protection zone permissions do not apply.

Determine if the community is at-risk. The community is at-risk when conditions are conducive to a large-scale wildland fire disturbance event; and for which a significant threat to human life or property exists as a result of a wildland fire disturbance event.

1. This area has been identified as high risk in the Lemhi County community wildfire protection plan (page 26, - Sheep Creek Hwy 93 N. - Lost Trail Hwy 93 N.). This is based on: past fire occurrence, wildland fuel conditions, number of people affected, and local fire suppression.
2. Several fires have occurred in this area in 2000 and 2003, and the area is at high probability for lightning caused fire ignition.
3. The area is in condition class 2 and 3[9], and is dominated by multi-story dense forests. These fuel conditions have proven to sustain high amounts of crown fires. The Frog Pond fire burned in 2003. The fire started on the ridge top and burned to the edge of the Moose Creek Estates in one afternoon, a distance of approximately 5 miles. Approximately 50 percent of the forested area burned in crown fire, and another 20 percent in high severity fire.
4. A large number of people would be affected by a large high severity fire in this area, including those that may be at the visitor center, ski area, Moose Creek Estates, and those driving Hwy 93 during the time of the fire. In addition, post fire effects include impacts to the same groups of people with the addition the winter skiers and those dependent on the use of Hwy 93.
5. The Lost Trail Ski Area has had structural fire protection twice in the last decade.

Step 5. Map the boundary of the community. Once completed go to Step 6.

1. **Lost Trail Ski Area** – The boundary of the community is the Forest Service permit boundary for the special use permit.
2. **Moose Creek Estates** – The boundary of the community is the private property boundary. The boundaries abut National Forest System lands and the lots to be developed are located throughout the estate.

[9] Condition Class describes the departure from historical conditions based on the number of missed fire cycles and the amount of change in forest structure and species composition. A qualitative risk ranking is assigned to each condition class: low, moderate, high. The chance of losing key ecosystem components in wildland fire increases from condition class 1 (lowest risk) to condition class 3 (highest risk)[9]. "Risk" is not defined as the probability of a fire occurring; rather, it refers to the potential harmful effects to key ecosystem components that may occur because of altered vegetation composition and structure and to the uncharacteristic wildfire effects that can occur once a wildland fire ignites and burns.

Condition classes are defined as:

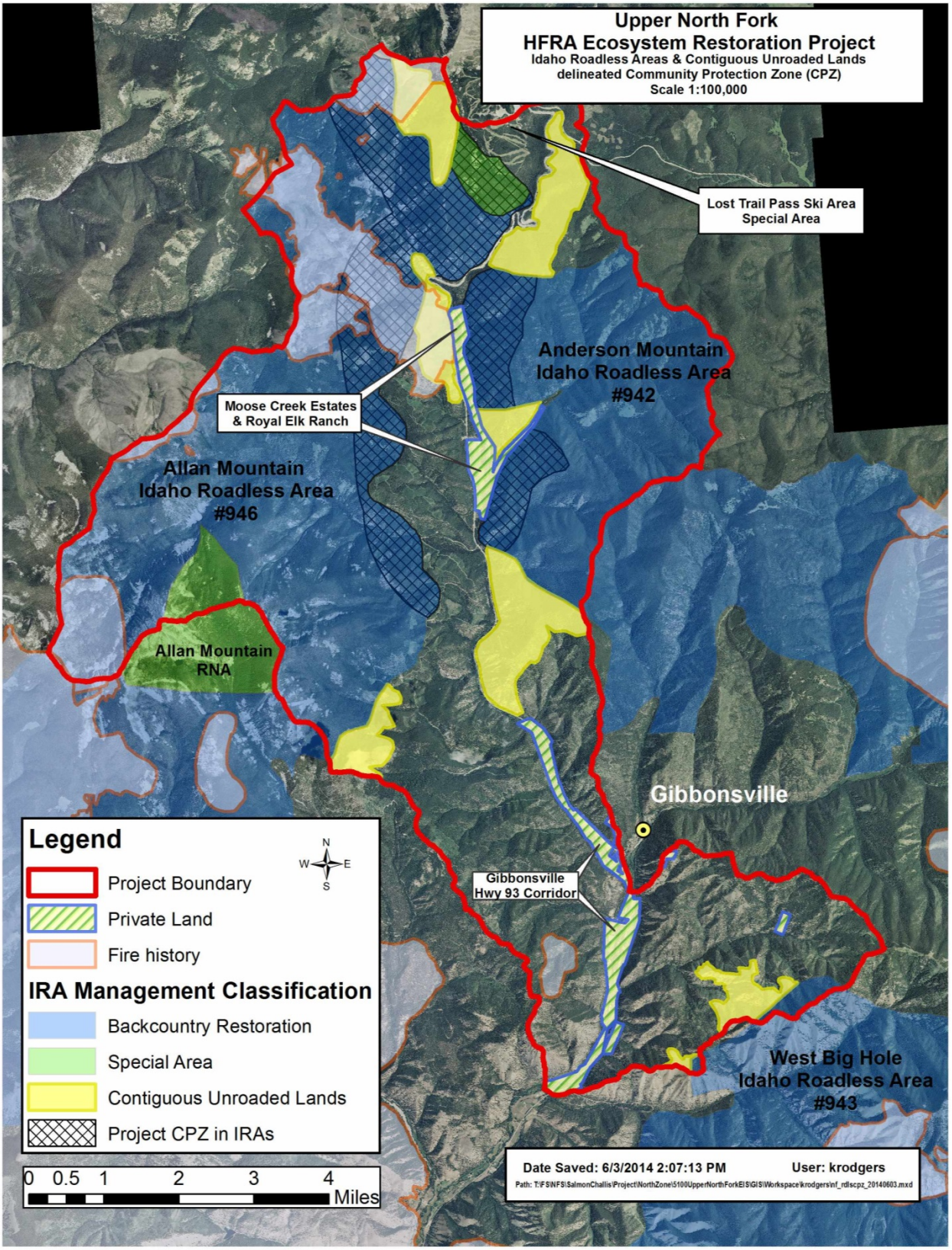
Condition class 1 – Little departure from the natural fire regime and natural range of variability; risk of losing key ecosystem components is low;
Condition class 2 – Moderately departed from the natural fire regime and natural range of variability; risk of losing key ecosystem components is moderate;
Condition Class 3 – Highly departed from the natural fire regime and natural range of variability; risk of losing key ecosystem components is high.

Step 6. Map the CPZ from the boundary of the at-risk community.

1. Map the area extending ½ mile from the boundary of the at-risk community (call this the ½ mile boundary)
2. From the ½ mile boundary out to one additional mile:
    a. Map sustained steep slopes.
    b. Map lands in condition class 3.
    c. Map geographic features that aid in creating an effective fuel break, such as a road or ridge top.

The areas mapped as described above become the community protection zone.

For the Upper North Fork project, both the Moose Creek Estates and the Lost Trail Ski Area (within Idaho) will have the full 1.5 mile community protection zone area, because all the lands within the outer mile meet one or two of the above criteria. At a minimum all of the area is at least condition class 2.


Upper North Fork
HFRA Ecosystem Restoration Project
Idaho Roadless Areas & Contiguous Unroaded Lands
delineated Community Protection Zone (CPZ)
Scale 1:100,000
Lost Trail Pass Ski Area
Special Area
Anderson Mountain
Idaho Roadless Area
#942
Moose Creek Estates
& Royal Elk Ranch
Allan Mountain
Idaho Roadless Area
#946
Allan Mountain
RNA
Gibbonsville
Gibbonsville
Hwy 93 Corridor
West Big Hole
Idaho Roadless Area
#943
Legend
Project Boundary
Private Land
Fire history
IRA Management Classification
Backcountry Restoration
Special Area
Contiguous Unroaded Lands
Project CPZ in IRAs
N
W
E
S
0 0.5 1 2 3 4
Miles
Date Saved: 6/3/2014 2:07:13 PM
User: krodgers

Appendix E – Treatments by Unit

Table 110. Alternative 1 Treatments by unit

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
1	2502.9	burn unit	Yes			BB	None	None	N/A	1.1	1	None	None	None	
2	5657.3	burn unit	Yes			BB	None	None	N/A	1	2	None	None	None	
3	5450.8	burn unit	Yes			BB	None	None	N/A	0.5	3	None	None	None	
4	3556.6	burn unit	Yes			BB	None	None	N/A	1	4	None	None	None	
5	2617.3	burn unit	Yes			BB	None	None	N/A	1	5	None	None	None	
6	1136.3	burn unit	Yes			BB	None	None	N/A	1	6	None	None	None	
7	2549.7	burn unit	Yes			BB	None	None	N/A	0.5	7	None	None	None	
8	1660.7	burn unit	Yes			BB	None	None	N/A	2.5	8	None	None	None	
9	2420.5	burn unit	Yes			BB	None	None	N/A	3	9	None	None	None	
10	1938.4	burn unit	Yes			BB	None	None	N/A	2	10	None	None	None	
11	1615.9	burn unit	Yes			BB	None	None	N/A	2	11	None	None	None	
12	1337.4	burn unit	Yes			BB	None	None	N/A	1.5	12	None	None	None	
13	2991.9	burn unit	Yes			BB	None	None	N/A	1.2	13	None	None	None	
14	1940.2	burn unit	Yes			BB	None	None	N/A	1	14	None	None	None	
15	2457.3	burn unit	Yes			BB	None	None	N/A	0.5	15	None	None	None	
16	344.9	shaded fuel break				Thin commercial acres	NC and Pile	Pile RX	W.T.Y commercial acres	None	1			Temp Road, 0.79, #15	Snotel Sites
17a	16.9	shaded fuel break				Cut and HP	Pile RX	None	N/A	None	15			None	
17b	5.4	shaded fuel break				Thin commercial acres	NC and Pile	Pile RX	W.T.Y commercial acres	None	15			None	
17c	70.0	shaded fuel break				Tractor ground in Moose Crk outside RHCA could be CT. Pierce Crk NC and pile.	NC and pile in CT	Pile RX	W.T.Y commercial acres	None	15			None	
17d	51.0	shaded fuel break				Helicopter outside of RHCA	NC and Pile	Pile RX	W.T.Y	None	13			None	
18	27.8	meadow				Handfall, Girdle	BB	None	Lop&Scat	0	14			None	

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
									ter						
19	9.5	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
20	11.9	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
21	118.6	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
22	31.8	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
23	150.0	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
24	210.0	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
25	68.3	meadow	Y	0.4	12	Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
26	3.1	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
27	3.1	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
28	3.7	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	14			None	
29	135.8	meadow	Y	1.0	21	Handfall, Girdle	BB	None	Lop&Scat ter	0	13			None	
30	187.8	meadow	Y	14.7	33	Cut & HP	Pile RX	BB	Lop&Scat ter	0	13			None	
31	62.4	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	13			None	
32	151.3	meadow	Y	2.1	33	Cut & HP	Pile RX	BB	Lop&Scat ter	0	12			None	
33	36.8	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	4			None	
34	44.1	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	3			None	
35	107.5	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	1	1			Temp Road, 1.03, #16	
36	78.1	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	1.2	15			None	Existing Temp Road being used. Constructing Road in Lynx Habitat (Cindy)
38a	6.6	tractor				CT w/ possible NC	Pile RX	None	W.T.Y	0	15			None	

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
38b	29.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	15			Temp Road, 0.47, #37	Constructing Road in Lynx habitat (Cindy verifying if OK)
39	27.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.9	15			Temp Road, 0.47, #37	Constructing Road in Lynx habitat (Cindy verifying if OK)
40	47.0	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	15			None	
41a	5.9	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.1	14			None	U272113A to be decommissioned after use
41b	28.7	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	14			None	U272113A to be decommissioned after use
42	17.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0	14			None	U272113A to be decommissioned after use
43a	17.7	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	14			None	
43b	10.6	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	14			None	
43c	15.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	14			None	
44	15.5	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	11			Temp Road, 0.74, #3	
45a	23.9	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.1	14			None	
46	82.6	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	11			None	
47a	22.3	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	11			Temp Road, 0.74, #3	
47b	8.0	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	11			None	
47c	6.6	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	11			None	
49	20.5	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	11			None	U262114F to be decommissioned after use

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
50a	121.1	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	1.1	11			None	Include Commercial acres from adjacent fuel break unit 227
50b	61.2	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	11			None	
50c	194.0	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	1.2	12			None	Include Commercial acres from adjacent fuel break unit 227
51	23.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	11			None	U262123D to be decommissioned after use
54	33.9	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	11			None	U262123B to be decommissioned
56	47.6	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.7	10			None	
68	21.7	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.1	9			None	
70	145.2	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	2.6	9			None	
71a	49.6	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	1.6	10			None	
71b	16.2	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	10			None	
71c	38.6	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	1.3	10			None	
73	24.4	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	8			None	
74	55.1	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	1.2	8			Existing Level 1	
76	21.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	8			Existing Level 1	
77	10.0	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	8			Temp Road, 0.49, #2	
78	10.6	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	8			None	U262134E to be decommissioned after use

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
79	17.6	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	8			None	U262135B to be decommissioned after use
80	13.6	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	8			None	U262134E to be decommissioned after use
81	17.0	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.1	8			None	U262134E to be decommissioned after use
83	24.5	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	8			None	U262134E to be decommissioned after use
85	148.3	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	7			None	Existing Level 1 Roads
86	55.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	1.1	7			None	U262135F to be decommissioned after use
87	23.6	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	7			None	U262135D and U262126A to be decommissioned after use
88	181.8	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.1	7			None	U262127AA/J/Z/Y/W/U/R/V to be decommissioned after use
89	21.4	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	7			None	U262127Z to be decommissioned after use
92	25.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	7			None	U262128A and U262127D to be decommissioned after use
93	52.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	1.2	7			Temp Road, 0.35, #32	U262128A/E to be decommissioned after use

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
94	57.8	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	7			Temp Road, 0.25, #31	U262127D and U262128Ato be decommissioned after use
95	21.4	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	1	6			Temp Road, 1.13, #9 and Temp Road, 0.56, #8	Existing Level 1 Roads
96	22.5	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	1.1	6			Temp Road, 1.13, #9 and Temp Road, 0.56, #8	Existing Level 1 Roads
97	22.7	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	1	6			Temp Road, 1.13, #9 and Temp Road, 0.56, #9	Existing Level 1 Roads
98	66.4	tractor	Yes			CT w/ possible NC	Pile RX	BB	W.T.Y	1.8	5			Temp Road, 0.79, #1	U262122E to be decommissioned after use
100	16.1	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	5			New Temp, 0.75, #1	
101	35.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	5			New Temp, 0.75, #1	
102	30.3	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	5			New Temp, 0.21, #7	
103	22.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	6			New Temp, 0.56, #8	
104	11.7	pct				Thin, Prune, HP	Pile RX	None	N/A	None	6			None	
105	10.0	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	5			None	
106	6.5	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	5			None	
107	15.7	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	5			None	Unauthorized routes U262116A, U262116B, U262116C, if used then decommission.
110a	26.5	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	5			None	Level 1 Road
110b	11.1	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	5			None	Level 1 Road

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
111	34.3	pct				Thin, Prune, HP	Pile RX	None	N/A	None	4			None	
112	76.7	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	4			None	Level 1 Road, Decommissioned after use U262010A
113	36.5	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	4			None	Long skid distance?
114	7.7	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	4			None	
116b	37.9	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	3			None	Find a way to obliterate user-created ATV trail post-logging. Decommission U262104F post treatment.
117	22.5	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
118a	15.9	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	3			None	Level 1 Road
118b	39.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	3			None	Level 1 Roads
118c	28.0	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	3			None	Level 1 Roads
118d	22.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	3			None	Level 1 Roads
118e	7.0	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	3			None	Level 1 Roads
120	17.1	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	3			None	Level 1 Road
121	26.9	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	2			None	Find a way to obliterate user-created ATV trail post-logging.
122	27.0	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	2			Temp Rd, 0.67, #10	Level 1 Road
123	27.2	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.9	2			Temp Rd, 0.67, #10	
124	28.6	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	2			Temp Rd, 0.67, #11	
125a	8.4	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	2			None	On Highway will require traffic control
125b	10.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	2			None	On Highway will require traffic control

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
125c	7.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	2			None	On Highway will require traffic control
125d	20.9	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	2			None	On Highway will require traffic control
125e	14.7	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	2			None	On Highway will require traffic control, Obliterate use-created ATV trails post-logging
126	83.4	helicopter				CT w/ possible NC	BB	None	W.T.Y	1	2			None	Level 1 Road
127	60.8	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	2			None	Level 1 Road
133	21.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	2			None	Level 1 Road, Decommissioned after use 60157B
134	2.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	14			None	
138	15.5	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	1			None	
139	18.9	meadow				Handfall, Girdle	BB	None	Lop&Scat ter	0	1			None	
140	16.3	pct	Y	16.2	14	Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
141	9.6	pct	Y	0.0	14	Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
142	28.6	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
144	2.6	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
145	8.0	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
146	10.3	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
147	10.5	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
148	8.2	pct	Y	1.4	29	Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
149	11.8	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
150	10.5	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
151	5.4	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
152	9.6	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
153	12.0	pct				Thin, Prune, HP	Pile RX	None	N/A	None	3			None	
154	6.8	pct	Y	2.2	41	Thin, Prune, HP	Pile RX	None	N/A	None	4			None	
155	14.7	pct				Thin, Prune, HP	Pile RX	None	N/A	None	4			None	
159	9.8	pct				Thin, Prune, HP	Pile RX	None	N/A	None	5			None	
160	29.8	pct				Thin, Prune, HP	Pile RX	None	N/A	None	7			None	U262127F Needs to be Decommissioned
161	59.9	pct	Y	1.0	81	Thin, Prune, HP	Pile RX	None	N/A	None	7			None	U262127M, U262127A, U262127C, Need to be Decommissioned
162	28.7	pct				Thin, Prune, HP	Pile RX	None	N/A	None	7			None	
163	5.7	pct				Thin, Prune, HP	Pile RX	None	N/A	None	7			None	
164	5.8	pct				Thin, Prune, HP	Pile RX	None	N/A	None	7			None	
165	6.3	pct				Thin, Prune, HP	Pile RX	None	N/A	None	7			None	
167	19.0	pct				Thin, Prune, HP	Pile RX	None	N/A	None	7			None	U262127A to be Decommissioned
168	32.4	pct				Thin, Prune, HP	Pile RX	None	N/A	None	7			None	U262127A to be Decommissioned
169	35.8	pct				Thin, Prune, HP	Pile RX	None	N/A	None	7			None	U262128G to be decommissioned
170	65.4	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	U262232C and U262232A to be decommissioned
171	59.3	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	
172	24.3	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	U252205A/B/F to be decommissioned
173	13.9	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	U252205G to be decommissioned
174	7.1	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	U252205C to be decommissioned

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
175	27.6	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	U252205C to be decommissioned
176	24.5	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	
177	9.2	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	
178	7.9	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	
179	18.3	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	
180	13.9	pct	Y	1.3	142	Thin, Prune, HP	Pile RX	None	N/A	None	9			None	U252207D to be decommissioned
181	95.7	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	U252112H, U252207C to be decommissioned
182	15.9	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	U252101A to be decommissioned
183	100.3	pct	Y	0.7	132, 144, 149	Thin, Prune, HP	Pile RX	None	N/A	None	9			None	U252112A/B/C/E/F/G to be decommissioned
184	56.8	skyline				CT	Landing Pile RX	None	W.T.Y	None	1			Temp Road, 1.03, #16 and .27, #17	
185	32.5	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	1	7			Temp Road, 0.47, #35	U262123I to be decommissioned
186	18.6	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	6			Temp Road, 1.13, #9	
187	19.4	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	3			None	Level 1 Road
189	19.2	pct				Thin, Prune, HP	Pile RX	None	N/A	None	9			None	
190	20.1	pct				Thin, Prune, HP	Pile RX	BB	N/A	None	8			None	U252102A to be decommissioned
191	18.2	pct				Thin, Prune, HP	Pile RX	BB	N/A	None	8			None	
192	34.5	pct				Thin, Prune, HP	Pile RX	BB	N/A	None	8			None	Level 1 Road
193	19.4	pct				Thin, Prune, HP	Pile RX	BB	N/A	None	6			None	
194	60.8	pct				Thin, Prune, HP	Pile RX	BB	N/A	None	5			None	
195	40.9	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	5			None	

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
196	23.8	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	7			None	U262127E to be decommissioned
197	12.6	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	7			None	U262127F Needs to be Decommissioned
199	3.6	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	7			None	
200	32.1	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	7			None	U262135D, U262126A Needs to be Decommissioned
201	18.2	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.1	7			None	U262135D Needs to be decommissioned
202	37.0	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	7			None	
203	8.7	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.1	7			None	
204	9.4	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	8			Temp Road, 0.1, #6	
205	61.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	8			None	U262134E to be decommissioned after use
206	2.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.1	8			None	
207	34.9	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	8			None	
208	12.2	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	8			Temp Road, 0.28, #23	U262135L to be decommissioned
209	6.9	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	8			None	
210	14.1	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	8			Temp Road, 0.13, #24	
211	36.1	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	8			None	U252102A to be decommissioned
212	12.6	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	8			None	
213	18.3	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	15			Temp Road, 4.14, #11	
214	62.6	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	15			Temp Road, 4.14, #11 and 0.12, #5	
215	7.1	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	15			Temp Road, 4.14, #11	

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
216	72.8	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.7	15			Temp Road, 4.14, #11 and 0.12, #14	
217	60.0	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	15			Temp Road, 4.14, #11	
218	52.6	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	15			Temp Road, 4.14, #11 and 0.1, #12	
219	12.5	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	15			Temp Road, 4.14, #11	
220	19.0	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	15			None	
221	22.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.9	15			Temp Road, 4.14, #11	
222	28.1	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	15			Temp Road, 0.22, #13	
224	41.1	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	0.8	15			none	
225	335.0	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	3.5	13			None	
226	140.2	shaded fuel break	Y	15.6	86,95	Cut and HP	Pile RX	None	N/A	0	7,8			None	U262134A and U262134G to be decommissioned
227	80.1	shaded fuel break	Y	0.5	33	Thin commercial acres	Pile RX	None	N/A	0	12,13			None	
228	81.9	shaded fuel break				Cut and HP	Pile RX	None	N/A	0	3,4			None	
229	56.1	shaded fuel break				Cut and HP	Pile RX	None	N/A	0	7			None	U262136B and U262135G Decommission after use
230	14.4	shaded fuel break				Cut and HP	Pile RX	None	N/A	0	7			None	
231	148.4	shaded fuel break				Cut and HP	Pile RX	None	N/A	0	5,7			None	U262221B and U262123I Decommission after use
232	25.1	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.6	15			None	
233	59.0	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	15			Temp Road, 0.88, #4	

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
234	12.2	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	11			Temp Road, 1.20, #3	
235	19.1	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	11			Temp Road, 1.20, #3	
236	68.9	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.2	11			Temp Road, 1.20, #3	
237	34.2	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	11			None	
238	15.7	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.5	11			None	
239	55.3	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	1	11			None	
240	33.5	skyline				CT w/ possible NC	Pile RX	BB	W.T.Y	0.3	11			None	
241	8.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	11			None	
242	11.3	tractor				CT w/ possible NC	Pile RX	BB	W.T.Y	0.4	11			None	
243	4.8	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.2	10			None	
244	22.4	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.6	10			None	U252206E to be decommissioned
245	22.6	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	1	10			None	U252206B to be decommissioned
246	9.5	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.6	10			None	
247	7.3	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.4	10			None	
248	9.6	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.5	10			None	U252206F to be decommissioned

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
249	8.5	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.5	10			None	U252206F to be decommissioned
250	9.5	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.7	10			None	U252206F to be decommissioned
251	39.7	helicopter				CT w/ possible NC	Pile RX	BB	W.T.Y	0.9	10			None	
252	6.0	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.1	10			None	U262231B to be decomissioned
253	3.2	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.2	10			None	
254	22.9	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0	10			None	
255	17.2	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.5	10			None	U252206F, U252206B to be decommissioned
256	18.9	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.3	10			None	U252206F, U252206B to be decommissioned
257	22.1	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.1	10			None	U252206C to be decommissioned
258	13.6	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.1	10			None	U252206D to be decommissioned
259	23.4	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.2	10			None	U252206F, U252206B to be decommissioned

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
260	40.3	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.1	10			None	U252206F to be decommissioned
261	14.1	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.3	10			None	U262232D, U262231B to be decommissioned
262	11.0	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.2	10			None	
263	10.9	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.1	10			None	
264	4.8	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.2	10			None	
265	2.6	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.2	10			None	
266	4.3	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.2	10			None	
267	10.8	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.3	10			None	
268	7.4	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.3	10			None	
269	7.3	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.4	10			None	

Unit number	Acres	Treatment	Old growth y/n	Acres of old growth	Old growth id(s)	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Burn unit #	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
270	33.6	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.1	10			None	U262232C to be decommissioned
271	7.5	non-commercial fuels treatment				BB	NC Thin, Lop&Scatter	None	N/A	0.2	10			None	U262232C to be decommissioned
272	7.6	pct				Thin, Prune, HP	Pile RX	None	N/A	None	10			None	
273	22.0	pct				Thin, Prune, HP	Pile RX	None	N/A	None	10			None	U262231C to be decomissioned
274	14.5	pct				Thin, Prune, HP	Pile RX	None	N/A	None	10			None	
275	33.9	pct				Thin, Prune, HP	Pile RX	None	N/A	None	10			None	
276	69.8	pct				Thin, Prune, HP	Pile RX	None	N/A	None	10			None	U262232A to be decommissioned

Table 111. Alternative 2 treatments by unit

Unit number	Acres	Treatment	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
16	405.0	shaded fuel break	NC thin & pile	Pile Rx	None	None	none			none	
44	15.5	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
47a	10.2	skyline	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
47d	12.2	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
77	10.0	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
95	21.4	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
96	22.5	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	

Unit number	Acres	Treatment	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
97	22.7	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
98	55.2	tractor	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
100	16.1	helicopter	CT w/ possible NC	BB	None	W.T.Y	0.6			none	
101	46.6	helicopter	CT w/ possible NC	BB	None	W.T.Y	0.7			none	
102	30.3	helicopter	CT w/ possible NC	BB	None	W.T.Y	0.9			none	
103	22.3	tractor	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.7	forwarder		none	
122a	14.1	skyline	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.2			none	
122b	12.9	helicopter	CT w/ possible NC	BB	None	W.T.Y	0.6			none	
123	27.2	helicopter	CT w/ possible NC	BB	None	W.T.Y	0.9			none	
124a	5.7	tractor	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.3			level 1 road	
124b	22.9	helicopter	CT w/ possible NC	BB	None	W.T.Y	0.5			none	
184	104.2	helicopter	CT	Landing Pile RX	None	W.T.Y	none			none	
185	32.5	tractor	CT w/ possible NC	Pile Rx	BB	W.T.Y	1	Increased		none	Forwarder, long skid distances, more slash in unit
186	18.6	helicopter	CT w/ possible NC	Pile Rx	BB		same			none	
204	6.3	skyline	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
208	12.2	shaded fuel break	NC thin & pile	Pile Rx	None	None	none			none	
210a	7.5	skyline	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.2			none	
210b	6.7	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.2			none	
213	18.3	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.7			none	
214	62.6	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.7			none	
215	7.1	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.5			none	
216	72.8	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.7			none	
217	60.0	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.8			none	

Unit number	Acres	Treatment	1st entry	2nd entry	3rd entry	Slash treatment	Fireline needs (miles)	Skid trail (miles)	Landings (#/acres)	Transportation needs (type,miles, #)	Notes
218	52.6	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.3			none	
219	12.5	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.5			none	
221	22.2	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.9			none	
222	28.1	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	0.5			none	
226	143.3	shaded fuel break	Cut and HP	Pile Rx	None	None	none			none	
233	59.0	tractor	CT w/ possible NC	Pile Rx	BB	W.T.Y	same	Increased		none	Forwarder, long skid distances, more slash in unit
234	12.2	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
235	19.1	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	
236	68.9	helicopter	CT w/ possible NC	Pile Rx	BB	W.T.Y	same			none	

Appendix F – Response to Comments

Public Comments Submitted on the DEIS Upper North Fork HFRA Project

	Commenter	Date the Comment was Received
1	Jay Davis - Lemhi County Roads	03/24/2014
2	Jay Davis	03/24/2014
3	Steve Flynn - Sun Mountain Lumber	04/07/2014
4	Janice Richardson	04/09/2014
5	Doug Carlson	04/10/2014
6	Bruce Barnes	04/15/2014
7	Milt & Sue Usher	04/20/2014
8	Jerry Jayne	04/21/2014
9	Paul Edstrom	04/26/2014
10	Bob Cope - Lemhi County Commissioners	04/26/2014
11	Donald Smith	04/26/2014
12	Will Wyland	04/26/2014
13	J.C Rye	04/28/2014
14	Clifford Shaw	04/29/2014
15	William & Janet Gibbs	05/01/2014
16	Allison O'Brien - Dept. of Interior	05/02/2014
17	Jim Fazio - Governor's Lewis & Clark Trail Committee	05/02/2014
18	Paul Stokes	05/05/2014
19	Dyrk Krueger - EFM Inc	05/05/2014
20	Christine Reichgott - EPA, Region 10	05/05/2014
21	Buck Ryan - Snake River Waterkeeper	05/09/2014
22	Bob Wilson - Moose Creek Estates	05/16/2014
23	John Goodman - Moose Creek Estates	05/16/2014
24	Greg Behm	05/18/2014
25	Louise Wagonecht	05/18/2014
26	Tom Curet - Idaho Dept. Fish & Game	05/19/2014
27	Michelle Tucker - Lemhi County Forest Restoration Group	05/19/2014
28	John Robison - Idaho Conservation League	05/19/2014
29	Idaho Dept of Parks & Recreation	5/20/2014

Jay Davis – 03/24/2014

Comment Number	Comment
1	What is the reason for closing roads?
Response:	These decisions were made under the 2009 Travel Plan. The justifications for the closures are found within the Travel Plan Document. The exception is #449 which has a section proposed for closure in Alternative 2 because of recurring slides.
2	What happens when a fire breaks out in the area in the future and these roads are no longer in place?
Response:	These decisions were made under the 2009 Travel Plan and the fire resources in the area will make case-by-case decisions on how best to suppress fires in different locations.
3	Where is the money coming from to decommission these roads?
Response:	The funding will come from a variety of sources. The cost of the decommissioning will vary road by road because each road will be decommissioned differently. Some will come from the Forest's annual budgets and some will come from other funding sources such as special Regional Forest Service funding. Some will be closed under Timber Sale or Stewardship contracts.

Jay Davis – County Roads – 03/24/2014

Comment Number	Comment
1	I'd like to know if these roads were identified in the 2009 travel plan inventory and gone through the analysis by that team?
Response:	All of the roads in both Action Alternatives, with the exception of road #449 were identified in the 2009 Travel plan. A section of #449 is proposed for closure under Alternative 2 because of recurring slides.
2	What is the reason for closing these roads?
Response:	The reason for the closure of each individual road was made and documented in the Travel Plan and those reasons can be found in that document.
3	Has your fire team made comment on these roads and what was there comment as far as fire suppression?
Response:	No, they have not commented on the closures during this project's comment period but they had input during the Travel Plan process. All of our local fire resources are aware of the road designations that were made by the Travel Plan.

Sun Mountain Lumber (Steve Flynn) – 04/07/2014

Comment Number	Comment
1	Alt 1, with some changes has our support.
Response:	Thank you for your comment.
2	We are concerned about the economic viability of the project. It is important for the FS to realize that the nearest processing facility of any size, our facility in Deer Lodge, is nearly 140 miles from Gibbonsville and the next nearest facility is 160 miles away. Transportation costs alone are very high, the addition of helicopter logging makes this project very difficult to pencil. Nearly 50% of the harvest proposal requires helicopter or skyline operations – the 2 most expensive harvest operations. Any volume that can be converted to skyline from helicopter will reduce the cost of operations on that volume (by my estimates) by around $40 per ton.
Response:	Thank you for your comment. The Forest Service understands the economic implications of helicopter logging compared to skyline and has made every effort to make as many acres skyline as opposed to helicopter as possible. The units that are designated as helicopter have been included in the analysis despite their economic challenges because the treatment of those acres is considered necessary in order to meet the hazardous fuels reduction portion of the purpose and need of the project.
3	I have done some map-work on possible additional road locations that would convert most of the helicopter harvest areas into skyline. These locations, of course, would have to be verified on the ground but it appears that an additional five miles or less of road construction would accomplish this. Please consider the following additional road locations: Unit 251: Extend road planned for de-commissioning into top of unit. Unit 50 A &B: Extend mid-slope road between units 236 & 237 into the upper area of units 50a & b and build road from the switchback in unit 237 into 50b. Unit 224: Extend road that ends at the edge of this unit Unit 126: Open existing road through this unit- some of this may be tractor ground. Unit 50c: locate road from existing road below the ridge on the north side.
Response:	Thank you for your suggestions. Converting more helicopter acres to skyline would be ideal, however without re-scoping for public comment we cannot make a change such as adding 5 additional miles of temporary road. Especially given the controversial nature of road building.

Janice Richardson – 04/09/2014

Comment Number	Comment
1	Would like to be notified when prescribed burns are planned.
Response:	Thank you for your response Janice. We will continue to include you on our prescribed burn notification list and give you advanced notice of upcoming burns.

Doug Carlson – 04/10/2013

Comment Number	Comment
1	Open existing but un-classified FS roads before a project starts and allow the public access with firewood permits to clear out some dead material and then close it back up after the project.
Response:	While it may be possible to open unauthorized routes for temporary purposes, the use of such routes needs to be warranted by a pressing need for additional resource management or emergency access. In general, while providing a small public benefit, the cost of opening and closing roads likely exceeds the benefit to the public. Many roads will be decommissioned through the application of short entrance treatments that do not require removing established vegetation and the process of opening and then closing roads with added vegetation establishment needs adds substantial cost. Firewood gathering as a whole is not particularly effective in treating fuels because of the limited removal based on choices made by firewood gatherers.

Milt & Sue Usher – 04/20/2014

Comment Number	Comment
1	Living adjacent to the SCNF and watching it burn every year I totally support and initiative that reduces the fuel load for future fires
Response:	Thank you for your comment.
2	I cannot support an agenda totally unrelated to fuels reduction or any other perceivable facet of legitimate “ecosystem restoration”.
Response:	Thank you for your comment.
3	My primary concern with the UNF HFRA Ecosystem restoration project is the CLOSURE and subsequent decommissioning of Forest Road (Old #449) between Hammarrean Creek and Johnson Creek.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).
4	Closure of the short stretch of road effectively isolates the Twin Creek area and severely limits access to a huge part of the Forest.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).
5	This short stretch of roads is not marked as part of the planned decommissioning on the official website maps. But the Forest Service in their Gibbonsville public meeting that this would be one of the “decommissioned roads” even though it is now open to all vehicle traffic.
Response:	Alternative 2 includes closing a portion of the Hammerean Loop Road. The road would be closed to all motorized use at the existing rock slide and turnarounds established (See Chapter 2, page 17).

Comment Number	Comment
6	The Forest Service Plan as well as the recent Travel Plan fails to consider the intent of the American with Disabilities Act (ADA).
Response:	The Travel Plan did consider the ADA. While ADA is often cited as a reason for more motorized access, there is no statutory requirement to provide additional motorized access on forest roads for a specific group. Where pedestrian access is allowed or encouraged, restrictive devices should allow wheelchairs and other assistive devices to pass. Travel management is not within the the scope of this project and the project makes no decisions that would alter current access for either motorized or non-motorized access with one exception.
7	The closure of this road greatly restricts recreational users from enjoying the Forest Road system.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).
8	Closure of this road isolates the Twin Creeks campground (the only one in that whole part of the Forest) from hundreds of miles of Forest Access.
Response:	Thank you for your comment regarding the Hammerean Loop Road. Closure of a section of the Hammerean Loop Road would not limit access to the Twin Creeks Campground.
9	It's impossible to justify the EIS's statement that the effects on recreation would be "short term" and indirect.
Response:	Thank you, what you say is true as it relates to the proposed closure of a segment of FS #449 in Alternative 2. We have edited this in the Recreation section and as Alternative 1 is the preferred Alternative the effects from Alt 1 will be short term and indirect.
10	We agree that Fuels reduction can be an important fire prevention action however that should not necessitate closing roads which might be helpful in accessing the area in case of fire.
Response:	Fuels reduction doesn't necessitate closing roads. The proposed road closures are already designated as closed in the travel plan. In most cases they are grown over and would require substantial work for use.
11	The Forest road #449 is apparently set to be closed they said decommissioned, how is different than closed?
Response:	Decommissioning is intended to restore impacted land to resource production, and includes reestablishing permanent vegetative cover. Closure is a treatment designed to minimize resource impacts and maintenance expenditures during periods of non-use, while retaining the road prism and constructed features for future management activities. Road #449 would not be either closed or decommissioned in its entirety, only a short section that passes through an active land slide area is being considered for closure or decommissioning. Access to either side of the slide area would be retained but the road would not provide a complete loop between Twin Creek and Votler Creek.
12	This road is important to the public for Recreation, gathering firewood, hunting, etc. And could possibly in a major failure of Hwy 93 North, parallel to 449, be an emergency evacuation route.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228). Due to the current slide area, the Hammerean Road Loop would not be a suitable emergency evacuation route.
13	Not one person we know unrelated to this project has said yes to closing this road, number 449 in particular and all others in general.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).

Jerry Jayne – 04/21/2014

Comment Number	Comment
1	I don't think we should be building roads, even temporary ones in roadless areas such as the 2 mile road proposed in the Anderson Mountain roadless area. That goes for any other activity that degrades the given roadless areas wilderness characteristics or reduces its potential for possible future statutory wilderness designation.
Response:	Under the Idaho Roadless Rule areas with a Backcountry/Restoration management classification, timber cutting, sale and removal, and temporary road construction are permissible under certain conditions (36 CFR 294 Part C, §294.23(b)(2) and 294.24 (c)). The action alternatives conform to the conditions outlined in the Idaho Roadless Rule for these permissions. Fuels reduction and temporary road construction activities proposed inside these Idaho Roadless Areas (IRAs) would occur adjacent to private lands, existing highways, and areas with Forest system roads and active management. Neither action alternative would reduce the existing capability of these IRAs to be suitable for wilderness consideration. (See Chapter 3, FEIS, Roadless and Unroaded Areas; Specialist Report for Roadless and Unroaded Lands Analysis in the project record).
2	The proposed forest plan amendment to allow lightning caused fires to burn if not threatening property sounds good; I think it's what the FS should be doing in all roadless areas.
Response:	Thank you for your comment.
3	…explain the reason for fire suppression in the Allen Mountain RNA.
Response:	The Allen Mountain RNA was created due to the fact subalpine larch exists in that specific area. It is lowest stand (latitudinal) of subalpine larch in the lower 48. That species of tree is highly susceptible to fire mortality. Forest plan direction calls for fire suppression in that RNA to protect that unique circumstance.
4	I also question the Forest Plan amendment to allow reducing the width of certain RHCAs, where timber harvest is not allowed. I question the statement on page 142 in the DEIS that says that "there would be no change in sediment risk from modifying RHCA buffers in the listed 11 units."
Response:	Harvest units were designed so that standard PACFISH buffers were excluded from the treatment units with the exception of units where a road prism in combination with the Forest Plan filter strip would intercept overland flow before it reached a stream channel. Water Erosion Prediction Project (WEPP) modeling of these 11 units supports that the majority of sediment transported from a treated slope and road prism cutslope would be deposited on the road surface and that the forested filter strips are effective in capturing any additional sediment leaving the road prism.
5	How would this project be financed?
Response:	Planning and implementation of the Upper North Fork HFRA Ecosystem Restoration Project would be financed with federally appropriated funding as it becomes available each fiscal year. There is also a possibility that a stewardship contract could be utilized in the future to fund restoration work utilizing proceeds from timber harvest.
6	Is some of the funding coming from provisions in the farm bill?
Response:	No.

Don Smith – 04/26/2014

Comment Number	Comment
1	The Hammerrean Loop Road, old road #449. This road should remain open all the way to the Twin Creeks campground. This road provides riding opportunities for 4-wheelers and snowmobilers from the campground without having to travel Hwy 93.
Response:	Thank you for your comment regarding the Hammerean Loop Road. Closure of a section of the Hammerean Loop Road would not limit access to the Twin Creeks Campground. The proposal to close a section of the Hammerean Loop Road is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).
2	This road could be used to route emergency traffic around any closures of Hwy 93 between Twin Creek and Gibbonsville.
Response:	Thank you for your comment regarding the Hammerean Loop Road. Due to the current slide area, the Hammerean Road Loop would not be a suitable emergency evacuation route.
3	All references to this road closure seem to be a late addition to this EIS.
Response:	The closure has been proposed for as long as there has been a 2nd Action Alternative. The 2nd Action Alternative was developed after the public scoping period in August, 2012.
4	Road #078A, Cyanide Gulch Road should be re-again locked during the hunting season and left open during the rest of the year.
Response:	This is a Travel Plan issue and outside the scope of the project which focuses on fuels and vegetative management.
5	Most of these closed roads shown in either alternative are closed and re-vegetated and should be left alone. Money should not be spent on these already closed roads.
Response:	Appendix A Design Criteria #121: …"If the roads identified for decommissioning are well vegetated and closed to traffic, a less ground disturbing method of decommissioning will be used that only treats the beginning of the road so as not to encourage unwanted motorized use."
6	I am not against removing the dead or dying timber and if work roads or new roads are added to the landscape close them out.
Response:	Thank you for your comment.

Lemhi County Commissioners (Robert Cope) – 04/26/2014

Comment Number	Comment
1	Lemhi County fully recognizes the need for fuels reduction across the County's landscape.
Response:	Thank you for your comment.
2	We further recognize the lack of appropriated funds to conduct fuels reduction projects. We therefore recommend that whenever and wherever possible, timber sales and/or stewardship contracts be developed that allow the needed work to pave its own way.
Response:	We intend to pursue opportunities for stewardship and for timber sale contracts whenever possible.

Comment Number	Comment
3	In areas where analysis of skyline or traditional logging methods has been done, we recommend that the option of surface logging remain open.
Response:	The ground based vs. skyline logging systems were determined based upon road access and slope conditions.
4	We believe that access to the national forest is essential for firefighting, veg management and the provision of emergency services.
Response:	This belief is aligned with the SNCF Forest Plan and multiple use objectives.
5	At least one road is scheduled for decommissioning simply because it exists in an IRA. It should be noted that the road existed at the time that the roadless areas were designated and has continued to exist in such an area for the last 35 years.
Response:	The road you refer to is not designated as a system route in the Travel Plan.
6	Since the Idaho Roadless rule does not prohibit pre-existing roads in areas with a backcountry or restoration theme, we see no reason to decommission such roads.
Response:	The Idaho Roadless Rule does not prohibit the (pre-) existing road mentioned in this comment (36 CFR 294 Part C, § 294.26 (a)). This route was not designated as a system route (open road for motorized use) in the Forest's Travel Plan, so this project presented an opportunity for decommissioning along with other unauthorized routes for ecosystem restoration activities. The Idaho Roadless Rule recognized that decisions concerning the future management of existing roads or trails in Idaho Roadless Areas should be made during the applicable travel management process.
7	For those roads that are to be decommissioned we strongly urge that these roads be closed without obliteration.
Response:	Appendix A Design Criteria #121 Activities associated with decommissioning non-system roads and closed system roads may include decommissioning roads by recontouring road templates and stabilizing with native vegetation (seeding). If the roads identified for decommissioning are well vegetated and closed to traffic, a less ground disturbing method of decommissioning will be used that only treats the beginning of the road so as not to encourage unwanted motorized use.
8	Allowing connectivity of trails to allow motorized use of loop trails is far preferable to creating dead end trails through points of closure.
Response:	Thank you for your comment regarding what is assumed to be the Hammerean Loop Road. The proposal to close a section of the Hammerean Loop Road is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).
9	…We feel helicopter logging should be a last resort when all other options for logging have been eliminated.
Response:	Thank you for your comment.
10	We consider it essential to utilize Alternative 1, with the construction of a temporary road above Pierce Creek, rather than Alternative 2, which would necessitate helicopter logging in that area.
Response	Thank you for your comment.

Paul A. Edstrom – 04/26/2014

Comment Number	Comment
1	The USFS should not close road #449 between Hammerean Creek and Johnson Gulch.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).
2	Also people coming in from either direction have only one way out becoming a public safety issue and hazard because falling rocks, snags, fire or weather may block their way out.
Response:	Thank you for your comment.
3	Finally, I think the FS would want the road open to access possible fire starts in the area
Response:	Thank you for your comment.

Will Wyland – 04/26/2014

Comment Number	Comment
1	Do not close another road - we need these outlets for our fulfillment of the outdoor experience.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).

J.C Rye – 04/28/2014

Comment Number	Comment
1	Please do no close another road. (Road #449)
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).

Clifford Shaw – 04/29/2014

Comment Number	Comment
1	This policy to close the road from Twin Creek Campground to Hammerrean Creek that appears to have been the policy adopted by the USDA Forest Service is of a major concern and requires an immediate review.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).
2	The roads are vital to the livelihood of those that live in the region as well as many that enjoy the Forests.
Response:	Thank you for your comment.

William and Janet Gibbs – 05/01/2014

Comment Number	Comment
1	We strongly object to closing road 449. We need more not less public access to the Forest.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).

US Department of Interior (Allison O'Brien) – 05/02/2014

Comment Number	Comment
1	The Department of the Interior has reviewd the DEIS for the Upper North Fork Healthy Forest Restoration Act Ecosystem Restoration Project, Salmon-Challis National Forest, Idaho. The Department has no comments on the document at this time.
Response:	Thank you for your comment.

Jim Fazio (The Governor's Lewis & Clark Trail Committee) – 05/02/2014

Comment Number	Comment
1	The exact location of Lewis & Clark's campsite at Lost Trail is not known, nor the exact route up to it. However, that historic campsite is somewhere in the vicinity of the ridge and there are several good possibilities. I hope your project will not alter the area close to the ridge or "improve" that nice road into the former site of Saddle Mountain Lookout. No action in that area is the best action.
Response:	The exact location of the campsite is unknown. If we knew the exact location, our proposed action would not adversely affect an ephemeral site of this nature. No alterations of the road to the former site of Saddle Mountain Lookout are proposed.

Dyrk Krueger – 05/05/2014

Comment Number	Comment
1	I support Alternative 1, the Proposed Action.
Response:	Thank you for your comment.
2	I would encourage the FS to do as much treatment as possible in riparian areas while maintaining adequate shade for stream channels and minimizing erosion and sedimentation.
Response:	Thank you for your comment.
3	Another reason I support Alt 1 is because it has about 450 acres more tractor logging than Alt 2 and since tractor logging is less expensive than skyline or helicopter logging this may enable the FS to retain more receipts to help complete other activities like culvert replacement, stream restoration etc…
Response:	Thank you for your comment.

Christine B. Reichgott (Environmental Protection Agency) - 05/05/2014

Comment Number	Comment
1	We find the DEIS does a good job in evaluating the effects of the proposed action and that overall sufficient efforts have been made to avoid and minimize the adverse effects of the action. Therefore we rate the document “L.O” (Lack of Objections).
Response:	Thank you for your comment.
2	We believe that alternative 2 as designed is the environmentally preferable alternative as it does not include the temporary roads and also entails less tractor and skyline logging.
Response:	Thank you for your comment.
3	We recommended that the FS avoid temporary road construction unless it can be demonstrated that temporary road construction would result in less potential environmental impact, particularly in the long term.
Response:	Building temporary roads provides for better contractual controls than heavily used skid trails and would result in more complete restoration and better long term results. Appendix A Design Criteria #120 All newly constructed temporary roads will be decommissioned by fully recontouring the road template and stabilizing with native vegetation (seeding) the disturbed area during the appropriate time of year after the decommissioning. Monitoring of the decommissioned temporary roads will occur the year after seeding to determine if additional revegetation work is required.
4	We recommend that the monitoring of any road sites with the potential for adverse impacts to water quality impacts be included in the Record of Decision (site specific monitoring instead of sample monitoring as identified in Appendix A).
Response:	The deciding official will determine whether they would like to require site specific monitoring in the Record of Decision.
5	We are supportive of the use of ICO (individual clumps and openings) approach to thinning developed by Larson and Churchhill (2012) and our pleased to see the trend towards creating species and spatial heterogeneity within the project area.
Response:	Thank you for your comment.

Comment Number	Comment
6	We also support the proposed amendment to allow for wildfire use to achieve management objectives.
Response:	Thank you for your comment.
7	We believe the associated analysis of air quality and airshed analysis is satisfactory.
Response:	Thank you for your comment.
8	Also while we do not oppose the proposed amendment to modify road buffer widths for PACFISH to allow for mechanical treatment above the road outside of the modified riparian habitat, we believe that of the 11 sites, some sites may incur adverse impacts to water quality. We recommend site specific monitoring for these sites.
Response:	We will follow any additional monitoring recommendations identified in National Marine Fisheries and Fish and Wildlife consultations. A detailed analysis of effects to water quality (temperature, sediment and spawning habitat, and chemical contaminants/nutrients) as a result of mechanical treatments above roads outside of modified RHCAs can be found in the Fisheries Biological Assessment (BA). The BA determined mechanical treatments within these 11 units meet PACFISH standards and guidelines, maintain PACFISH Resource Management Objectives and do not change existing environmental baseline conditions; thus, adverse impacts to water quality are not expected. Current and ongoing water quality and sediment monitoring efforts within the project area are disclosed on page 136 of the DEIS. The Forest will follow any additional monitoring recommendations identified in National Marine Fisheries Service and U.S. Fish and Wildlife Service fisheries consultations.
9	Finally we believe the FEIS would benefit from additional information concerning future plans for re-planting.
Response:	The FEIS does not address future reforestation plans because none of the vegetation management activities would trigger a need for reforestation. If in the future reforestation activities are needed they will be analyzed under a different NEPA document

Paul Stokes – 05/05/2014

Comment Number	Comment
1	I believe you need to build more roads to better access this area to do a more time saving restoration.
Response:	Thank you for your comment.
2	Alternative 1 is the best choice.
Response:	Thank you for your comment.
3	Forest Road #449 is on the SCNF travel as being open for travel by all vehicles and should be left open.
Response:	Thank you for your comment regarding the Hammerean Loop Road. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).

Bob Wilson (Moose Creek Estates Owner) – 05/16/2014

Comment Number	Comment
1	We enthusiastically support the Upper North Fork HFRA Project.
Response:	Thank you for your comment.
2	As owner of Moose Creek Estates where access to temporary roads and landings are proposed, I need to be involved in discussions prior to final decisions being made. (Unit 212-222)
Response:	The North Fork Ranger District will coordinate with Moose Creek Estates regarding any requested access.
3	We recommend that if helicopter logging becomes too costly, that the temporary road proposal be used…
Response:	Thank you for your comment.
4	The proposal to close the Hammerrean loop road in Alt 2 should be removed from consideration for the following reasons: 1). It is good access for people to access mushroom hunting areas. 2). Many people use firewood gathering which benefits forest health. 3). It can provide emergency access between the Upper North Fork and Lower North Fork and Hwy 93 in the advent of a catastrophic road blockage. 4). Many elderly as well as younger people enjoy walking and biking/4-wheeling the road because of its minimal traffic.
Response:	Thank you for your comment regarding the Hammerean Loop Road (#449). This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228). Due to the current slide area, the Hammerean Road Loop would not be a suitable emergency evacuation route.
5	In Alt 1, a temporary road proposed to access 212-222 may involve private property. The EIS should reflect this consideration and either re-route or indicate how landowners would be the proposed road development.
Response:	The North Fork Ranger District will coordinate with Moose Creek Estates regarding any requested access.
6	Under the Idaho Roadless Rule, temporary roads can be authorized if the deciding official believes that there is no reasonable way to accomplish the community protection objectives without the construction of temporary roads. If it is “reasonable” to incorporate helicopter logging to treat these units as part of the larger scale package, then the responsible official should not authorize the temporary roads. If it is “unreasonable” then the temporary roads can be authorized.
Response:	Thank you for your comment.

Comment Number	Comment
7	We recommend that the Forest Service describe the factors the agency applies to determine the “reasonableness” of accomplishing the roadless portion of the project without temporary road construction. The Forest Service should describe in more detail the suite of possible funding sources as part of the determination of what is reasonable.
Response:	The Forest Service preferred alternative for the Upper North Fork Project is Alternative 1 - The Proposed Action which would utilize temporary roads for accessing fuels reduction treatments in the Anderson Mountain Idaho Roadless Area (IRA). The Idaho Roadless Rule does outlines that the responsible official may authorize temporary road construction for community protection zone activities pursuant to § 294.24(c)(1)(i) if in the official’s judgment the community protection objectives cannot be reasonably accomplished without a temporary road. The “reasonableness” factors considered in authorizing temporary road construction for this project included : Other fuels reduction treatment methods, such as shaded fuel breaks, non-commercial thinning which could be accomplished without roads would be less effective in achieving objectives because of existing tree density, fuel loading and terrain factors in the locality where treatment is needed. Treatments are consistent with Forest Plan management prescriptions (3A-5A) for timber harvest and retention of large trees called for in the Idaho Roadless Rule to promote fire resilient stands. Access across private land (through easement) is readily available for entry to priority areas for treatment; other potential access points for temporary or other road construction would involve additional road and bridge construction at added cost and resource impacts. Ground and skyline based treatments of timber stands for fuels reduction is more likely to be implemented versus helicopter logging based on current economics. Assurances that temporary roads would be decommissioned and obliterated post fuels reduction treatment are provided for in the Idaho Roadless Rule. Community Protection Zone priority treatment areas adjacent to Moose Creek Estates do not have the same quality of roadless area characteristics for solitude and naturalness that are present in interior portions of the Anderson Mountain IRA. This situation is not anticipated to change because of likely continued use and occupancy of the private land. Planned treatments would maintain and improve the long-term vegetation and ecological processes, components of the roadless characteristics and wilderness attributes related to in the Anderson Mountain IRA.
8	The document should provide an estimate of costs per acre of prescribed fire treatments.
Response:	Best estimates for burning on the North Fork District are: $30-50 acre for PSD, $60 broadcast, $40 handpile per acre and about $20 per machine pile.
9	Where possible, the Forest Service should indicate where they anticipate using contractors and what they anticipate doing in-house.
Response:	The Forest Service will not be deciding in advance which unit will be treated in-house vs. using contractors. The treatments will be the same either way with the same prescriptions, but the specific decisions will be made annually based upon internal and external funding available, Forest Service budgets, the status of existing stewardship agreements and timber market values.
10	The No Action alternative should consider the economic cost of smoke from large forest fires in the area.
Response:	This analysis did not include the economic cost of smoke from large forest fires. The Forest recognizes that there is a cost however the data to support such an analysis does not exist locally.

Comment Number	Comment
11	We again request that wildlife and big game habitat security considerations submitted by the LCFRG in April 2012 be incorporated into the proposed action, and/or the documents Appendix A integrated design features and monitoring requirements criteria if those criteria are required operating standards.
Response:	The purpose and need of the project is the driver for the proposed action. While meeting the hazardous fuels reduction goals, big game habitat – notably for elk – may not meet criteria set forth in the land and resource management plan (LRMP), depending on whether or not we include non-Forest Service ownership If we do, then we will require a project-specific amendment in order to conduct the proposed action. If we do not, no amendment would be required. The cover and forage habitat are addressed against the standards of the LRMP, even though there may be more recent scientific information indicating that the figures we use have changed. The purpose and need of the project may not meet these newer criteria, even if they were the standard in the LRMP, and might require a project-specific amendment, too. We incorporated all design criteria to the extent practicable, knowing some resources may be temporarily compromised in an effort to protect human life and property. In the analysis, we have determined that there will be sufficient hiding cover on available National Forest Service managed lands in the project area.
12	We strongly urge that the criteria described in Appendix A of the DEIS be incorporated and described in the proposed action and evaluated in the environmental impacts section.
Response:	The contents of Appendix A are reference within the proposed action.
13	The proposed action also states that all old growth stands would be burned and that only 50 linear feet of downed woody debris would be targeted for retention regardless of stand size or forest type. This is inconsistent with Appendix A #135, and retention of only 50 feet of downed material is grossly inadequate to provide habitat for forest mammals and birds.
Response:	#135 in Appendix A is related to Aspen stands and conifer encroachment. The 50 linear feet meets the requirements of the LRMP, although in all probability there will be more woody debris than this available after treatment in all units, especially in the large burn units. The vegetation diversity standard on the LRMP page IV-18 for aspen, ponderosa pine, Douglas-fir, and spruce/fir types indicates the desired diameter and length.
14	The proposed action should include specific proactive Aspen and Whitebark pine restoration activities that will be conducted independently of burning and harvest.
Response:	The proposed action includes a programmatic
15	The DEIS should also provide a phased schedule of what proposed activities would occur. It is important to confine disturbance activities to the smallest area over the shortest time period to avoid wildlife displacement.
Response:	The implementation activities will occur as funding and environmental conditions allow and all appropriate mitigation measures and design criteria will be utilized to lessen the impact to wildlife.
16	We suggest that a design feature be developed and implemented to retain a greater portion of surface fuels that proposed. This might be addressed by more selective prescribed burning in smaller acreage units (e.g, ≤500 acres).
Response:	I believe your were referring to designated old growth with this comment. If you refer back to Appendix A #140 we do address your concern here. Old growth units will not have any direct ignitions but fire will be allowed to move into these areas on their own. Regarding prescribed fire size in designated old growth, the majority of the stands are less than 500 acres and would not have fireline around them.

Comment Number	Comment
17	We suggest that specific routes or sections of routes be identified where ladder fuel clearing is necessary. There should be no clearing along temporary roads or those planned for decommissioning. A 200 foot buffer should be the maximum width allowed where such clearing is necessary.
Response:	The treatments you are describing are only associated with designated “shaded fuel break” units. The shaded fuel break units can be seen on the map.
18	We suggest a modification of fuel treatments proposed in units immediately south of these passes to create a strategic east-west linkage corridor with vegetative attributes suitable for lynx, wolverine, and other forest carnivores. This would entail modification of fuels treatments to retain >40-50% canopy cover and judicious use of broadcast burning to minimize loss of down woody material (i.e., blowdown, deadfall) and dense, shrubby understory. In Chief Joseph vicinity, we recommend these modifications be applied to 36, 38a, 38b, 39, 40 and 42. In the Lost Trail Pass vicinity, we recommend these modifications be applied to units 16, 35 and 184.
Response:	Thank you for your comment. These units in question were looked at in great detail between fire and fuel staff and wildlife biologist. In the Chief Joseph vicinity the units were identified as areas critical for hazardous fuels reduction for many reasons that include the vicinity to a busy highway and the fact that they are at the top of a major ridge that would be the only feasible line of defense for fire fighters should a fire get established between Hwy. 93 and the Anderson Mountain Road. In the Lost Trail Pass vicinity the units in question were also identified as areas critical for hazardous fuels treatment to help protect the Lost Trail Ski Area. The north-south ridge line that runs through the center of unit 16 would be the first line of defense for fire fighters should a fire get established west of the ridge in question. The analysis of these treatments units projected that existing canopy cover of 50-80% would be reduced to 40% or less following thinning and under burning. The wildlife biologist in working with the US Fish and Wildlife Service determined that with these projected changes there would be adequate remaining habitat in the vicinity of these mountain passes to provide an east-west linkage corridor for lynx, wolverine, and other forest carnivores. We believe there will be adequate dense forest cover remaining on the landscape to the south of the treatment units to provide suitable cover habitat for carnivores to move through the project area.
19	We are concerned that the proposed fuel treatments may further reduce habitat suitability for several forest sensitive species already affected by large scale wildland fire disturbance in the surrounding landscape.
Response:	Effects to wildlife from the proposal are addressed in the analysis. The past effects of timber harvest and wildfires were taken into consideration as part of the existing condition, and served as the basis for changes projected to occur from proposed fuels reduction activities. The wildlife analysis determined that there may be impacts to some species’ habitats, but that the impact from extreme fire behavior like those we have seen recently and in 2000 on the Bitterroot NF has a greater possibility be even more adverse. Thus, treatments that may reduce potential fire intensity across the landscape may help to prevent such large scale losses in suitable habitats.
20	Given the proximity of this subpopulation (Mountain Goats) to alternative 2 helicopter treatment units, we request that flight paths, distance from treatment units, and line of sight distances be evaluated to avoid or minimize disturbance impacts to mountain goats.
Response:	We did not analyze mountain goats for this project as we are not required to under the Endangered Species Act or National Forest Management Act. The mountain goat is not threatened or endangered, listed as a Regional Forester’s Sensitive species, nor listed as species to analyze under the LRMP. The mountain goat is no longer a Management Indicator Species for the Forest. That being said, the nearest helicopter unit is about 1.5 miles (2.4 kilometers) from known mountain goat observations (USFS database). The three units on the west side US 93 are 1.6 to 2.2 miles distant, and are separated by a tall ridge and other lower ridges from the observations. The units on the east side of US 93 are from 1.5 to 3.4 miles distant. The two smaller, closer units face generally south, away from the known goat observations. The largest unit is on a northwest-facing slope (above Pierce Creek) and a ridge generally separates it from direct line-of-sight with the goat observations. We believe this adequately addresses the concern with the proximity of goat observations.

Comment Number	Comment
21	The DEIS for the Upper North Fork Project needs to prioritize the establishment of a comprehensive monitoring program for fisheries, wildlife and associated habitat. Monitoring programs should clearly correspond to the timeline, goals, objectives and project stages and emphasize the importance of maintaining and improving wildlife habitat both over short and long term timeframes. Monitoring should take place throughout project implementation and findings from monitoring programs should be taken into account and adjusted for during each stage of the Upper North Fork Project. Both project stages and associated monitoring should be made available for public review. Comprehensive monitoring programs and strategies should be in place prior to initiating treatments.
Response:	Our monitoring plan is located in Appendix A of the EIS and outlines the typical implementation and effectiveness monitoring conducted by the Forest as a normal business practice. Appendix A also discloses our coordination efforts with Lemhi County Forest Restoration Group to conduct third party monitoring. Third party monitoring is an ongoing and successful component of the local collaborative efforts and will continue to be a vital component for the Upper North Fork Project.
22	In Alternative 1 Unit 126 is proposed for helicopter logging, and this unit is adjacent to unit 125d which is proposed for tractor logging. The unit 126 acres has an existing closed system road on the upper west side which may present options other than helicopter logging. These options should be considered. Units 50a, 50b, 50c are all proposed helicopter units. There is a closed system roads in the upper east side of these units. They are adjacent to units 236 and 237 that are proposed as skyline units. Changing the treatments of 50a-c to skyline should be considered as a more economical option to helicopter logging.
Response:	Alternative 1 minimizes use and construction of temporary roads with knowledge that this generally increases treatment costs but provides for lower overall watershed impacts. Comparatively, Alternative 2 allows for more flexibility in logging and transportation systems to improve the economic feasibility of the treatments. Additional factors in selecting logging systems include Forest Plan direction, Safety, and topography. While the map indicates close proximity to roads, in many cases the road location does not facilitate the logging system proposed in this comment. An example would be the three “50” units, in this case, the road mentioned is on the opposite side of the ridge from the proposed units and would not facilitate a skyline system. Likewise, unit 126 could be a steep adverse skid, or long favorable skid bit is likely a too flat or convex slope to yard with the cable systems available.

John Goodman (Moose Creek Estates Operations Manager) – 05/16/2014

Comment Number	Comment
1	We enthusiastically support the Upper North Fork HFRA Project.
Response:	Thank you for your comment.
2	As the operations manager of Moose Creek Estates where access to temporary roads and landings are proposed, I need to be involved in discussions prior to final decisions being made. (Unit 212-222)
Response:	The North Fork Ranger District will coordinate with Moose Creek Estates regarding any requested access.
3	We recommend that if helicopter logging becomes too costly, that the temporary road proposal be used…
Response:	Thank you for your comment.
4	The proposal to close the Hammerrean loop road in Alt 2 should be removed from consideration for the following reasons: 1). It is good access for people to access mushroom hunting areas. 2). Many people use firewood gathering which benefits forest health. 3). It can provide emergency access between the Upper North Fork and Lower North Fork and Hwy 93 in the advent of a catastrophic road blockage. 4). Many elderly as well as younger people enjoy walking and biking/4-wheeling the road because of its minimal traffic.
Response:	Thank you for your comment regarding the Hammerean Loop Road (#449). This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228). Due to the current slide area, the Hammerean Road Loop would not be a suitable emergency evacuation route.
5	In Alt 1, a temporary road proposed to access 212-222 may involve private property. The EIS should reflect this consideration and either re-route or indicate how landowners would be the proposed road development.
Response:	The North Fork Ranger District will coordinate with Moose Creek Estates regarding any requested access.
6	Under the Idaho Roadless Rule, temporary roads can be authorized if the deciding official believes that there is no reasonable way to accomplish the community protection objectives without the construction of temporary roads. If it is “reasonable” to incorporate helicopter logging to treat these units as part of the larger scale package, then the responsible official should not authorize the temporary roads. If it is “unreasonable” then the temporary roads can be authorized.
Response:	Thank you for your comment.

Comment Number	Comment
7	We recommend that the Forest Service describe the factors the agency applies to determine the “reasonableness” of accomplishing the roadless portion of the project without temporary road construction. The Forest Service should describe in more detail the suite of possible funding sources as part of the determination of what is reasonable.
Response:	The Forest Service preferred alternative for the Upper North Fork Project is Alternative 1 - The Proposed Action which would utilize temporary roads for accessing fuels reduction treatments in the Anderson Mountain Idaho Roadless Area (IRA). The Idaho Roadless Rule does outlines that the responsible official may authorize temporary road construction for community protection zone activities pursuant to § 294.24(c)(1)(i) if in the official’s judgment the community protection objectives cannot be reasonably accomplished without a temporary road. The “reasonableness” factors considered in authorizing temporary road construction for this project included : Other fuels reduction treatment methods, such as shaded fuel breaks, non-commercial thinning which could be accomplished without roads would be less effective in achieving objectives because of existing tree density, fuel loading and terrain factors in the locality where treatment is needed. Treatments are consistent with Forest Plan management prescriptions (3A-5A) for timber harvest and retention of large trees called for in the Idaho Roadless Rule to promote fire resilient stands. Access across private land (through easement) is readily available for entry to priority areas for treatment; other potential access points for temporary or other road construction would involve additional road and bridge construction at added cost and resource impacts. Ground and skyline based treatments of timber stands for fuels reduction is more likely to be implemented versus helicopter logging based on current economics. Assurances that temporary roads would be decommissioned and obliterated post fuels reduction treatment are provided for in the Idaho Roadless Rule. Community Protection Zone priority treatment areas adjacent to Moose Creek Estates do not have the same quality of roadless area characteristics for solitude and naturalness that are present in interior portions of the Anderson Mountain IRA. This situation is not anticipated to change because of likely continued use and occupancy of the private land. Planned treatments would maintain and improve the long-term vegetation and ecological processes, components of the roadless characteristics and wilderness attributes related to in the Anderson Mountain IRA.
8	The document should provide an estimate of costs per acre of prescribed fire treatments.
Response:	Best estimates for burning on the North Fork District are: $30-50 acre for PSD, $60 broadcast, $40 handpile per acre and about $20 per machine pile.
9	Where possible, the Forest Service should indicate where they anticipate using contractors and what they anticipate doing in-house.
Response:	The Forest Service will not be deciding in advance which unit will be treated in-house vs. using contractors. The treatments will be the same either way with the same prescriptions, but the specific decisions will be made annually based upon internal and external funding available, Forest Service budgets, the status of existing stewardship agreements and timber market values.
10	The No Action alternative should consider the economic cost of smoke from large forest fires in the area.
Response:	This analysis did not include the economic cost of smoke from large forest fires. The Forest recognizes that there is a cost however the data to support such an analysis does not exist locally.

Comment Number	Comment
11	We again request that wildlife and big game habitat security considerations submitted by the LCFRG in April 2012 be incorporated into the proposed action, and/or the documents Appendix A integrated design features and monitoring requirements criteria if those criteria are required operating standards.
Response:	The purpose and need of the project is the driver for the proposed action. While meeting the hazardous fuels reduction goals, big game habitat – notably for elk – may not meet criteria set forth in the land and resource management plan (LRMP), depending on whether or not we include non-Forest Service ownership If we do, then we will require a project-specific amendment in order to conduct the proposed action. If we do not, no amendment would be required. The cover and forage habitat are addressed against the standards of the LRMP, even though there may be more recent scientific information indicating that the figures we use have changed. The purpose and need of the project may not meet these newer criteria, even if they were the standard in the LRMP, and might require a project-specific amendment, too. We incorporated all design criteria to the extent practicable, knowing some resources may be temporarily compromised in an effort to protect human life and property. In the analysis, we have determined that there will be sufficient hiding cover on available National Forest Service managed lands in the project area.
12	We strongly urge that the criteria described in Appendix A of the DEIS be incorporated and described in the proposed action and evaluated in the environmental impacts section.
Response:	The contents of Appendix A are reference within the proposed action.
13	The proposed action also states that all old growth stands would be burned and that only 50 linear feet of downed woody debris would be targeted for retention regardless of stand size or forest type. This is inconsistent with Appendix A #135, and retention of only 50 feet of downed material is grossly inadequate to provide habitat for forest mammals and birds.
Response:	#135 in Appendix A is related to Aspen stands and conifer encroachment. The 50 linear feet meets the requirements of the LRMP, although in all probability there will be more woody debris than this available after treatment in all units, especially in the large burn units. The vegetation diversity standard on the LRMP page IV-18 for aspen, ponderosa pine, Douglas-fir, and spruce/fir types indicates the desired diameter and length.
14	The proposed action should include specific proactive Aspen and Whitebark pine restoration activities that will be conducted independently of burning and harvest.
Response:	The proposed action includes a programmatic prescription for the treatment of Aspen and Whitebark pine independent of burning and harvesting wherever it may be found within the project area. Because we didn't feel that our existing Aspen and Whitebark pine mapping layers included all existing stands we felt that the programmatic prescription would allow for more treatment as stands were found. The programmatic prescriptions may be found under Alternative 1 – the Proposed Action.
15	The DEIS should also provide a phased schedule of what proposed activities would occur. It is important to confine disturbance activities to the smallest area over the shortest time period to avoid wildlife displacement.
Response:	The implementation activities will occur as funding and environmental conditions allow and all appropriate mitigation measures and design criteria will be utilized to lessen the impact to wildlife. The Forest will develop it's implementation schedule with input from collaborating agencies after there is a signed decision.
16	We suggest that a design feature be developed and implemented to retain a greater portion of surface fuels that proposed. This might be addressed by more selective prescribed burning in smaller acreage units (e.g, $\leq$500 acres).
Response:	I believe your were referring to designated old growth with this comment. If you refer back to Appendix A #140 we do address your concern here. Old growth units will not have any direct ignitions but fire will be allowed to move into these areas on their own. Regarding prescribed fire size in designated old growth, the majority of the stands are less than 500 acres and would not have fireline around them.

Comment Number	Comment
17	We suggest that specific routes or sections of routes be identified where ladder fuel clearing is necessary. There should be no clearing along temporary roads or those planned for decommissioning. A 200 foot buffer should be the maximum width allowed where such clearing is necessary.
Response:	The treatments you are describing are only associated with designated “shaded fuel break” units. The shaded fuel break units can be seen on the map.
18	We suggest a modification of fuel treatments proposed in units immediately south of these passes to create a strategic east-west linkage corridor with vegetative attributes suitable for lynx, wolverine, and other forest carnivores. This would entail modification of fuels treatments to retain >40-50% canopy cover and judicious use of broadcast burning to minimize loss of down woody material (i.e., blowdown, deadfall) and dense, shrubby understory. In Chief Joseph vicinity, we recommend these modifications be applied to 36, 38a, 38b, 39, 40 and 42. In the Lost Trail Pass vicinity, we recommend these modifications be applied to units 16, 35 and 184.
Response:	Thank you for your comment. These units in question were looked at in great detail between fire and fuel staff and wildlife biologist. In the Chief Joseph vicinity the units were identified as areas critical for hazardous fuels reduction for many reasons that include the vicinity to a busy highway and the fact that they are at the top of a major ridge that would be the only feasible line of defense for fire fighters should a fire get established between Hwy. 93 and the Anderson Mountain Road. In the Lost Trail Pass vicinity the units in question were also identified as areas critical for hazardous fuels treatment to help protect the Lost Trail Ski Area. The north-south ridge line that runs through the center of unit 16 would be the first line of defense for fire fighters should a fire get established west of the ridge in question. The analysis of these treatments units projected that existing canopy cover of 50-80% would be reduced to 40% or less following thinning and under burning. The wildlife biologist determine that with these projected changes there would be adequate remaining habitat in the vicinity of these mountain passes to provide an east-west linkage corridor for lynx and wolverine. The wildlife biologist in working with the US Fish and Wildlife Service determined that with these projected changes there would be adequate remaining habitat in the vicinity of these mountain passes to provide an east-west linkage corridor for lynx, wolverine, and other forest carnivores. We believe there will be adequate dense forest cover remaining on the landscape to the south of the treatment units to provide suitable cover habitat for carnivores to move through the project area.
19	We are concerned that the proposed fuel treatments may further reduce habitat suitability for several forest sensitive species already affected by large scale wildland fire disturbance in the surrounding landscape.
Response:	Effects to wildlife from the proposal are addressed in the analysis. The past effects of timber harvest and wildfires were taken into consideration as part of the existing condition, and served as the basis for changes projected to occur from proposed fuels reduction activities. The wildlife analysis determined that there may be impacts to some species’ habitats, but that the impact from extreme fire behavior like those we have seen recently and in 2000 on the Bitterroot NF has a greater possibility be even more adverse. Thus, treatments that may reduce potential fire intensity across the landscape may help to prevent such large scale losses in suitable habitats.
20	Given the proximity of this subpopulation (Mountain Goats) to alternative 2 helicopter treatment units, we request that flight paths, distance from treatment units, and line of sight distances be evaluated to avoid or minimize disturbance impacts to mountain goats.
Response:	We did not analyze mountain goats for this project as we are not required to under the Endangered Species Act or National Forest Management Act. The mountain goat is not threatened or endangered, listed as a Regional Forester’s Sensitive species, nor listed as species to analyze under the LRMP. The mountain goat is no longer a Management Indicator Species for the Forest. That being said, the nearest helicopter unit is about 1.5 miles (2.4 kilometers) from known mountain goat observations (USFS database). The three units on the west side US 93 are 1.6 to 2.2 miles distant, and are separated by a tall ridge and other lower ridges from the observations. The units on the east side of US 93 are from 1.5 to 3.4 miles distant. The two smaller, closer units face generally south, away from the known goat observations. The largest unit is on a northwest-facing slope (above Pierce Creek) and a ridge generally separates it from direct line-of-sight with the goat observations. We believe this adequately addresses the concern with the proximity of goat observations

Comment Number	Comment
21	The DEIS for the Upper North Fork Project needs to prioritize the establishment of a comprehensive monitoring program for fisheries, wildlife and associated habitat. Monitoring programs should clearly correspond to the timeline, goals, objectives and project stages and emphasize the importance of maintaining and improving wildlife habitat both over short and long term timeframes. Monitoring should take place throughout project implementation and findings from monitoring programs should be taken into account and adjusted for during each stage of the Upper North Fork Project. Both project stages and associated monitoring should be made available for public review. Comprehensive monitoring programs and strategies should be in place prior to initiating treatments.
Response:	Our monitoring plan is located in Appendix A of the EIS and outlines the typical implementation and effectiveness monitoring conducted by the Forest as a normal business practice. Appendix A also discloses our coordination efforts with Lemhi County Forest Restoration Group to conduct third party monitoring. Third party monitoring is an ongoing and successful component of the local collaborative efforts and will continue to be a vital component for the Upper North Fork Project.
22	In Alternative 1 Unit 126 is proposed for helicopter logging, and this unit is adjacent to unit 125d which is proposed for tractor logging. The unit 126 acres has an existing closed system road on the upper west side which may present options other than helicopter logging. These options should be considered. Units 50a, 50b, 50c are all proposed helicopter units. There is a closed system roads in the upper east side of these units. They are adjacent to units 236 and 237 that are proposed as skyline units. Changing the treatments of 50a-c to skyline should be considered as a more economical option to helicopter logging.
Response:	Alternative 1 minimizes use and construction of temporary roads with knowledge that this generally increases treatment costs but provides for lower overall watershed impacts. Comparatively, Alternative 2 allows for more flexibility in logging and transportation systems to improve the economic feasibility of the treatments. Additional factors in selecting logging systems include Forest Plan direction, Safety, and topography. While the map indicates close proximity to roads, in many cases the road location does not facilitate the logging system proposed in this comment. An example would be the three “50” units, in this case, the road mentioned is on the opposite side of the ridge from the proposed units and would not facilitate a skyline system. Likewise, unit 126 could be a steep adverse skid, or long favorable skid bit is likely a too flat or convex slope to yard with the cable systems available.

Gregory Behm – 05/18/2014

Comment Number	Comment
1	We are very supportive of this project.
Response:	Thank you for your comment.
2	One concern I have is the heavy reliance on helicopter logging. Although I agree that if all else is equal, it would be better to avoid making roads in process of saving the forest, I do not agree that the project should be delayed/cancelled just to avoid making temporary roads that could be decommissioned after the project is done.
Response:	Thank you for your comment.
3	We fully support the use of temporary roads in this project. Better to have a few roads for a short time than to let the forest burn in its current state.
Response:	Thank you for your comment.

Louise Wagenecht– 05/18/2014

Comment Number	Comment
1	Put in a glossary of acronyms.
Response:	Acronyms have been spelled out in the Final EIS.
2	Have an alternative without helicopter logging or with only helicopter logging in roadless area.
Response:	Alternatives were developed based upon comments received during scoping.
3	Would have been nice to see a table of all previous timber sales in the area.
Response:	Table 20 in chapter 2 gives a good description of past timber sales in the area. Exact locations are not given but the year of harvest and the acreage harvested are provided. Appendix C – Past, Present and Reasonably Foreseeable Activities lists an acreage summary for timber sales in the project area by decade for the last 50 years.
4	This is a huge project covering a large geographical area, and writing an EIS to analyze it was certainly appropriate. However, analyzing it under the framework of HFRA does the public a disservice, because you are taking advantage of that law to analyze (essentially) only one alternative.
Response:	We have analyzed 2 action alternatives. The HFRA authority only requires one action alternative, however we addressed issues that came from scoping by creating a 2nd action alternative.
5	But without a full and serious analysis of several alternatives, we aren't allowed to look at other ways of thinking about wildfire, prescribed fire, or logging.
Response:	We have analyzed two action alternatives. The HFRA authority only requires one action alternative under the circumstances typical of this project. Issues that came from public scoping and further collaborative involvement in project planning compelled us to develop and consider a 2nd action alternative to addressed additional important factors.
6	And if your entire context for analyzing No Action consists of the Mustang Complex, you're ignoring many other circumstances.
Response:	The Health Forest Restoration Act (HFRA) states that while agencies are not expected to fully develop a no action alternative, "they should evaluate the effects of failing to implement the project. This evaluation should allow an assessment of the short and long-term effects of failing to implement the project in the event the court is asked to consider requests for an injunction" (HFRA Field Guide, 2004). Initial planning and collaboration for the Upper North Fork HFRA project started in 2009 and formal scoping in 2011 so the considerations for No Action were formulated long before the Mustang Complex wildfire of 2012.
7	In order to do this project as you want, you intend to loosen protections for big game winter range.
Response:	The purpose and need of the project is the driver for the proposed action. While meeting the hazardous fuels reduction goals, big game habitat – notably for elk – may not meet criteria set forth in the land and resource management plan (LRMP), depending on whether or not we include non-Forest Service ownership If we do, then we will require a project-specific amendment in order to conduct the proposed action. If we do not, no amendment would be required. The cover and forage habitat are addressed against the standards of the LRMP, even though there may be more recent scientific information indicating that the figures we use have changed. The purpose and need of the project may not meet these newer criteria, even if they were the standard in the LRMP, and might require a project-specific amendment, too. We incorporated all design criteria to the extent practicable, knowing some resources may be temporarily compromised in an effort to protect human life and property . In the analysis, we have determined that there will be sufficient hiding cover on available National Forest Service managed lands in the project area.
8	Nowhere can I seem to find a good definition within the EIS of exactly what "Designated Old Growth Treatment" means. Please tell me.

Comment Number	Comment
Response:	Design Feature 140 gives a good description of what treatments will be done in Designated Old Growth
9	Left out entirely is any economic analysis of how much this whole thing is going to cost.
Response:	A socio-economic discussion is included in Chapter 3 of the document.
10	So it appears that the 66.3 miles of road are really only 52.4 miles of non-system roads, plus the 13.9 miles of “temporary” road that haven’t even been built yet, and therefore cannot possibly have a closed designation. But what are the 52.4 miles of “non-system user-created roads”? Are they old skid trails that are being used by four-wheel drive recreationists? If they weren’t engineered and have no road prism, how are they to be decommissioned?
Response:	The non-system or unauthorized routes being used to implement the project are generally old temporary roads or skid trails from previous projects. Temporary roads are only authorized for short periods and specific uses and are by policy required to be closed and returned to vegetative production. In some cases closure methods were ineffective and continued use by the public may have kept them open. Non-system roads have had a varety of descriptive designations attached to them over the last 15 years including “non-system”, “user created”, “unclassified” and “unauthorized”. The current terminology as provided in the Travel Rule uses “Unauthorized Route” for all non-system routes regardless of how they were created. Decommissioning may be done using a variety of methods including scarification, partial or full re-contouring, entrance treatments to discourage unauthorized use, restoration of drainage, and vegetation establishment depending on site specific needs.
11	Exactly how would this project help this species (whitebark pine), which is in dire straits thanks to white pine blister rust and mountain pine beetle attacks? How many acres of this species are in the project area?
Response:	There are not any areas that are solely occupied by Whitebark Pine so it is difficult to assign an accurate acreage amount. This project will help Whitebark Pine by removing competition for light and nutrients. Perhaps the greatest benefit that will be realized is the reduced risk of catastrophic stand replacing fire.
12	Just what else, pray tell, are you planning to do in the Upper North Fork drainage, and when are you going to tell us about it?
Response:	Appendix C – Past, Present and Reasonably Foreseeable Activities discloses and describes a list of reasonably foreseeable actions that were used in the analysis of the project. No other activities are being planned or anticipated in this area at this time. The large landscape approach to this project and scheduled implementation, once approved, would occur over the next 10 to 15 years.
13	Many logging units are proposed, but nowhere can we look at a table of these units so that we can know the individual acreages, the steepness of slopes, how much basal area will be left after logging, or how much volume will be cut.
Response:	Steepness of slopes and acreages are located within the Hydrology/Soils specialist report. The prescriptions are located within the Unit Cards which are available upon request.
14	To my knowledge, the Salmon-Challis National Forest has never deliberately burned an entire major drainage. You are in uncharted territory here, and you have not sufficiently disclosed the cumulative effects of doing so, perhaps because neither you nor anyone else knows what they would be.
Response:	The Salmon-Challis has conducted several large prescribed burns (>1000 acres) over the past several years. We have no intentions of burning the entire Upper North Fork Drainage at one time. The project has been divided into 15 larger burn units. Our plan would be to identify a unit each year for the life of the project and burn approximately 1000-3000 acres in those units per year. Also, we would not be looking to burn each unit so the entire area was black; a mosaic approach to mimic more of a natural wildfire would be the objective.
15	And why even analyze a No New Temporary Road Construction alternative?
Response:	We analyzed the No New Temporary Road Construction alternative because that was the issue that arose from our public scoping period in 2012.

Comment Number	Comment
16	"All thinning (commercial/precommercial) units would receive a follow-up prescribed burn treatment." What exactly would this consist of? Broadcast burning? Pile burning?
Response:	After they are harvested, most commercial units would have large landing piles where the logs are processed for hauling. Those piles would be burned about one year after creation. Then the units themselves would have a follow up, low intensity broadcast burn 2-3 years later. Pre-commercial units would have piles that would be burned during the winter months about one year after being constructed.
17	Just what qualifies LCEDA to administer timber sales? And who inspects the actual work to make sure it's done correctly?
Response:	In the hypothetical case of including a timber sale as a supplemental project agreement under the Master Stewardship Agreement with LCEDA the authority for administering that contract would be transferred to LCEDA by the Forest Service through the agreement and the Forest Service Sale Administrator would work alongside with LCEDA designated employees to ensure that the contract is carried out correctly. For more information on Stewardship Authorities please visit the following website: http://www.fs.fed.us/restoration/Stewardship_Contracting/overview.shtml
18	Nowhere in the discussion of hazardous fuels reduction treatments do we learn of any upper limits on DBH for trees to be cut. Does such a thing exist?
Response:	There is no upper limit on DBH for trees to be cut. The prescriptions call for retention of "the largest" trees within a unit which will vary by unit.
19	And what do you do with all the slash, which will amount to many tons of fuels per acre?
Response:	The slash will be handpiled and left on site for at least one year for drying and biomass utilization. The types of hand piles generally produce about 10-15 tons/acre.
20	Once again, you have not included a complete description of proposed silvicultural activities in the EIS, which essentially makes this information unavailable to the public.
Response:	The Section on Mechanical Treatments on page 12 of Chapter 2 in the DEIS provides the explanation of what we plan to do.
21	Although the EIS talks about saving large trees, we don't know exactly what this means, since we aren't able to compare the map to a table of the units and see how much basal area is supposed to be left, or how steep the unit is, or what the upper limit on DBH of cut trees is.
Response:	The section starting on Page 271 and continuing onto page 272 that talks about the consistency with the Idaho Roadless Rule defines large trees as the largest and healthiest trees in the stand. There are no exact size limits for a tree to be considered a large tree.
22	What we can see from the maps is that thousands of contiguous acres will be logged, and since they are in roaded areas that were previously logged, the cumulative effects will be considerable. These effects are not disclosed or discussed in any meaningful way.
Response:	There is a cumulative effects analysis for each resource located in Chapter 3. The Forest has increased its cumulative effects analysis in response to these public comments. The results of this additional analysis, especially for wildlife, can be seen in Chapter 3 as well as in the individual specialist reports
23	Table 17 raises a question, since it says that that forest with Douglas-fir as the majority tree species will decrease by 10,747 acres, and forest with lodgepole pine as the majority tree species will decrease by 3,909 acres. No corresponding increase in other forest types is listed. What exactly is going on here?
Response:	Table 17 is somewhat confusing but after a closer look you will see that the cover types are being shifted from stands with a majority of DF or LP to stands that are more heterogeneous.

Comment Number	Comment
24	Could you give me a definition of “stem exclusion”?
Response:	Stem exclusion is a stage of forest development that is characterized by having all of the available growing space occupied. This means that new trees have a hard time establishing and are thus excluded from the stand and that trees with superior growth form will begin to out-compete less vigorous trees. Less vigorous will become stunted or may even die during this stage.
25	Another exaggeration. Have there really been more than 200 firefighter entrapments in Lemhi County since 1979? How are firefighter entrapments counted? If a crew of 20 fire fighters are entrapped, does this count as 20 entrapments? Please define your terms and give us the details.
Response:	This is not an exaggeration. There have indeed been more than 200 individual firefighter entrapments in Lemhi County since 1979. One human being is counted as one entrapment, so if a crew of 20 are all entrapped on the same fire that counts as 20 entrapments. An entrapment is defined as “a situation where personnel are unexpectedly caught in a fire-behavior-related, life-threatening position where planned escape routes or safety zones are absent, inadequate, or have been compromised. An entrapment may or may not include deployment of a fire shelter for its intended purpose.” The Salmon-Challis National Forest is known to be one of the most difficult and dangerous places in the United States to fight wildland fire.
26	Judging from these maps, the implementation of this project will mean thousands of contiguous acres of logged ground, something that this drainage has not seen before. You have not disclosed the cumulative effects of doing this, probably because you don’t know yourselves, but I’m thinking that many forest species will find it difficult to live with.
Response:	The cumulative effects analysis has been completed and is located in Chapter 3 of the EIS.
27	The Forest Service manual directs the agency to “Manage habitats for all existing native and desired nonnative plants, fish and wildlife species in order to maintain at least viable populations of such species.” I am at a loss to figure out how you are going to do that in this drainage while logging and burning virtually the whole thing.
Response:	In this project we believe based upon the analyses completed that we will have no negative impact on any species’ population or habitat and would not affect viability at the Forest or Regional scale. Thinning will move the treated stands to a more historic condition which will be more resilient to insect, disease, and fire threats. Fuel break treatments are designed to protect property and lives and are small in total area and strategically placed so as to be effective. Meadow treatments are designed to provide big game summer foraging habitat that has been reduced due to conifer encroachment. The broadcast burning is designed to break fuel accumulations and continuity, leaving a mosaic of burned and unburned areas on the landscape, like what might occur under historic conditions. Timber removal and fire are the methods or tools by which we would remove understory trees from overly dense, primarily pine and Douglas-fir stands. In essence, by attempting to change the current trend from dense, middle-aged conifer stands toward a mosaic of vegetation types, ages, and structural classes, we are improving the long term outlook for habitats for those very desired native and desired species that historically were found on the landscape.

Snake River Waterkeeper (Buck Ryan) – 05/09/2014

Comment Number	Comment
1	Use of HFRA based on Wildland Urban Interface. Upon first reading of the proposed project, one gets the impression that this is a highly developed (urban) area. However, a review of the map of Idaho Roadless Areas within Community Protection Zones with Buffers provided on the Salmon Challis website, shows there are three clusters of development. Two of these occur along the North Fork River corridor and the third is the Lost Trail Ski Area. No developments are shown away from these areas. To "protect" these small areas, the Forest Service has proposed a 41,000 acre project under HFRA. This seems a stretch to include this large area under HFRA when buffers could be managed around these particular places.
Response:	While it is accurate that three clusters of development constitute the identified communities at risk, the project purpose and need identifies values of the State Highway 93 transportation corridor and the Salmon River Scenic Byway, private lands, residences and a winter recreation ski facility which fall within the Lemhi County WUI. The purpose of this project as outlined in the DEIS Introduction is to reduce hazardous natural fuels, restore plant communities, improve fish and wildlife habitat, and create an environment that is more resilient to disturbance as part of a fire-adapted landscape. A large scale approach is needed to address the project area current condition of biodiversity at risk.
2	One of the clusters along the North Fork occurs adjacent to Gibbonsville. We see from your website that there was a similar fuels reduction project around Gibbonsville circa 2004, yet the Project Area for this effort extends downriver past Gibbonsville. There are no one mile or half mile buffers shown for this cluster of buildings. It is not clear why this is the case, but the absence of buffers indicates this developed area is not considered WUI for the purpose of this project and may have already been addressed in the Gibbonsville project.
Response:	The Upper North Fork HFRA project was designed in part to complement and continue Wildland Urban Interface (WUI) treatments initiated in the Gibbonsville area in the last decade. Due to legal challenges to earlier fuels reduction proposals (prior to the HFRA of 2003) and the new provisions of the Idaho Roadless Rule of 2008 it was appropriate to re-evaluate opportunities to address fuel reduction needs around Gibbonsville. The Gibbonsville community is within WUI delineated by Lemhi County and a community at risk identified by the HFRA (See additional information in the Fire/Fuel Specialist Report in the project record). The website mapping referred to in this comment displays WUI in the project area. It also identifies Moose Creek Estates and Lost Trail Pass Ski Area as new communities at risk with delineated buffers to display areas where permissions/restrictions for fuels reduction activities apply to Idaho Roadless Areas (IRAs). Project area activities near Gibbonsville are not of the nature or within IRAs which would require mapping of buffers such as displayed in the Moose Creek and Lost Trail vicinities.
3	Regarding the Lost Trail Ski Area and the developments along the North Fork immediately south, aerial images of these locations indicate that the Lost Trail Ski Area is buffered by ski runs, roads and open areas from which trees appear to already have been removed. See Figure 1 at the end of these comments. The developed area immediately south of the Lost Trail ski area has sparse tree cover, contains wetland or riparian vegetation, open meadows and the adjacent forest also has many open slopes and areas of sparse tree cover with pockets of more dense forest on north slopes. This area is also buffered by US Highway 93 ROW and a secondary road to the east, both of which provide access for fire fighting and response actions. See Figure 2 for an aerial image showing these features. Both areas are mapped showing ½ mile and one mile buffers.
Response:	The proposed treatments are designed to protect the Lost Trail Ski Area as a whole and the trees within the area, not just the ski lodge building.
4	Remove the HFRA classification for the larger portion of the currently defined project area and reissue the project in two parts. First, address only the half mile and one mile buffers around the Lost Trail Ski Area and the adjacent community along US 93 under HFRA. An analysis of the canopy, fuel and fire risk to these two specific areas should define the risk using Forest Service models, taking into account the existing forest fragmentation by roads, streams and riparian areas, meadows, open areas and the adjacent forest structure within the half mile and one mile buffers shown.
Response:	The project meets all criteria required under the HFRA Authority.

Comment Number	Comment
5	Issue the remaining Forest Health treatment under a normal NEPA process with additional alternatives developed thru scoping.
Response:	The project meets all criteria required under the HFRA Authority.
6	We find it troubling that Lemhi County has drawn a huge boundary for its CPZ to include vast acreage outside currently developed areas. Lemhi County issues building permits and has control over development within its boundary. One has to ask what ordnances Lemhi County has in place to require non-combustible construction, buffers around structures, non-issuance of permits in areas of high fire and flood hazard, and providing fire protection including hydrants and water storage for fire fighting. Here the US taxpayers are asked to support a massive project such as this because the county has chosen to issue building permits in areas it claims are at risk from fire. The Forest Service has apparently jumped on the bandwagon in order to use this as an excuse to log a large area and escape more stringent NEPA and environmental obligations.
Response:	Lemhi County is the appropriate entity and jurisdiction to delineate the Wildland Urban Interface (WUI) boundary. This process considered existing conditions, terrain and fuels, fire occurrence, location of private and public resources and other factors. More information about this topic is contained in the County Wildfire Protection Plan accessible at http://www.idl.idaho.gov/fire/counties/index.html. As outlined in the Background and Purpose and Need of the DEIS, the Forest Service has the responsibilities to address management needs identified for National Forest lands in the project area. Predicted fire behavior modeling of timber stands and representative fuel types indicates that high intensity fire with rapid rates of spread would be likely under extreme fire-weather conditions. The risk from fire is genuine and the project was designed to respond to the existent situation.
7	A more detailed description of the project that provides data for the current stand structure (dbh breakdown) and the structure following the logging portion of the project is needed. Map locations of areas to be logged on an aerial and topographic image delineating stand type (Douglas fir, aspen, lodgepole, whitebark pine, etc.) and provide a tabulation of the individual stand characteristics so the public has a better understanding of conditions before and after proposed treatments.
Response:	Much of this information can be found in the silviculture specialist report in the current conditions sections. Metrics of change for individual stands is not provided because we are more concerned with how the landscape as a whole will be affected rather than an individual stand. Maps with this exact information will not be made as they are not required, but the information can be found in tables.
8	Map all roads and road classifications showing roads, slopes, soil type (erodibility and favorable or unfavorable for seeding). Show terrain and forest cover image as background to provide further clarifications. Also map those roads to be decommissioned.
Response:	All roads to be decommissioned are mapped. Road classifications, slopes and soil types are located in the Roads and Soils Specialist reports.
9	Provide data showing the amount of timber to be removed (board feet) and sizes to be cut. We are concerned about the removal of live, mature trees that can become old growth, so understanding of just what is to be removed and what is to be left is critical to the public understanding of the project.
Response:	The silvicultural prescriptions for the commercial treatment units are available for every unit in the Unit Card document as well as the silviculture report.
10	Identify aspen areas and provide stand characteristics of aspen and other tree species. The DEIS failed to adequately identify aspen stands and current condition for tree species, recruitment and understory vegetation.
Response:	The project includes a programmatic approach to aspen management.

Comment Number	Comment
11	Overall, the mapping provided on the Salmon-Challis website and in the DEIS tries to combine so much information, we can't relate the project elements such as roads, treatments, riparian buffers, big game winter range and so forth, to the actual vegetation types and conditions, slope, structures, land ownerships, etc. More maps that segregate project elements and provide more relatable details are needed.
Response:	The map package includes a grid system break-down of the large alternatives maps.
12	There needs to be a more detailed description of the vegetation types and conditions occurring in the understory in addition to the forest cover (trees). Provide maps of vegetation types and descriptions of the species, cover and production within those types.
Response:	Much of this requested information can be found in the silviculture specialist report in the current conditions sections. Metrics of change for individual stands is not provided because we are more concerned with how the landscape as a whole will be affected rather than an individual stand. Maps with this exact information as they are not required, will not be made but the information can be found in tables.
13	We support the philosophy of Alternative 2 in which roadless areas will not have any road construction, instead relying on skylining or helicopter tree removal.
Response:	Thank you for your comment.
14	Our major concern is that roads, even decommissioned roads, continue to fragment habitat due to human use.
Response:	Thank you for your comment.
15	We request a more detailed mapping analysis of project roads and those to be decommissioned in section 2 of these comments. Alternative 2 would omit road construction in roadless areas, which we support.
Response:	All roads to be decommissioned are shown on the Alternative maps located within the map package.
16	Decommissioning of all roads should be permanent, with re-contouring, reseeding and blocking of entry points in a manner that is fully effective in preventing vehicle entry. Design parameters, seeding mixes, methods of reclamation should be detailed for each road and soil type. Contracts for timber projects could include these requirements to be achieved upon project completion, with a definite timeline.
Response:	The level of decommissioning of each individual road will be determined based upon the environmental concerns of each road. The design criteria for decommissioning as well as seed mixes, soil types, etc. are located within the Hydrology/Soils report and unit cards.
17	We don't oppose the use of prescribed fire, but recognize that natural vegetation such as sagebrush or other shrubs, grasses and wildflowers occur in the project area and can carry ground fires under normal or dry conditions.
Response:	Thank you for your comment.
18	These communities may occur in various seral stages and we disagree with the DEIS that late seral stages are necessarily a bad thing.
Response:	Thank you for your comment.
19	Similarly for aspen and open conifer forest, grasses, flowers and shrubs can be in a productive and late seral state. There has to be some balance in this approach rather than burn everything to reduce fuels and future fire severity, particularly since the vast majority of the project area can be allowed to function naturally by addressing the buffer zones shown around Lost Trail Ski area and the one developed area described above.
Response:	Thank you for your comment.

Comment Number	Comment
20	A further analysis of plant (tree and understory) ecological status should be done to compare current conditions to appropriate Ecological Site Descriptions. A vegetation/soil map delineating the plant communities and a tabulation of their current and potential species distribution and production should be provided so the public knows the condition of their National Forest and what is to be lost or gained as a result of the project.
Response:	Much of this information can be found in the silviculture specialist report in the current conditions sections. Metrics of change for individual stands is not provided because we are more concerned with how landscape as a whole will be affected.
21	The DEIS waffles on future fire suppression in the area, leaving it open to suppress future fires while admitting that the degradation it says exists in the project area is due to fire suppression. Once this project is completed, it is time to let fires burn and engage in fire protection in the buffer zones around the "real" communities that exist. Lemhi County must be engaged in this fire protection effort as we noted above. It can't be all up to the taxpayers and the ecosystem to bear the expense of lax County rules that allow development in areas that are difficult or expensive to protect. Private landowners also should be obligated to address their property in ways that reduce susceptibility to fire.
Response:	The EIS does not propose a change in the way the Forest Service suppresses wildfire with the exception of the proposed site specific Forest Plan amendment for natural ignitions which can only apply to areas which are covered by a burn plan and thus would have the same effects as a prescribed ignition. The EIS also proposes the use of prescribed fire to help return to a more frequent, low-intensity fire regime. Otherwise all suppression activities would be consistent with annual, national direction and be conducted with a mix of Federal, State and County suppression efforts as they currently are. Private landowners in Lemhi County are always encouraged and educated to help reduce the susceptibility to fire of their properties.
22	We support letting natural ignitions burn.
Response:	Thank you for your comment.
23	Big game winter range would change direction for thermal and hiding cover within Management Area 4A in order to achieve fuels reduction targets of the project. This is problematic as well. Are objectives currently being met? If so there is no need to change. Are objectives not being met? If not, why and will the project cause those to be met? We can't support change without a more detailed analysis, including maps and data describing current conditions and those resulting from the project.
Response:	The purpose and need of the project is the driver for the proposed action. While meeting the hazardous fuels reduction goals, big game habitat – notably for elk – may not meet criteria set forth in the land and resource management plan (LRMP), depending on whether or not we include non-Forest Service ownership if we do, then we will require a project-specific amendment in order to conduct the proposed action. If we do not, no amendment would be required. The cover and forage habitat are addressed against the standards of the LRMP, even though there may be more recent scientific information indicating that the figures we use have changed. The purpose and need of the project may not meet these newer criteria, even if they were the standard in the LRMP, and might require a project-specific amendment, too. We incorporated all design criteria to the extent practicable, knowing some resources may be temporarily compromised in an effort to protect human life and property. We are not changing management direction for winter range. We determined that there will be sufficient hiding cover on available National Forest Service managed lands in big game winter range management areas (prescription MA4).

Comment Number	Comment
24	PACFISH requirements would be changed to modify riparian habitat conservation buffers so that mechanical treatments could be conducted above the road outside of the modified riparian habitat. Once again, maps are needed showing these areas and the plant communities occurring there. There needs to be a better rationale. If roads are inside the riparian buffer, are they roads that are to be decommissioned? Newly constructed? Can the road be relocated outside the buffer?
Response:	The roads associated with the 11 amended RHCA buffers are existing open system roads and will not be relocated as part of this project. Pages 141-143 of the DEIS describe how proposed modified RHCA buffers meet PACFISH requirements. The roads associated with the 11 amended RHCA buffers are existing open system roads and will not be relocated as part of this project. The project file contains unit cards that include detailed maps and identify the specific design criteria and BMPS for each unit.
25	The DEIS admits that ecological integrity is not its objective, but that is SRW's objective. All ecosystem attributes should not be sacrificed due to Lemhi County's ambitious planning document that apparently described the entire area as a community protection zone when there are no widespread communities to protect.
Response:	Thank you for your comment.
26	We support the habitat improvement projects described.
Response:	Thank you for your comment.
27	There was no presentation of water quality or habitat data, particularly sediment impacts to spawning areas for these four species. We don't know the current condition of habitat for these species in the project area. Does data exist? If not, baseline data should be collected prior to project implementation and then repeated measurements during project implementation should determine inputs and impacts so that mitigation can be implemented. A monitoring plan should be included to measure water quality and stream sediment status in spawning areas in affected reaches.
Response:	Water quality and fish habitat data, including current baseline conditions as well as a detailed analysis of sediment impacts, are discussed in the Fisheries Biological Assessment. Ongoing water quality and sediment monitoring efforts within the project area are disclosed on page 136 of the DEIS. We will follow any additional monitoring recommendations identified in National Marine Fisheries Service and U.S. Fish and Wildlife Service fisheries consultations.
28	The DEIS claims that road densities over 3 miles/sq mile don't alter watershed function, however the Middle Fork area has a density of 5 miles/square mile. This should be addressed. Why is the road density this high? Is it due to roads that are to be decommissioned? If so, will decommissioning improve the situation?
Response:	The Middle Fork is not within our project area.
29	As the aerial views show, the project area consists of steep slopes and apparent areas of bare soil, perhaps indicating soils that are highly erodible or don't revegetate quickly, so the premise that vegetation will re-establish quickly may not be true.
Response:	The rate that slopes revegetate will be variable based on soils, slope, aspect, moisture regime etc. The hydrology/Soils report as well as the unit cards provides information about the dominant landtype, moisture regime and revegetation potential for each unit. Three different seed mixes were developed for this project to better fit differing environmental conditions on each unit.
30	As we suggest above, the ability of the different soil types to revegetate or be seeded effectively may result in higher sediment loads. This needs further analysis.
Response:	We have taken this into account different soil types and environmental factors and developed three different seed mixes as describe above. The drier south facing slopes will produce more sediment naturally. Our goal is not to eliminate sediment transport form these sites but to avoid any increase or restore them to natural rates in as short a time as possible.

Comment Number	Comment
31	More details of the water quality and stream habitat impacts resulting from that fire need to be provided.
Response:	More detail of the water quality and stream habitat impacts from fire and the proposed activities can be found in the Hydrology/Soils specialist report located in the project record.
32	Comparisons of stream and water quality conditions pre-fire and post-fire could provide insight as to expectations should the project area burn. Further descriptions of the results of that fire could also provide a better understanding as to what type of areas burned, were any spared and what were their characteristics.
Response:	Water Erosion Prediction Project (WEPP) modeling was completed for each of the treatment units. Tables located in the Soil/Water specialist report provide comparative probabilities of erosion and sediment delivery between existing condition and proposed activities as well as differences between high and moderate wildfire severity and prescribed burning.
33	There appears to be a premise in the DEIS that if habitat for terrestrial wildlife is destroyed or made less suitable, the animals will find habitat elsewhere. This is of concern.
Response:	Effects to each species are assessed in the document. Some animals will be displaced and others may continue to reside in poorer quality habitat. In general, the lower elevation treatments will move habitats in a direction toward increased sustainability over the long term as they become more fire-resilient, where appropriate to forest type. At higher elevations, fuel reduction efforts will reduce the potential that forested stands will experience high-severity, stand replacing fire.
34	The Endangered Species Act prohibits any “adverse modification” of ESA habitat and has a goal of restoring populations. The Forest Service must take a second look at this. The rationale that lynx haven’t been documented recently may reflect prior “adverse modifications” such as roads, timber projects, the Lost Trail Ski Area and other human impacts.
Response:	The biological assessment concluded that the project may affect, but is not likely to adversely affect the Canada lynx. According to US Forest Service and US Fish and Wildlife Service under the Northern Rockies Lynx Management Direction, the Forest is still not considered occupied by Canada lynx. While there is one recent observation, as noted, there still remains no known reproduction on the Forest. Furthermore, within suitable lynx habitat in the project area, efforts were made to reduce the potential impact to lynx and their habitat by not treating in suitable habitat. Short term effects of fuel treatments may affect lynx prey, but should benefit prey in the long term. The lynx is at the southern extent of its range in the US Rocky Mountains, and populations are believed strongly reflect abundance of food more than other suitable habitat factors.
35	Management Indicator Species are listed in the Salmon Challis Forest Plan amendments found online. We may have missed the discussion in the DEIS, but MIS didn’t appear to be addressed. MIS habitat capability and suitability should be analyzed. This is particularly necessary since the Mustang Fire altered a large portion of the North Fork area in 2012 and any prior evaluations are outdated.
Response:	Management Indicator Species were assessed in the analysis process. This includes analysis of the greater sage grouse (no impact), pileated woodpecker (may impact), and Columbia spotted frog (may impact). For the pileated woodpecker and Columbia spotted frog, the project would not impact populations at the forest-scale.

Comment Number	Comment
36	Big game winter range should be protected or enhanced, not altered by allowing negative departures from their habitat needs just to accommodate this project.
Response:	The purpose and need of the project is the driver for the proposed action. While meeting the hazardous fuels reduction goals, big game habitat – notably for elk – may not meet criteria set forth in the land and resource management plan (LRMP), depending on whether or not we include non-Forest Service ownership If we do, then we will require a project-specific amendment in order to conduct the proposed action. If we do not, no amendment would be required. The cover and forage habitat are addressed against the standards of the LRMP, even though there may be more recent scientific information indicating that the figures we use have changed. The purpose and need of the project may not meet these newer criteria, even if they were the standard in the LRMP, and might require a project-specific amendment, too. We incorporated all design criteria to the extent practicable, knowing some resources may be temporarily compromised in an effort to protect human life and property. In the analysis, we have determined that there will be sufficient hiding cover on available National Forest Service managed lands in the project area.
37	Big game winter range should be protected. We note that it is shown adjacent to Gibbonsville along the river strip development. The characteristics of this particular area should be analyzed in detail to determine the actual characteristics of the habitat, current tree spacing, road buffers, river buffers, meadows, riparian, buffers and open areas around structures, rather than just treating it as part of the overall project area.
Response:	The purpose and need of the project is the driver for the proposed action. While meeting the hazardous fuels reduction goals, big game habitat – notably for elk – may not meet criteria set forth in the land and resource management plan (LRMP), depending on whether or not we include non-Forest Service ownership If we do, then we will require a project-specific amendment in order to conduct the proposed action. If we do not, no amendment would be required. The cover and forage habitat are addressed against the standards of the LRMP, even though there may be more recent scientific information indicating that the figures we use have changed. The purpose and need of the project may not meet these newer criteria, even if they were the standard in the LRMP, and might require a project-specific amendment, too. We incorporated all design criteria to the extent practicable, knowing some resources may be temporarily compromised in an effort to protect human life and property. (In the analysis, we have determined that there will be sufficient hiding cover on available National Forest Service managed lands in the project area.
38	Northern goshawks have not been observed in the area. The question is not their absence, but whether there is suitable habitat. If sufficient habitat exists, it should be retained and the analysis should determine if, as we suggest above, other activities have displaced goshawk from otherwise suitable range.
Response:	There is one northern goshawk observation in the area, near Lick Creek, and separated from the nearest unit by a prominent ridge. The only treatment that would occur in or near this observation is broadcast burning. This type of treatment is unlikely to adversely impact northern goshawks and is more likely to improve foraging habitat conditions for the bird. The analysis included an assessment of suitable habitat in the project and potential impacts.
39	The DEIS estimates approximately 5,000 acres within the project area contain invasives such as spotted knapweed, Canada thistle and other invasive species. It appears that little will be done to prevent further expansion of these invasives and the disturbance by the proposed project will exacerbate the problem.
Response:	Design Criteria (Appendix A) which incorporate a wide range of prevention methods are a part of the project. The design features were developed to prevent further expansion of Canada thistle and other invasive species.
40	Engage Lemhi County in addressing weeds on private property thru their regulatory mechanisms. A plan should be developed in conjunction with the County to directly address the invasives issue.
Response:	Actions on private lands are beyond the scope of this project. Lemhi County is already engaged in parternships with the Forest Service to address these invasive plant issues. The SCNF cooperates with Lemhi County and the State of Idaho on an ongoing basis to manage invasive species on the lands they are each responsible.

Comment Number	Comment
41	Control invasives on all roads for the project and other roads in the project area. Road closures and vehicle restrictions should be implemented.
Response:	In alternative 2 the “No new temporary road construction” alternative the effects to weeds have been described. Some reduction of weed risk form roads was noted in that alternative, however increases in other treatment methods allow for a slight reduction in weed risk.
42	Treat all known infestations each year and monitor the results. Treatments should continue until the invasives are eliminated.
Response:	Specific weed treatments are not a part of this project. Treatments and monitoring are ongoing across the SCNF (refer to the forest wide FEIS for weed management at: http://www.fs.usda.gov/detail/scnf/landmanagement/planning/?cid=STELPRDB5310492 All projects on the SCNF include elements to prevent weed spread in accordance with the 2003 Programmatic Weed Management FEIS. The goal of ongoing treatments is the removal of invasive species.
43	Invasives appear to be an accepted externalized cost of doing business, however, the true cost needs to be analyzed and funded out of project proceeds as part of the project.
Response:	Funding sources vary year by year for invasive species management practices. Treatments are ongoing across the SCNF (see comment #43).
44	Determine the board feet of timber to be removed, the costs and revenues.
Response:	The EIS describes the desired future condition of each stand type, not the board feet of timber being removed. The objective is hazardous fuels reduction and ecosystem restoration, not timber volume produced. This cost information was not required as part of the analysis. Costs and revenues will vary year to year and location to location.
45	Determine the costs for road construction and rehabilitation of roads.
Response:	This information was not required as part of the analysis. Costs will vary year to year and location to location.e
46	Determine the costs for weed control as we describe above.
Response:	Please see cost analysis.
47	Determine the Forest Service administrative costs for the project by item.
Response:	This information was not required as part of the analysis however, some of these costs are available in the cost analysis which was created in response to comments from the DEIS.
48	While the DEIS provided a fairly detailed review of literature on climate change and silviculture, it didn’t actually calculate current and potential carbon storage, energy and carbon emissions generated through the various activities and whether the timber to be removed is to be used for fuels or construction lumber.
Response:	This information was not required as part of the analysis. The timber removed may be used for whatever the purchaser chooses.
49	There is a percentage of waste when generating construction products that also should be included in the accounting.
Response:	This is not required in the analysis.

Comment Number	Comment
50	Life cycle analyses of fuel reduction treatments including removal of woody biomass, combustion of fuel in logging machinery, transport, burning of slash, milling energy use, and other factors lead to the conclusion that over the long term, carbon losses from treatment projects may exceed those from wildfire because most of the carbon mass remains on site unburned during fire . This analysis should be a companion to the economic analysis described above.
Response:	A detailed carbon loss analysis is not required as a part of this analysis.
51	The DEIS has not fully addressed the Forest Service Roadmap, nor has it addressed conservation of habitats and reduction of non-climate stressors to help fish and wildlife adapt in accordance with the National Fish, Wildlife and Plants Climate Adaptation Strategy. These should be identified, described and appropriate mitigations proposed for implementation as part of the project that will enhance the ability of wildlife species to remain in the project area by reducing fragmentation, human presence, invasive species, hunting, trapping and off road vehicle impacts (see attachment).
Response:	Addressing the Forest Service Roadmap is not required for this analysis. Several Design Criteria (Appendix A) have been developed to prevent impacts from weed as a result of project implementation (see comment # 40).

Idaho Conservation League (Jon Robison) – 05/19/2014

Comment Number	Comment
1	The Idaho Conservation League supports the overall goals of wildlife habitat restoration and hazardous fuel reduction.
Response:	Thank you for your comment.
2	We do have concerns that the intensity and locations of the fuel reduction projects may have adverse impacts to wildlife and wildlife habitat. We did not feel these issues were adequately assessed in the present document and believe that additional steps should be taken to avoid, minimize and mitigate these impacts. These steps could involve adjusting the treatment locations and prescriptions or developing additional design features.
Response:	Treatment locations developed are designed to manage the wildfire threat (decrease severity) and should not eliminate wildlife habitat. While impacts to wildlife are certain, we believe they are not significant, and that the reducing the risk of fire is greater than slight modifications to habitat. This way, we reduce the threat that large areas of habitat area lost in a severe fire.
3	We recommend that the Forest Service either develop a Supplemental Draft Environmental Impact Statement or submit a Draft Record of Decision with an Objection Period to ensure that the public has the opportunity to review and comment on these changes.
Response:	We will be submitting a Draft ROD with an Objection Period when the FEIS is released. Thank you for your comment.
4	We appreciate the inclusion of 3 new culverts, the 150 meters of improved fish passage and the 3 miles of stream restoration.
Response:	Thank you for your comment.
5	We support and appreciate the 67 miles of road decommissioning and the resulting reduction in road densities.
Response:	Thank you for your comment.

Comment Number	Comment
6	We prefer the 11.6 miles of temporary roads in Alternative 2 rather than the 26.1 miles in Alternative 1 which will have increased soil impacts. Should Alternative 1 be selected, we recommend the development of additional design features to minimize soil disturbance, noxious weed and habitat fragmentation.
Response:	Thank you for your comment. Please see the Design Criteria listed in Appendix A.
7	Under HFRA, the Forest Service must design the project to maximize the retention of large-diameter trees.
Response:	In the Roadless analysis in Chapter 3 of the FEIS there is a section that addresses the consistency with the Idaho Roadless Rule defines large trees as the largest and healthiest trees in the stand. There are no exact size limits for a tree to be considered a large tree, it is all relative.
8	For example, the Soda Bear Project on the Malheur National Forest started with a prescription that preserved all trees with old growth characteristics and all trees 21" dbh and greater. They then incorporated a design feature that allowed for tree removal of trees greater than 21" if they were determined to be less than 150 years old. They also added a design feature to address the circumstance when a large diameter tree is competing with an even larger, more desirable tree and poses a risk to the larger tree. From the center of the larger, more desirable tree, the Forest Service established a circle equivalent to two times the diameter of the drip line. Should a less desirable tree occur within this area, it could be considered for removal. We recommend developing a similar set of criteria which will accomplish both the fuel reduction goals and the wildlife habitat protection goals.
Response:	Thank you for your comment and for the example of the Soda Bear Project. Our prescribing silviculturist will consider it when writing specific unit prescriptions. We have chosen to allow the diameter limit to vary based upon the size classes found in each individual stand and prescriptions will be written for each unit on a case by case basis after the unit has been walked again prior to implementation. We will not be removing trees in designated old growth stands and all prescriptions call for leaving the largest and healthiest trees
9	We support the proposed amendment #1 allowing unplanned ignitions to meet project objectives.
Response:	Thank you for your comment.
10	Vegetation and fuel treatments designed to open up stands will decrease security cover for elk, fisher, wolverine and lynx as well as habitat for pileated woodpeckers, flammulated owls and goshawks. To help compensate for this decreased security, we recommend adjusting the prescriptions and treatment locations so that wildlife corridors and core areas are not adversely impacted. Specifically, hazardous fuel reduction should be prioritized within the Communities at Risk Half Mile Buffer more than the Communities at Risk Mile and a Half Buffer and other areas.
Response:	Thank you for your comment -Impacts to Threatened, Endangered, Proposed, Sensitive, and Management Indicator Species were analyzed for the project. While there may be measureable impacts to the habitat for some of these species, in general the treatments would reduce the risk that large portions of habitat would be lost in a severe wildfire.
11	The Forest Service should consult with Idaho Department of Fish and Game to ensure that sufficient cover is retained to provide security for wildlife.
Response:	We do and have coordinated with the IDFG and they are a part of the Collaborative group that we work with.
12	We note that the Description of Proposed Action and Alternatives in Chapter 2 lacks any reference to Appendix A which contains 148 integrated design criteria, including in part wildlife recommendations provided by the Lemhi Forest Restoration Group. We recommend that the Forest Service consider and incorporate the criteria described in Appendix A.
Response:	Thank you for your comment, we will incorporate a reference in Chapter 2.

Comment Number	Comment
13	We recommend pre and post-treatment surveys for Flammulated Owls, Great Gray Owls and Northern Goshawks.
Response:	In lieu of surveys, managing to protect habitat as best as possible was our best option. During project activities, any discovered raptor nests would be and protected (Design Criteria #133).
14	We also recommend the retention of clusters of snags in stands and specifically those trees with broken tops, cavities, lightning scars, and dead portions as available.
Response:	Suitable trees and snags will be left on site to the extent practicable. See design criteria #132 and #136.
15	Regarding mountain goats, both helicopters and new road construction and associated activities may adversely impact this species. We recommend that the Forest Service analyze which approach, if any, would be best for minimizing impacts and if any seasonal timing restrictions for treatments should be incorporated.
Response:	We did not analyze mountain goats for this project as we are not required to under the Endangered Species Act or National Forest Management Act. The mountain goat is not threatened or endangered, listed as a Regional Forester's Sensitive species, nor listed as species to analyze under the LRMP. The mountain goat is no longer a Management Indicator Species for the Forest. That being said, the nearest helicopter unit is about 1.5 miles (2.4 kilometers) from known mountain goat observations (USFS database). The three units on the west side US 93 are 1.6 to 2.2 miles distant, and are separated by a tall ridge and other lower ridges from the observations. The units on the east side of US 93 are from 1.5 to 3.4 miles distant. The two smaller, closer units face generally south, away from the known goat observations. The largest unit is on a northwest-facing slope (above Pierce Creek) and a ridge generally separates it from direct line-of-sight with the goat observations. We believe this adequately addresses the concern with the proximity of goat observations.
16	Vegetation management should be designed to maintain or promote habitat requirements for Nest Areas, Post Fledging Family Areas and Foraging Areas.
Response:	Impacts to northern goshawks were analyzed. Broadcast burning is the only treatment proposed in any known goshawk sites, and would benefit goshawks, particularly in promoting foraging habitat characteristics. In general, retention of identified old growth and minor ladder fuel treatment in these stands will aid in protecting them from consumption during prescribed fire application and in the event of a wildfire.
17	Regarding road decommissioning, we recommend removing all culverts from unneeded roads and laying slash across the initial stretch of road to discourage illegal motorized use. We recognize that if some roads have already revegetated, it may be acceptable in certain circumstances to not conduct additional obliteration activities.
Response:	Thank you for your comment. Appendix A Design Criteria #121 addresses your comment.
18	For aspen and whitebark pine stands in the project area, we recommend removing or girdling encroaching conifers, consistent with the diameter recommendations above. Prescribed fire or scarification may also be needed to stimulate aspen suckers.
Response:	Encroaching conifers will be removed to help promote healthier Whitbark Pine and Aspen stands. This will be handled in the prescription for each stand.
19	Because grazing by sheep, cattle, deer or elk may adversely affect aspen sucker regeneration, the Forest Service should discourage grazing in these areas by modifying livestock herding patterns and timing and by stacking felled conifers around the aspen stand to serve as natural fencing.
Response:	There are no grazing allotments located within this project area.

Comment Number	Comment
20	We understand that a Forest Plan amendment is being proposed which would allow for mechanical treatments within the RCA on the uphill side of existing roads. We are still concerned about sedimentation and stream temperature issues. Even with a road between the harvest unit and the stream, sediment from timber harvesting can be channeled along ditches and go in culverts under the road into streams. Depending on the slope and aspect, tree removal may decrease shade cover over water. We recommend developing additional design features to address these concerns. These may include leaving additional woody material to intercept surface flows, incorporating diameter or height limits on trees, or modifying the type of equipment used. We recommend coordinating with the US Fish and Wildlife Service and NOAA Fisheries on these design features.
Response:	Detailed analyses of project effects to sedimentation and stream temperature can be found in the Fisheries Biological Assessment and in the project Hydrology/Soils report. Through Endangered Species Act consultation we are coordinating with both the U.S. Fish and Wildlife Service and NOAA Fisheries. Any additional design features recommended by the consulting agencies will be incorporated into the project.
21	Snag densities should reflect the variability across the landscape that is illustrated by the different PVGs occurring in the project area. Snag densities should vary, roughly according to a normal statistical distribution. The majority of snag densities across the project area should fall within 1-2 standard deviations of the mean snag densities required for white-headed woodpecker or flammulated owl as found in current research. If there is a lack of snags in the project area, the need is highlighted to recruit additional snags over time. Snag management is addressed in design criteria # 132 and #136.
Response:	With the recent mountain pine beetle outbreak, the increase in Douglas-fir Beetle, and spruce budworm there is no lack of snags in the project area. However, snag density is something that could checked during monitoring post-implementation to ensure we maintain enough large snags for wildlife benefit.
22	We support the goal of reducing the risk of uncharacteristic wildfire.
Response:	Thank you for your comment.
23	The silvicultural prescriptions for the project should be designed to compliment any natural fuel breaks in the local landscape. Instead of utilizing the same prescription throughout the project areas, we suggest using a mosaic approach that would result in a more naturally appearing landscape consistent with the potential vegetation groups at each soil type, aspect, and elevation.
Response:	All of the prescribed burning would attempt to mimic what fire would look like naturally. Although the entire project area has been analyzed for prescribed fire, not every acre will be black. Natural features, varying fuel types, aspect, elevation and time of year will all contribute to creating a naturally appearing fire scar. The general silvicultural prescription for the project is to thin from below but of course this will be tailored to suit the needs of the landscape and conditions at the time of implementation.
24	We recommend the utilization of slash piles from restoration activities for biomass or for firewood supplies.
Response:	Thank you for your comment; this is an opportunity we would like to pursue.
25	In order to facilitate firewood gathering in a sustainable manner, the Forest Service should separate usable firewood from any excess slash piles.
Response	Thank you for this suggestion. This may or may not be economically feasible during commercial operations.
26	Before any areas are opened for firewood gathering, the Forest Service should clearly mark trees and snags important for wildlife habitat.
Response:	The Salmon-Challis does not open up commercial units for firewood gathering. Please reference our personal-use firewood permit requirements for other provisions.

Comment Number	Comment
27	We support whole tree yarding to landings.
Response:	Thank you for your comment.
28	Skid trails should be designed and managed to reduce impacts to soils. For units where soil disturbance is a concern, we recommend that the Forest Service consider ground hauling over sufficient snow and frozen roads.
Response:	Design Criteria (Appendix A) are in place to reduce impacts to soil from skidding.
29	We also recommend taking proactive steps to prevent the introduction of noxious weeds and taking aggressive steps to control or eliminate existing noxious weed infestations. Before implementation of these projects, the Forest Service should ensure that all equipment has been thoroughly washed to remove noxious weed seeds and debris that might result in the introduction of such species on public lands.
Response:	Design Criteria (in Appendix A) have been developed specifically for noxious weed control through washing of equipment and other preventative methods.
30	The DEIS for the Upper North Fork project needs to prioritize the establishment of a comprehensive monitoring program for fisheries, wildlife, and associated habitat.
Response:	Monitoring plan is located at the end of Appendix A.
31	The Forest Service should complete full consultation with the US Fish and Wildlife Service and NOAA Fisheries to evaluate impacts and monitoring strategies in order to evaluate the effectiveness of the proposed forest treatments in regards to fish and wildlife species and habitat.
Response:	Thank you for your comment. Consultation with the Services is underway and will be completed prior to decision.
32	With regard to lynx, the Forest Service should ensure that all treatments and monitoring programs are consistent with the management direction of the Northern Rockies Lynx Management Direction (NRLMD). The Forest Service should consult with Fish and Wildlife Service on forest spacing, species composition, and pruning in regards to linkage zones and migration corridors. Downed logs and timber must be retained in these linkage zones.
Response:	A biological assessment was prepared for this project, and submitted as part of consultation with the US Fish and Wildlife Service. As the Forest is currently considered unoccupied as per the NRLMD, the Forest is not obligated to adhere to the guidelines found in that document. However, the Forest has done so to the extent practicable by designing treatments to address the hazardous fuel situation and retain suitable lynx habitat over much of the landscape where it is found.

Idaho Department of Fish and Game (Tom Curet) – 05/19/2014

Comment Number	Comment
1	Our assessment of the proposed alternatives suggests that elk security cover will be maintained consistent with Christensen et al. (1993).
Response:	Thank you for your comment.
2	IDFG recommends at least 25% of hiding and/or thermal cover, or as close to this number as possible, is maintained throughout the project area.
Response:	Thank you for your comment. The purpose and need of the project is the driver for the proposed action. While meeting the hazardous fuels reduction goals, big game habitat – notably for elk – may not meet criteria set forth in the land and resource management plan (LRMP), depending on whether or not we include non-Forest Service ownership If we do, then we will require a project-specific amendment in order to conduct the proposed action. If we do not, no amendment would be required. The cover and forage habitat are addressed against the standards of the LRMP, even though there may be more recent scientific information indicating that the figures we use have changed. The purpose and need of the project may not meet these newer criteria, even if they were the standard in the LRMP, and might require a project-specific amendment, too. We incorporated all design criteria to the extent practicable, knowing some resources may be temporarily compromised in an effort to protect human life and property. In the analysis, we have determined that there will be sufficient hiding cover on available National Forest Service managed lands in the project area.
3	Given that the Salmon Forest Plan Standards and Guidelines related to big game winter range is dated (> 25 years old) as it pertains to current knowledge of elk management, we recommend the Final EIS incorporate habitat suitability elements that reflect current body of scientific literature and management direction outlined in our 2014 Idaho Elk Management Plan.
Response:	Elk winter range managed by the Salmon-Challis NF occurs in a portion of the project area. An important feature of winter range includes high quality woody shrub availability. This project has in place design criteria to protect important browse plants (mahogany and aspen, for example). Treatments, in particular prescribed fire, would lead to an increase in early seral vegetation diversity that is beneficial for winter browse. We also determined that there will be sufficient hiding cover on available National Forest Service managed lands in big game winter range management areas (prescription MA4).
4	We are concerned that ladder fuels treatment along ingress/egress routes would reduce big game security cover along roads.
Response:	Thank you for your comment. The primary objective of hazardous fuels reduction along the ingress/egress routes is firefighter safety. In addition, the roads in questions were identified as areas for successful fire suppression action to take place. This 400 foot ladder fuels reduction will not occur along ALL roads as was mistakenly implied in the DEIS. In our analysis, the fuel break units wherein a 400 foot ladder fuel treatment distance would be applied are identified (see the wildlife report). These account for but a few of the treatment areas. For the most of the project area, treatments will not be as intensive.
5	Alternative 1 of the DEIS states that in non-mechanical treatment units, ladder fuels would be reduced to 400 feet on either side of access roads. IDFG recommends this distance be reduced to a maximum of 200 feet on either side of the road. This would closely approximate the standard that states security cover is adequate at a distance of 200 feet when 90 percent of an adult elk is hidden from view by vegetation (Thomas et al. 1979). We also recommend that the DEIS specify to which access roads this type of treatment will be applied and present that information in a table format. In addition, we recommend the SCNF evaluate the level of travel use of SCNF system roads and only apply treatments to those roads with the highest fire-start risk or potential.
Response:	The treatments you are describing are only associated with designated “shaded fuel break” units not on either side of access roads. The shaded fuel break units can be seen on the map. The 400 foot distance ladder fuel treatment would be applied in a few select areas. These account for but a few of the treatment areas. For the most of the project area, treatments will not be as intensive. There is a map in the wildlife report in which these are readily identified.

Comment Number	Comment
6	Travel management of temporary and existing closed roads during project implementation will be crucial to big game security and vulnerability, particularly during hunting seasons. Integrated Design Feature #19 (Appendix A page 349) addresses control of public access on some routes in a general sense, but not specifically for big game security. The IDFG recommends enhancing the design feature to include the importance of maintaining road closures for big game security and vulnerability. Integrated Design Feature #141 (Appendix A page 363) is more specific, but only mentions three roads. We recommend the Integrated Design Feature be expanded to explicitly state how and when all temporary and existing closed roads will be managed to mitigate potential effects to big game security and vulnerability. We also recommend that for temporary roads the final EIS specify if these roads will be gated or otherwise travel-restricted during project implementation.
Response:	Existing road access management would not be changed for this project. Security and vulnerability as it pertains to motorized access would not be affected by this project. Travel management and road access information are available from the Salmon-Challis NF.
7	The DEIS and subsequent Final EIS needs to ensure fuel treatment projects avoid or minimize disturbance on big game populations, as well as ensuring big game animals have ample opportunity to avoid and escape treated watersheds and have security cover in adjacent watersheds not actively treated.
Response:	Thank you for your comment. Fire and fuels staff worked closely with district wildlife biologists to ensure proposed treatments met the needs of big game animals and paid close attention to adjoining habitats to minimize disturbance and provide adequate security cover. We will implement fuels treatments in stages to help minimize disturbance to big game animals.
8	We recommend that fuel treatments are implemented in stages by watershed to minimize disturbance. One of the bullet points under Integrated Design Feature #132 (Appendix A pages 360 and 361) states that logging and road building activities will be planned to provide suitable displacement areas for big game. We recommend this be revised to be specific about timing of treatment applications at the watershed level, as well as the individual unit level within a watershed. Ideally, the IDFG would recommend that adjacent watersheds are not treated simultaneously during the same year.
Response:	The Design Features that you have referenced are intended to cover the concerns you have mentioned. In addition, there is opportunity for Fish and Game to participate in developing an implementation plan for fuel treatments to manage potential impacts to wildlife that are related to timing of activities.
9	Given the proximity of this subpopulation of mountain goats to proposed helicopter treatment units, we recommend flight paths, distance from heli-treatment units, and line-of-sight distances provide a 2-km buffer from known mountain goat areas. In addition the IDFG recommends that the final DEIS flight paths, distance from heli-treatment units, and line-of-sight distances be evaluated to avoid or minimize disturbance impacts to mountain goats.
Response:	We did not analyze mountain goats for this project as we are not required to under the Endangered Species Act or National Forest Management Act. The mountain goat is not threatened or endangered, listed as a Regional Forester's Sensitive species, nor listed as species to analyze under the LRMP. The mountain goat is no longer a Management Indicator Species for the Forest. That being said, the nearest helicopter unit is about 1.5 miles (2.4 kilometers) from known mountain goat observations (USFS database). The three units on the west side US 93 are 1.6 to 2.2 miles distant, and are separated by a tall ridge and other lower ridges from the observations. The units on the east side of US 93 are from 1.5 to 3.4 miles distant. The two smaller, closer units face generally south, away from the known goat observations. The largest unit is on a northwest-facing slope (above Pierce Creek) and a ridge generally separates it from direct line-of-sight with the goat observations. We believe this adequately addresses the concern with the proximity of goat observations.

Comment Number	Comment
10	Lost Trail and Chief Joseph passes, at the north end of the project area, are identified as lynx linkage areas. Preserving these connectivity corridors is particularly important to the conservation of boreal species at the southern edge of their distributions in the U.S. Rocky Mountains, including lynx, wolverine, fisher, grizzly bear, gray wolf, and other forest carnivores.
Response:	Thank you for your comment. The units in question were looked at in great detail between fire and fuels staff and district wildlife biologist. In the Chief Joseph vicinity the units were identified as areas critical for hazardous fuels reduction for many reasons that include the vicinity to a busy highway and the fact that they are at the top of a major ridge that would be the only feasible line of defense for fire fighters should a fire get established between Hwy. 93 and the Anderson Mountain Road. In the Lost Trail Pass vicinity the units in question were also identified as areas critical for hazardous fuels treatment to help protect the Lost Trail Ski Area. The north-south ridge line that runs through the center of unit 16 would be the first line of defense for fire fighters should a fire get established west of the ridge in question. The analysis of these treatments units projected that existing canopy cover of 50-80% would be reduced to 40% or less following thinning and under burning. The wildlife biologist, in working with the US Fish and Wildlife Service, determined that with these projected changes there would be adequate remaining habitat in the vicinity of these mountain passes to provide an east-west linkage corridor for lynx, wolverine and other forest carnivores.
11	Additional fuel treatments proposed in the DEIS and those associated with Chief Joseph ski trail maintenance have the potential to further impede movement of lynx, wolverine, and other forest carnivores along this divide.
Response:	Thank you for your comment. The Chief Joseph units were not designed for ski trail maintenance; the units were identified as areas critical for hazardous fuels reduction for many reasons that include the vicinity to a busy highway and the fact that they are at the top of a major ridge that would be the only feasible line of defense for fire fighters should a fire get established between Hwy. 93 and the Anderson Mountain Road. The purpose and need for hazardous fuel treatments is the driver for this project. The impacts to wildlife that would inhabit the area or use it transitionally were analyzed, including an assessment of potential cumulative effects from other activities. The biological assessment concluded that the project may affect, but is not likely to adversely affect the Canada lynx or wolverine. According to US Forest Service and US Fish and Wildlife Service under the Northern Rockies Lynx Management Direction, the Forest is still not considered occupied by Canada lynx. While there is one recent observation, there still remains no known reproduction on the Forest. Furthermore, within suitable lynx habitat in the project area, efforts were made to reduce the potential impact to lynx and their habitat by not treating in suitable habitat. Short term effects of fuel treatments may affect lynx prey, but should benefit prey in the long term. The lynx is at the southern extent of its range in the US Rocky Mountains, and populations are believed strongly reflect abundance of food more than other suitable habitat factors.
12	Given the existing, cumulative human footprint on Lost Trail/Chief Joseph passes proper, we recommend a modification of fuel treatments proposed in units immediately south of these passes to create a strategic east-west linkage corridor with vegetative attributes suitable for lynx, wolverine, and other forest carnivores. This would entail modification of fuel treatments to retain ≥40-50% canopy cover (Poole et al. 1996, Lofroth et al. 2010) and judicious use of broadcast burning to minimize loss of down woody material (i.e., blowdown, deadfall) and dense, shrubby understory.
Response:	Thank you for your comment. In the wildlife BA we analyzed the effects to lynx and wolverine, and determined that there would not likely be an adverse effect, with review from the US Fish and Wildlife Service. Treatments may impact other forest carnivores, and we analyzed the impact to fishers. Prescribed fire treatments are likely to retain suitable canopy cover; silviculture treatments will vary in impact from greatly reducing cover habitat in the fuel break to less reduction in precommercial thinning. We believe there will be adequate dense forest cover remaining on the landscape to the south of the treatment units to provide suitable cover habitat for carnivores to move through the project area.

Comment Number	Comment
13	In the Chief Joseph vicinity, we recommend these modifications be applied to units 36, 38a, 38b, 39, 40, and 42. In the Lost Trail Pass vicinity, we recommend these modifications be applied to units 16, 35, and 184. These changes will mitigate existing and proposed impacts to the Lost Trail/Chief Joseph lynx linkage area, will facilitate present and future movement opportunities for a wide range of wildlife, and will direct wildlife use to relatively undisturbed habitats within Inventoried Roadless Areas.
Response:	Thank you for your comment. I believe your concern here is the same for comment 10. Our response would be the same. We believe there will be adequate dense forest cover remaining on the landscape to the south of the treatment units to provide suitable cover habitat for carnivores to move through the project area.
14	A stated primary objective of this Project is to improve habitat diversity for fish and wildlife. This can be accomplished if treatments are implemented in stages, in space and time, across the Project Area.
Response:	Thank you for your comment. The treatments will be implemented in stages over space and time across the Project Area. There is opportunity for participation in developing an implementation plan for fuel treatments to manage potential impacts to wildlife that are related to timing of activities.
15	Aggressive treatments to reduce canopy cover, ladder fuels, and surface fuels across the entire project area will not be compatible with fisher habitat requirements. This concern is heightened due to the significant and cumulative loss of fisher habitat in the North Fork Ranger District from the 2012 Mustang Fire. We have similar concerns with potential lynx denning habitat and foraging habitat for boreal owl and northern goshawk.
Response:	Impacts to fisher and other old forest-dependent species were analyzed for the project. While there was a loss of mature, relatively dense forested habitat in the Mustang fire, some suitable habitat remains, in particular in riparian areas that did not burn so severely. Furthermore, the whole of the Mustang fire perimeter did not burn severely and some forested habitat remains. The Salmon River mountains and central Idaho are populated by fishers at lower densities than northern Idaho, and large fires are more common here than further north. As such, local populations are subject to the influence of fire more so than northern populations. While this project may impact fisher habitat quality within the North Fork drainage in the short term, in the long term we feel it alleviates some risk that the whole upper North Fork drainage may be lost to a severe fire. We feel that the impacts of the project would not lead to a trend toward federal listing given their relatively secure status with the US Fish and Wildlife Service and US Forest Service Region 1 in northern Idaho and western Montana.
16	Integrated design features in Appendix A of the DEIS give procedural direction for burns conducted in designated old growth (#140), but do not address retention of key structural elements of fisher (or lynx) habitat (down woody material, snags) in the remaining treatment units. We suggest a design feature be developed and implemented to retain a greater portion of surface fuels than proposed. This might be addressed by selective prescribed burning in smaller acreage units (e.g., ≤500 acres).
Response:	If you refer back to Appendix A #140 we do address your concern here. Old growth units will not have any direct ignitions but fire will be allowed to move into these areas on their own; this should address your concerns and meet the needs of the species in questions. Regarding prescribed fire size in designated old growth, the majority of the stands are less than 500 acres. Furthermore, there is ample source material available from other fires in the project area boundary (Frog Pond and Sula fires) and there will be patches of available material created from prescribed burning. That is to say, the burning operations will consume some fuels that are on the ground, but will also create more for future availability. In general, we would expect the available down wood to remain available in the old growth units.
17	We are concerned that under-burning in old growth units may remove structural characteristics unique to this mature forest class and important for a range wildlife species reliant on old growth habitat. We recommend the final EIS better define old growth objectives and strategies.
Response:	Design Feature 140 in Appendix A gives a good description of what treatments will be done in Designated Old Growth. In general, we would expect the available down wood to remain available in the old growth units because we would not directly set fire in these units. While we may thin ladder fuels in the road accessible old growth habitat, our goal is to retain these treated units on the landscape as functioning old growth.

Comment Number	Comment
18	Since 2000, several large (>1,000 acres) wildfires burned portions of the North Fork Ranger District and neighboring Bitterroot and Beaverhead-Deerlodge National Forests within and surrounding the project area. We recommend that the DEIS recognize the occurrence of these wildfires and analyze the action alternatives cumulatively with these wildfire effects in mind.
Response:	Thank you for your comment. Analyzing cumulative effects requires focusing on the resource (fire/fuels), ecosystem, and human community that may be affected and developing an adequate understanding of how the resources are susceptible to effects. Cumulative effects analysis on natural systems must use natural ecological boundaries and analysis of human communities must use actual sociocultural boundaries to ensure including all effects. For fire and fuels the spatial context for specific treatments and the cumulative effects boundary is approximately 135,385 acres. This boundary is the North Fork of the Salmon River Hydrological Unit Code 5. It was selected because it encompasses the full extent of the direct and indirect effects of the proposed action and alternatives. Please refer to pp.32-33 of the fire/fuels specialist report. For wildlife, the cumulative effects were analyzed at a scale that was appropriate and different for each species. Because the project area is so large, the boundary itself was often suitable for a cumulative effects analysis, except for wide ranging species like lynx where we analyzed adjacent lynx analysis units. Nevertheless, we have taken this issue into consideration and will address it in the wildlife report and final analysis.
19	We request that the Final EIS evaluate the proposed fuel treatment's interaction with previous wildfires (e.g., Mustang, Saddle, Black Frog, Rombo, Frog Pond, Elkhorn, Bear Spring) for cumulative effects on populations and habitat for lynx, wolverine, fisher, boreal owl, flammulated owl, northern goshawk, black-backed woodpecker, and pileated woodpecker.
Response:	Thank you for your comment. Analyzing cumulative effects requires focusing on the resource (fire/fuels), ecosystem, and human community that may be affected and developing an adequate understanding of how the resources are susceptible to effects. Cumulative effects analysis on natural systems must use natural ecological boundaries and analysis of human communities must use actual sociocultural boundaries to ensure including all effects. For fire and fuels the spatial context for specific treatments and the cumulative effects boundary is approximately 135,385 acres. This boundary is the North Fork of the Salmon River Hydrological Unit Code 5. It was selected because it encompasses the full extent of the direct and indirect effects of the proposed action and alternatives. Please refer to pp.32-33 of the fire/fuels specialist report. Effects to wildlife from the proposal are addressed in the analysis. The past effects of timber harvest and wildfires were taken into consideration as part of the existing condition, and served as the basis for changes projected to occur from proposed fuels reduction activities. For wildlife, the cumulative effects were analyzed at a scale that was appropriate and different for each species. Because the project area is so large, the boundary itself was often suitable for a cumulative effects analysis, except for wide ranging species like lynx where we analyzed adjacent lynx analysis units. Nevertheless, we have taken this issue into consideration and will address it in the wildlife report and final analysis.
20	As referenced above in the case of fisher, we are concerned that proposed fuel treatments may further reduce habitat suitability for several forest-sensitive species already affected by large-scale wildland fire disturbance in the surrounding landscape.
Response:	We acknowledge there may be impacts to some species. However, we believe that the impacts will not lead to a listing with the US Fish and Wildlife Service. We believe that habitat suitability may be impacted, but that in the end there will remain suitable habitat in the project area. Ultimately, the alternative we analyze under the HFRA, a severe wildfire, presents a worse condition than the relatively minor treatments on the landscape under the action alternatives.
21	The DEIS recognizes aspen and whitebark pine as important elements of habitat diversity within the project area. Proposed actions call for enhancing these species through opportunistic treatments (prescribed burns, removal of competitive species) wherever they occur. While this approach is practical, it does not provide quantifiable targets to ensure landscape restoration goals for aspen and whitebark pine will be met.
Response:	We do not have any landscape restoration goals to meet. The Forest as a whole is in the beginning stages of restoration for these at risk species and we will treat them appropriately where they occur

Comment Number	Comment
22	Our main concern is to limit, as best as possible, sedimentation impacts on fish habitat in the Project Area.
Response:	The Upper North Fork HFRA Ecosystem Restoration Project was specifically designed to limit sedimentation impacts on fish habitat by incorporating BMPs and Integrated Design Features (Appendix A of the DEIS). Analyses of project effects on fish habitat from sediment is included in the DEIS on pages 140-146 and in the Fisheries Biological Assessment.
23	Best Management Practices in the DEIS found in Appendix A. Integrated Design Features (Pages 352-359) appear robust enough to help minimize fine sediment from entering stream channels. However, there will be instances when intense precipitation events will occur on bare soils and the Forest Service and/or timber harvest contractors will have to take expedited measures using appropriate BMPs are being implemented and followed to limit and control sediment movement.
Response:	We will minimize the potential for intense short duration storm related effects by minimizing ground disturbance and maintaining as much ground cover as possible. Any necessary reclamation such as spreading slash and seeding will occur in as short a time as possible to reduce the potential for the occurrence of a damaging storm event on exposed soil.
24	The final EIS needs to be explicitly clear that BMP and/or turbidity monitoring and enforcement will occur during Proposed Action activities. Additionally, monitoring fine sediment in known fish habitat and at historic sample locations should be ongoing throughout the length of the Project.
Response:	Turbidity monitoring will occur with any instream work as required by the programmatic agreement and consultation with National Marine Fisheries and the Fish and Wildlife Service. The six depth fines monitoring sites in the project area will continue to be monitored through the life of the project.
25	We have reviewed the Proposed Site Specific Amendment #3 and have general concerns in its overall effectiveness given the relative small size (approximately 75 acres) compared to the size of the overall project (41,423 acres).
Response:	Within 11 commercial thinning units, approximately 75 acres are proposed to be removed from RHCA designation through a site-specific Forest Plan amendment (DEIS pages 8, 16 and Appendix B). Detailed analyses of the effectiveness of the modified RHCA buffers can be found in the Hydrology/Soils Report and in the Fisheries Biological Assessment (BA). The BA determined commercial treatments within these 11 units meet PACFISH standards and guidelines, maintain PACFISH Resource Management Objectives and do not change existing environmental baseline conditions.
26	We recommend not altering or amending the PACFISH buffer designations unless you are only enhancing aspen stands.
Response:	Areas for fuels treatments were determined based on existing versus desired vegetation conditions in all forest habitat types and plant association groups as discussed in both the Silviculture Specialist Report and the Fire and Fuels Specialist Report. Modified PACFISH RHCA buffers are proposed in 11 units where a road crosses into an RHCA boundary and where commercial thinning treatments were proposed upslope of the road. These units were not limited to aspen stands.
27	Additionally, the SCNF should consider moving roads (if at all possible given expense, valley width and topography) out of PACFISH buffer areas.
Response:	Thank you for your comment.

Comment Number	Comment
28	If the SCNF is adamant about thinning 75 acres of RHCA and PACFISH buffer habitat we recommend you provide scientific evidence (peer-reviewed literature) or results of successful projects that show the desired outcome of fuel treatments in these areas to help further justify this Proposed Action.
Response:	There are several peer-reviewed articles which can be found in the Fire and Fuels Specialist Report that speak to the importance of fuels treatments and the location of those treatments when taking a landscape-level management approach. Specifically, Graham 2004 mentions that not treating in riparian areas and private land can reduce the effectiveness of landscape level treatments.
29	The DEIS does not establish fish/wildlife monitoring as a priority, nor is there clear guidance on fish/wildlife monitoring elements. Therefore, we recommend that SCNF and partners develop and implement a comprehensive and spatially extensive monitoring program for the Upper North Fork project to assess responses to treatments by multiple taxa (fish, birds, mammals, amphibians, invertebrates) in a statistically robust and scientifically integrated fashion with short (implementation monitoring) and long-term (effectiveness monitoring) goals in mind.
Response:	See monitoring plan at the end of Appendix A. Multi-party monitoring is utilized whenever possible.
30	Page 192: No motorized hunting access (the normal operating procedure) during hunting season on newly established project access routes using Kelly humps, berms, or gates or other appropriate technique.
Response:	There will be no public access allowed on the newly established temporary project access routes. They will only be used for project implementation. Roads associated with commercial units will be opened and used for accessing the units to treat them and then closed as part of the contract.
31	Page 192: Inconsistency with table 58 and text for 21,344 acres of forage or cover. It should read “there remains 21,344 acres of cover in the management area.”
Response:	Thank you for your comment. The suggested adjustments will be made to the text in the specialist report and the FEIS.
32	Page 193: Elk security cover is calculated by considering 250 acre coniferous patches in a non-linear configuration at least one-half mile from an open road for security areas of over 30 percent the area (Hillis et al. 1991). Pre-treatment there are four such patches, totaling 12,873 acres or 31 percent of the project area. Post-treatment there would be 10,351 acres or 25 percent cover which meets the LRMP standards and guidelines.
Response:	Thank you for your comment. The suggested adjustments will be made to the text in the specialist report and the FEIS.
33	Page 361: Cover patches will be designed to be at least 600 feet wide, in a non-linear configuration, and should be at least 250 acres.
Response:	Thank you for your comment. The Salmon NF LRMP (p. IV-121) indicates “Cover patches will be designed to be at least 600 feet wide and should be at least 25 acres in size if silviculturally and economically feasible.” Impacts to cover habitat are assessed in the wildlife report. Cover habitat will generally remain available and larger than 25 acres except in the fuel break units. In the short term, units having other thinning applications followed by prescribed fire may have a decrease in cover, followed in the longer term by an increase in cover when treated stands regenerate with new conifer and shrub growth.
34	Page 155: the recent verified observation of a male lynx on the Salmon/Cobalt Ranger District occurred on January 26, 2012.
Response:	Thank you for the information.

Comment Number	Comment
35	IFWIS database contains several recent, verified records of wolverine utilizing SCNF habitats as low as 4,000-5,000 ft. elevation encompassing mixed conifer forest, riparian forest, and mountain shrub communities.
Response:	Thank you for providing this information. While there are limited observation records in the project area, it is assumed that wolverine would indeed utilize the project area. However, the most critical habitat feature defining wolverine habitat is suitable denning habitat, which is largely unavailable in the project area and especially in the treatment units.
36	There are several recent, verified wolverine observation records within the project area and documented movement of telemetry-instrumented wolverine between the Anaconda-Sapphire/Flint Creek ranges of Montana and the Beaverhead/Bitterroot ranges of Idaho.
Response:	Thank you for providing this information. While there are limited observation records in the project area, it is assumed that wolverine would indeed utilize the project area. However, the most critical habitat feature defining wolverine habitat is suitable denning habitat, which is largely unavailable in the project area and especially in the treatment units.
37	A wolverine population estimate for Idaho can be extrapolated from predicted habitat modeled by Inman et al. (2013). A conservative estimate for Idaho is 140 wolverines, with a much lower number comprising the effective population size (the proportion of the actual population that contributes to future generations).
Response:	Thank you for the comment. Based upon our analysis, we found it unlikely that this project would adversely affect individual wolverines or a population of wolverines.
38	The wolverine population in the contiguous U.S. is currently a “proposed” Distinct Population Segment. Please insert as appropriate throughout DEIS.
Response:	Thank you for your comment. The US Fish and Wildlife Service has extended the comment period for listing the wolverine.
39	IFWIS database contains 28 boreal owl records within the project area. Surveys for boreal owls were conducted by IDFG in 2011, resulting in 9 detections within the project area. Effects determinations based on “no known boreal owls in the project area” should be reevaluated.
Response:	Thank you for the comment and information; it will be applied to the specialist report and document. The wildlife report has been updated to reflect this new information.
40	IFWIS database contains 8 flammulated owl records within the project area. Surveys for flammulated owls were conducted by IDFG as part of a SCNF Challenge Cost Share in 2012. Effects determinations based on “no records of flammulated owls in the project area” should be reevaluated.
Response:	Thank you for the comment and information. The wildlife report has been updated to reflect this new information.
41	Page 185: Under Action Alternatives, Direct and Indirect Impacts to northern goshawk, based on Scott et al. (2002) habitat suitability model and literature review, suitable goshawk nesting and foraging habitats are widely distributed and relatively abundant in the project area. Presumption that goshawks do not occupy the project area in the absence of protocol-based surveys is not supported by IDFG.
Response:	Old growth stands that are the most suitable nesting habitat would be treated so as to prevent their loss on the landscape, either by treating around old growth stands or reducing ladder fuels. Treatments such as prescribed burning and precommercial thinning would increase foraging habitat quality on a broader scale by opening very dense understories so that goshawks are better able to pursue prey. Northern goshawks may occupy the project area, and design criteria are in place to adjust the project should a nest or individuals be discovered. We feel the impacts from this project would not lead toward federal listing of the northern goshawk given its range wide security.

Comment Number	Comment
42	Pages 140, 141 and 166: There are significant discrepancies in the DEIS about if there will or will not be commercial thinning in RHCA areas. Please clarify throughout document.
Response:	Commercial thinning units were designed so that standard PACFISH buffers were excluded from them with the exception of 11 units where a road exists within the RHCA. The project proposes modifying RHCA boundaries in these 11 units to the edge of the road prism through a Forest Plan amendment (DEIS pages 8, 16 and Appendix B). This would allow commercial thinning upslope of the road outside of the modified RHCA boundary. Thus, there would be no commercial thinning in RHCAs nor in modified RHCAs. Edits to language in the DEIS have been incorporated to clarify this.
43	Page 133, Table 49: The temperature data presented do not clearly state when these data were collected or if they were averaged for a given month. Please provide clarification to state exactly what the temperature data represent.
Response:	The temperatures reported in table 49 are the mean of the daily means for the period of record (July1- September 30).
44	Restrict logging of winter ranges to times when elk and deer are absent. The Department recommends no logging activities be permitted in known winter range from December 1 to April 15 to avoid potential effects to wintering big game species.
Response:	Thank you for your comment. There is opportunity for participation in developing an implementation plan for fuel treatments to manage potential impacts to wildlife that are related to timing of activities. Design criteria #140 indicates that aerial and motorized use be restricted between December 1st through April 15th except upon site-specific clearance with the wildlife biologist.
45	If logging is conducted in the winter, concentrate activities into the shortest time and smallest area possible.
Response:	Thank you for your comment. There is opportunity for participation in developing an implementation plan for fuel treatments to manage potential impacts to wildlife that are related to timing of activities.
46	Provide “security areas” in adjacent watersheds where no management activities are underway to active timber sales. Provide an area at least as large as the sale area, with line-of-sight topographic barriers, and closed to vehicular traffic.
Response:	Thank you for your comment. There is opportunity for participation in developing an implementation plan for fuel treatments to manage potential impacts to wildlife that are related to timing of activities.
47	Do not log adjacent drainages simultaneously.
Response:	Thank you for your comment. There is opportunity for participation in developing an implementation plan for fuel treatments to manage potential impacts to wildlife that are related to timing of activities.
48	Plan logging to provide a diversity of cover classes throughout the winter range area.
Response:	Table 17 can be somewhat confusing but after a closer look at the data you will see that the cover types are being shifted from stands with a majority of DF or LP to stands that are more heterogeneous. The Forest will become a more mixed conifer forest as opposed to single species stands.
49	A diversity of forage conditions (in terms of forage structure; that is, grazed, burned, forage inside cover, un-grazed) will provide an array of grazing opportunities under varying climatological and snow conditions.
Response:	The LRMP addresses this in standards and guidelines, and the project will move to provide more variation than is already present, especially in reducing the area of mid-successional dense forests and increasing understory vegetative diversity.

Comment Number	Comment
50	Prescribed burning, judiciously applied, holds promise for improvement of forage quality on winter range if management objectives provide an array of forage conditions.
Response:	Thank you for your comment.
51	Seed disturbed areas to prevent re-establishment or introduction of noxious weed species.
Response:	Appendix A Design Criteria #27 addresses this concern. 27. Reestablish desirable vegetation to prevent bare ground conditions that favor weed establishment and spread (see design feature 71 for mixes). • Disturbed sites (areas made bare and compacted during project implementation) would have seedbeds prepared for reestablishing desirable vegetation. Site preparation would consist of one or more of the following actions: contouring, terracing, ripping, and scarifying; and integrate with design feature number 116. • For currently closed roads that have been reopened for the project and temporary roads in heavily weed infested areas; revegetate road surfaces with a seed mix that competes well with noxious weeds as a last project implementation action in those areas..
52	Restrict human access to winter ranges if the welfare of big game is a primary concern.
Response:	Thank you for your comment.
53	Big game welfare should be a primary consideration in the design and management of roads on winter ranges.
Response:	Thank you for your comment.
54	Promote aspen regeneration for important seasonal cover and protect from livestock browsing with fencing or strategic placement/falling of existing trees for at least 5 years post-treatment.
Response:	No livestock grazing allotments are located within this project area.
55	Monitor for and actively control noxious and invasive plant species.
Response:	See monitoring plan and Design Criteria in Appendix A. In addition, treatment and monitoring for invasive plant species are ongoing across the SCNF.

Lemhi County Forest Restoration Group – 05/19/2014

Comment Number	Comment
1	We appreciate the fact that the Forest Service developed both an alternative examining the environmental effects with no road construction within the Inventoried Roadless Area as well as an alternative with 2.1 miles of temporary road construction.
Response:	Thank you for your comment.
2	The proposal to close the Hammerean Loop Road in Alternative 2 should be removed from consideration.
Response:	Thank you for your comment. This proposal is included in Alternative 2 which is described in Chapter 2, page 17. The potential direct and indirect effects of closing a portion of this this road under Alternative 2 are best described in Chapter 3 Soils and Hydrology (pages 119-120) and Chapter 3 Recreation (page 228).

Comment Number	Comment
3	Maps for Alternatives 1 and 2 indicate the Pierce Creek Trail would be de-commissioned, but we believe this route is located on private land.
Response:	This trail is being dealt with under the current travel plan FSEIS. It will be converted it from a motorcycle trail to a non-motorized trail. The actual route on Pierce Creek that will be decommissioned is road 60082, it is currently a Level 1 road and is not located on private land.
4	In Alternative 1, a temporary road proposed to access Units 212 – 222 may involve private property. The EIS should reflect this consideration and either re-route or indicate how landowners would be involved in the proposed road development.
Response:	The North Fork Ranger District will contact Bob Wilson.
5	Under the Idaho Roadless Rule, temporary roads can be authorized if the deciding official believes that there is no reasonable way to accomplish the community protection objectives without the construction of temporary roads. If it is “reasonable” to incorporate helicopter logging to treat these units as part of the larger scale package, then the responsible official should not authorize the temporary roads. If it is “unreasonable” then the temporary roads can be authorized.
Response:	The Forest Service preferred alternative for the Upper North Fork Project is Alternative 1 - The Proposed Action which would utilize temporary roads for accessing fuels reduction treatments in the Anderson Mountain Idaho Roadless Area (IRA). The Idaho Roadless Rule does outlines that the responsible official may authorize temporary road construction for community protection zone activities pursuant to § 294.24(c)(1)(i) if in the official’s judgment the community protection objectives cannot be reasonably accomplished without a temporary road. The “reasonableness” factors considered in authorizing temporary road construction for this project included : Other fuels reduction treatment methods, such as shaded fuel breaks, non-commercial thinning which could be accomplished without roads would be less effective in achieving objectives because of existing tree density, fuel loading and terrain factors in the locality where treatment is needed. Treatments are consistent with Forest Plan management prescriptions (3A-5A) for timber harvest and retention of large trees called for in the Idaho Roadless Rule to promote fire resilient stands. Access across private land (through easement) is readily available for entry to priority areas for treatment; other potential access points for temporary or other road construction would involve additional road and bridge construction at added cost and resource impacts. Ground and skyline based treatments of timber stands for fuels reduction is more likely to be implemented versus helicopter logging based on current economics. Assurances that temporary roads would be decommissioned and obliterated post fuels reduction treatment are provided for in the Idaho Roadless Rule. Community Protection Zone priority treatment areas adjacent to Moose Creek Estates do not have the same quality of roadless area characteristics for solitude and naturalness that are present in interior portions of the Anderson Mountain IRA. This situation is not anticipated to change because of likely continued use and occupancy of the private land. Planned treatments would maintain and improve the long-term vegetation and ecological processes, components of the roadless characteristics and wilderness attributes related to in the Anderson Mountain IRA.
6	We recommend that the Forest Service describe the factors the agency applies to determine the “reasonableness” of accomplishing the roadless portion of the project without temporary road construction.
Response:	See response to 5 above

Comment Number	Comment
7	The Forest Service should describe in more detail the suite of possible funding sources as part of the determination of what is reasonable.
Response:	Thank you for your comment. Unfortunately it is very difficult to predict funding sources. Forest Service budgets vary annually and there are many possibilities for grants and other additional federal funding but they vary year by year as well making it difficult to predict what funding sources may be available. The Stewardship agreement is one tool available to us that allows the Forest Service to share costs with a partner.
8	The DEIS lacks information quantifying how much and what kind of timber would be made available for harvest under the two alternatives.
Response:	A good average figure for the North Fork District of volume per acre for commercial timber units is 10 CCF. Some stands have more and some less but 10 is a good estimate. Based upon this average volume per acre the Upper North Fork project would provide approximately 45,350 CCF of timber in either Alternative. It's the logging cost to obtain that volume (helicopter vs. skyline/tractor) that will differ between the 2 Alternatives. We cannot say exactly what kind of timber would be made available, that will vary unit by unit and depend upon market conditions.
9	The assessment should provide an estimate of costs/acre for prescribed fire treatments.
Response:	Best estimates for burning on the North Fork District are: $30-50 acre for PSD, $60 broadcast, $40 handpile per acre and about $20 per machine pile.
10	Where possible, the Forest Service should indicate where they anticipate using contractors and what they anticipate doing in-house.
Response:	The Forest Service will not be deciding in advance which unit will be treated in-house vs. using contractors. The treatments will be the same either way with the same prescriptions, but the specific decisions will be made annually based upon internal and external funding available, Forest Service budgets, the status of existing stewardship agreements and timber market values.
11	The No Action alternative should consider the economic cost of smoke from large forest fires in the area.
Response:	This analysis did not include the economic cost of smoke from large forest fires. The Forest recognizes that there is a cost however the data to support such an analysis does not exist locally.
12	The Proposed Action lacks specifics about how proposed burning and timber harvest would be designed or mitigated to avoid impacts to wildlife habitat and other resources.
Response:	The mitigation measures and design criteria are located in Appendix A.
13	The statement on page 16 describing the Proposed Alternative is of particular concern: "The primary objective of this project is hazardous fuels reduction. The amount of fuel loading that is characteristic of hiding and/or thermal cover conflicts with the primary objective of this project; therefore it would be necessary to amend the plan (RMP)." This statement implies that wildlife recommendations provided by the collaborative (please see Attachment A to the April 2012 memo) to protect specific areas of cover and habitat have been disregarded. We recognize that protecting or isolating some wildlife habitat constrains harvest or burning to some extent, but the assessment must provide credible discussion about what mitigation measures to protect such habitats are or are not acceptable.
Response:	The design criteria are located in the EIS in Appendix A and they do provide descriptions of how we would try to address some of the issues presented during project development. Certainly there are places in the project area where fuel conditions are incompatible with hiding cover. However, we believe the hiding cover will continue to meet the LRMP after implementation.
14	We strongly urge that the criteria described in Appendix A of the DEIS be incorporated and described in the Proposed Action and evaluated in the Environmental Impacts discussion.
Response:	Thank you for your comment. The design criteria are included in Appendix A by design. They are evaluated in the Environmental Impacts by resource area.

Comment Number	Comment
15	The Proposed Action also states for example, that all old growth stands would be burned and that only 50 linear feet of downed woody debris would be targeted for retention regardless of stand size or forest type. This is inconsistent with Appendix A # 135, and retention of only 50' of downed material is grossly inadequate to provide habitat for forest mammals and birds.
Response:	A #135 is related to Aspen stands and conifer encroachment. The 50 linear feet/ac of course wood debris comes from our Forest Plan. LRMP IV: 17-18 is our standard and guidelines, in this case our minimum. It is very likely there will be greater numbers than this as a result of recent beetle activity and prescribed fire effects.
16	The proposed action should include specific pro-active aspen and whitebark pine restoration activities that will be conducted independently of prescribed burning and timber harvest.
Response:	Encroaching conifers will be removed to help promote healthier Whitebark Pine and Aspen stands. This will be handled in the prescription for each stand.
17	The DEIS should provide a phased schedule of when proposed activities would occur. It is important to confine disturbance activities to the smallest area over the shortest time period to avoid wildlife displacement.
Response:	Implementation is proposed to occur over about a ten year time frame. There is opportunity for participation by Fish and Game in developing an implementation plan for fuel treatments to manage potential impacts to wildlife that are related to timing of activities.
18	We suggest that a design feature be developed and implemented to retain a greater portion of surface fuels than proposed. This might be addressed by more selective prescribed burning in smaller acreage units (e.g., ≤500 acres).
Response:	I believe your were referring to designated old growth with this comment. If you refer back to Appendix A #140 we do address your concern here. Old growth units will not have any direct ignitions but fire will be allowed to move into these areas on their own. Regarding prescribed fire size in designated old growth, the majority of the stands are less than 500 acres and would not have fireline around them.
19	We suggest that specific routes or sections of routes be identified where ladder fuel clearing is necessary. A 200' foot buffer should be the maximum width (100' on both sides) allowed where such clearing is necessary. There should be no clearing along temporary roads or those planned for decommissioning.
Response:	The treatments you are describing are only associated with designated "shaded fuel break" units. The shaded fuel break units can be seen on the map.
20	Lost Trail and Chief Joseph passes, at the north end of the project area, are identified as lynx linkage areas. Preserving these important connectivity corridors is particularly important to the conservation of boreal species at the southern edge of their distributions in the U.S. Rocky Mountains, including lynx, wolverine, fisher, grizzly bear, gray wolf, and other forest carnivores.
Response:	The analysis of these treatments units projected that existing canopy cover of 50-80% would be reduced to 40% or less following thinning and under burning. The wildlife biologist, in working with the US Fish and Wildlife Service, determined that with these projected changes there would be adequate remaining habitat in the vicinity of these mountain passes to provide an east-west linkage corridor for lynx, wolverine and other forest carnivores. We also believe there will be adequate dense forest cover remaining on the landscape to the south of the treatment units to provide suitable cover habitat for carnivores to move through the project area.

Comment Number	Comment
21	Additional fuel treatments proposed in the DEIS and those associated with Chief Joseph ski trail maintenance, have the potential to further impact movement of forest carnivores along the Divide.
Response:	Thank you for your comment. The units in question were looked at in great detail between fire and fuels staff and district wildlife biologist. In the Chief Joseph vicinity the units were identified as areas critical for hazardous fuels reduction for many reasons that include the vicinity to a busy highway and the fact that they are at the top of a major ridge that would be the only feasible line of defense for fire fighters should a fire get established between Hwy. 93 and the Anderson Mountain Road. In the Lost Trail Pass vicinity the units in question were also identified as areas critical for hazardous fuels treatment to help protect the Lost Trail Ski Area. The north-south ridge line that runs through the center of unit 16 would be the first line of defense for fire fighters should a fire get established west of the ridge in question. The analysis of these treatments units projected that existing canopy cover of 50-80% would be reduced to 40% or less following thinning and under burning. The wildlife biologist, in working with the US Fish and Wildlife Service, determined that with these projected changes there would be adequate remaining habitat in the vicinity of these mountain passes to provide an east-west linkage corridor for lynx, wolverine and other forest carnivores. We also believe there will be adequate dense forest cover remaining on the landscape to the south of the treatment units to provide suitable cover habitat for carnivores to move through the project area.
22	Given the existing, cumulative human footprint on Lost Trail/Chief Joseph passes proper, we suggest a modification of fuel treatments proposed in units immediately south of these passes to create a strategic east-west linkage corridor with vegetative attributes suitable for lynx, wolverine, and other forest carnivores. This would entail modification of fuel treatments to retain ≥40-50% canopy cover and judicious use of broadcast burning to minimize loss of down woody material (i.e., blowdown, deadfall) and dense, shrubby understory. In the Chief Joseph vicinity, we recommend these modifications be applied to units 36, 38a, 38b, 39, 40, and 42. In the Lost Trail Pass vicinity, we recommend these modifications be applied to units 16, 35, and 184. These changes will help mitigate existing and proposed impacts to the Lost Trail/Chief Joseph lynx linkage area, will facilitate present and future movement opportunities for a wide range of wildlife, and will direct wildlife use to relatively undisturbed habitats within Inventoried Roadless Areas.
Response:	Thank you for your comment. The units in question were looked at in great detail between fire and fuels staff and district wildlife biologist. In the Chief Joseph vicinity the units were identified as areas critical for hazardous fuels reduction for many reasons that include the vicinity to a busy highway and the fact that they are at the top of a major ridge that would be the only feasible line of defense for fire fighters should a fire get established between Hwy. 93 and the Anderson Mountain Road. In the Lost Trail Pass vicinity the units in question were also identified as areas critical for hazardous fuels treatment to help protect the Lost Trail Ski Area. The north-south ridge line that runs through the center of unit 16 would be the first line of defense for fire fighters should a fire get established west of the ridge in question. The analysis of these treatments units projected that existing canopy cover of 50-80% would be reduced to 40% or less following thinning and under burning. The wildlife biologist determined that with these projected changes there would be adequate remaining habitat in the vicinity of these mountain passes to provide an east-west linkage corridor for lynx, wolverine. Effects to lynx and wolverine are analyzed in the biological assessment that was submitted to the US Fish and Wildlife Service. We determined that the project was not likely to adversely affect the lynx or the wolverine. The biological assessment concluded that the project may affect, but is not likely to adversely affect the Canada lynx or wolverine. According to US Forest Service and US Fish and Wildlife Service under the Northern Rockies Lynx Management Direction, the Forest is still not considered occupied by Canada lynx. While there is one recent observation, there still remains no known reproduction on the Forest. Furthermore, within suitable lynx habitat in the project area, efforts were made to reduce the potential impact to lynx and their habitat by not treating in suitable habitat. Short term effects of fuel treatments may affect lynx prey, but should benefit prey in the long term. The lynx is at the southern extent of its range in the US Rocky Mountains, and populations are believed strongly reflect abundance of food more than other suitable habitat factors.

Comment Number	Comment
23	Since 2000, several large (>1,000 acres) wildfires have burned portions of the North Fork Ranger District and neighboring Bitterroot and Beaverhead-Deerlodge National Forests within and surrounding the project area. We were surprised that the DEIS did not analyze the action alternatives cumulatively with these wildfire effects.
Response:	Thank you for your comment. Analyzing cumulative effects requires focusing on the resource (fire/fuels), ecosystem, and human community that may be affected and developing an adequate understanding of how the resources are susceptible to effects. Cumulative effects analysis on natural systems must use natural ecological boundaries and analysis of human communities must use actual sociocultural boundaries to ensure including all effects. For fire and fuels the spatial context for specific treatments and the cumulative effects boundary is approximately 135,385 acres. This boundary is the North Fork of the Salmon River Hydrological Unit Code 5. It was selected because it encompasses the full extent of the direct and indirect effects of the proposed action and alternatives. Please refer to pp.32-33 of the fire/fuels specialist report. Effects to wildlife from the proposal are addressed in the analysis. The past effects of timber harvest and wildfires were taken into consideration as part of the existing condition, and served as the basis for changes projected to occur from proposed fuels reduction activities. For wildlife, the cumulative effects were analyzed at a scale that was appropriate and different for each species. Because the project area is so large, the boundary itself was often suitable for a cumulative effects analysis, except for wide ranging species like lynx where we analyzed adjacent lynx analysis units. Nevertheless, we have taken this issue into consideration and will address it in the wildlife report and final analysis.
24	We are concerned that proposed fuel treatments may further reduce habitat suitability for several forest-sensitive species already affected by large-scale wildland fire disturbance in the surrounding landscape. The assessment should address the cumulative impacts of the recent large fires adjacent to the Proposed Action.
Response:	Thank you for your comment. Analyzing cumulative effects requires focusing on the resource (fire/fuels), ecosystem, and human community that may be affected and developing an adequate understanding of how the resources are susceptible to effects. Cumulative effects analysis on natural systems must use natural ecological boundaries and analysis of human communities must use actual sociocultural boundaries to ensure including all effects. For fire and fuels the spatial context for specific treatments and the cumulative effects boundary is approximately 135,385 acres. This boundary is the North Fork of the Salmon River Hydrological Unit Code 5. It was selected because it encompasses the full extent of the direct and indirect effects of the proposed action and alternatives. Please refer to pp.32-33 of the fire/fuels specialist report. Effects to wildlife from the proposal are addressed in the analysis. The past effects of timber harvest and wildfires were taken into consideration as part of the existing condition, and served as the basis for changes projected to occur from proposed fuels reduction activities. For wildlife, the cumulative effects were analyzed at a scale that was appropriate and different for each species. Because the project area is so large, the boundary itself was often suitable for a cumulative effects analysis, except for wide ranging species like lynx where we analyzed adjacent lynx analysis units. Nevertheless, we have taken this issue into consideration and will address it in the wildlife report and final analysis.
25	Given the proximity of this subpopulation to Alternative 2 helicopter treatment units, we request that flight paths, distance from heli-treatment units, and line-of-sight distances be evaluated to avoid or minimize disturbance impacts to mountain goats.
Response:	We did not analyze mountain goats for this project as we are not required to under the Endangered Species Act or National Forest Management Act. The mountain goat is not threatened or endangered, listed as a Regional Forester's Sensitive species, nor listed as species to analyze under the LRMP. The mountain goat is no longer a Management Indicator Species for the Forest. That being said, the nearest helicopter unit is about 1.5 miles (2.4 kilometers) from known mountain goat observations (USFS database). The three units on the west side US 93 are 1.6 to 2.2 miles distant, and are separated by a tall ridge and other lower ridges from the observations. The units on the east side of US 93 are from 1.5 to 3.4 miles distant. The two smaller, closer units face generally south, away from the known goat observations. The largest unit is on a northwest-facing slope (above Pierce Creek) and a ridge generally separates it from direct line-of-sight with the goat observations. We believe this adequately addresses the concern with the proximity of goat observations.

Comment Number	Comment
26	The DEIS for the Upper North Fork project needs to prioritize the establishment of a comprehensive monitoring program for fisheries, wildlife, and associated habitat.
Response:	See monitoring plan in Appendix A.
27	Monitoring should take place throughout project implementation and findings from monitoring programs should be taken into account and adjusted for during each stage of the Upper North Fork project. Both project stages and associated monitoring should be made available for public review. Comprehensive monitoring programs and strategies should be in place prior to initiating treatments.
Response:	See Appendix A for monitoring plan.
28	The large amount of acreage proposed for helicopter logging in both Alternatives came as a surprise to collaborative members. The financial feasibility of accomplishing any of these acres seems questionable and the method may entirely exclude participation by the local workforce. An analysis of these issues should be included in the final EIS.
Response:	The exact acreage proposed for helicopter logging in both Alternatives has not changed since the development of this project.
29	In Alternative 1 Unit 126 is proposed for helicopter logging, this unit is adjacent to Unit 125d, which is proposed for tractor logging. The 126 area has an existing closed system road on the upper west side, which may present options other than helicopter logging. These options should be considered wherever appropriate.
Response:	Thank you for your comment, we will consider all opportunities to use skyline or tractor logging instead of helicopter.
30	Units 50a, 50b, 50c are all proposed helicopter units. There is a closed system road on the upper east side of these units. They are adjacent to units 236 and 237 that are proposed as skyline units. Changing the treatment of Units 50a-c to skyline should be considered as a more economical option to helicopter logging.
Response:	Alternative 1 minimizes use and construction of temporary roads with knowledge that this generally increases treatment costs but provides for lower overall watershed impacts. Comparatively, Alternative 2 allows for more flexibility in logging and transportation systems to improve the economic feasibility of the treatments. Additional factors in selecting logging systems include Forest Plan direction, Safety, and topography. While the map indicates close proximity to roads, in many cases the road location does not facilitate the logging system proposed in this comment. An example would be the three “50” units, in this case, the road mentioned is on the opposite side of the ridge from the proposed units and would not facilitate a skyline system. Likewise, unit 126 could be a steep adverse skid, or long favorable skid bit is likely a too flat or convex slope to yard with the cable systems available.

Idaho Parks and Recreation – 05/30/2013

Comment Number	Response
1	We were pleased to see that none of the road decommissioning will impact any existing motorized route opportunities under each of the proposed alternatives. The DEIS mentions that the Pierce Creek Trail #6121 would be reclassified from a single-track motorized trail to a non-motorized trail on Page 227. The Salmon-Challis Travel Plan SEIS decision already made this change in designation. This paragraph is mostly likely unnecessary in the FEIS.
Response:	Thank you for your comment. The designation was indeed made in the Salmon-Challis Travel Plan but it will be implemented through this project and the effects of the designation-change affect the analysis of the other proposed treatments which is why it's mentioned in the FEIS.
2	The DEIS disclosed that the Hammerean Creek Road #449 would not be available as a connecting route under Alternative 2. This road provides OHVs access from Gibbonsville to Twin Creek. The SCNF should consider downgrading this road from open to full size motor vehicles to an ATV trail through the existing rock slide. The IDPR Trail Cat Program can help fix the rock slide through this road section. The Trail Cat Program constructs ATV and single-track motorized trails. Mike Robinson, East Region Trails Specialist, can schedule work for this project. We encourage the North Fork Ranger District tokeep the Hammerean Creek Road open to at least ATV use as a through route.
Response:	Thank you for your comment. The preferred Alternative is Alternative 1, thus the proposed actions to the Hammerean Loop Road are not part of the Decision.
3	The Recreation analysis in the DEIS did a good job of disclosing the current condition and the alternative impacts.
Response:	Thank you for your comment.

Appendix G – Comments from Federal, State, and Local Agencies and Elected Officials

From: Jay Davis <jdavis@custertel.net>
Sent: Monday, March 24, 2014 2:03 PM
To: FS-comments-intermtn-salmon-challis-northfork
Cc: John Jakovac; Robert Cope; Rick Snyder; Stanley Bruce Davis
Subject: Upper Northfork HFRA Ecosystm rest.project

I am concerned about the 67 miles of road that you are planning on decommissioning in the Upper Northfork HFRA Ecosystm rest. project.

I would like to know if these roads were identified in the 2009 Travel plan inventory and gone through the analysis from that team ?

I would have liked to seen a map of these roads and been on discussion before this project got to this point, as I have ask before to be notified on any road issues.

What is reason for closing these roads?

Has your Fire team made comment on these roads and what was their comments as far as fire suppression?

Jay Davis
Access Specialist/Office Manager
Lemhi County Road and Bridge
206 Courthouse Drive
Salmon, Idaho 83467
208-756-2861
jdavis@custertel.net

"You cannot hang out with negative people and expect to live a positve life"

OFFICE OF THE COUNTY COMMISSIONERS
206 COURTHOUSE DRIVE
SALMON, IDAHO 83467

R. E. Cope, Chairman
Rick Snyder
John Jakovac

Phone: 208-756-2815 **Fax: 208-756-8424**

April 26, 2014

Mr. Charles Mark
Supervisor
Salmon-Challis National Forest
Salmon, Idaho 83467

Dear Mr. Mark:

Please accept the following comments from Lemhi County regarding the DEIS for the Upper North Fork Project:

1. Lemhi County fully recognizes the need for fuel reduction across the county's landscape. The current fuel load and number of dead and diseased trees poses, in our opinion, an imminent threat to our communities, watersheds, and ecosystems.

2. We further recognize the lack of appropriated funds to conduct fuel reduction projects. We therefore recommend that, whenever and wherever possible, timber sales and/or stewardship contracts be developed that allow the needed work to pay its own way.

3. The area designated for helicopter logging is significantly large. In areas where analysis of skylines or traditional logging methods has been done, we recommend that the option of surface logging remain open.

4. Although the road density on the Salmon-Challis may be higher than the national standard, we believe that access to the National Forest is essential for firefighting, vegetation management, and the provision of emergency services. At least one road is scheduled for decommissioning simply because it exists in an Inventoried Roadless Area. It should be noted that the road existed at the time the Roadless Areas were designated, and has continued to exist within such an area for the past thirty-five years. Since the Idaho Roadless Rule does not prohibit pre-existing roads in areas with a Backcountry/Restoration theme, we see no reason to decommission such roads.

5. For those roads that are to be decommissioned, we strongly urge that these roads be closed without obliteration. Again, for management and emergency purposes, we can not foresee the lack of necessity for these roads in the future. They may be used in an emergency if the road prism continues to exist.
6. Recreation may well continue to be important to Lemhi County's economy. Allowing

connectivity of trails to allow motorized use of loop trails is far preferable to creating dead-end trails through points of closure.

7. As was stated in point 3, we feel helicopter logging should be a last resort, when all other options for logging have been eliminated. Therefore, we consider it essential to utilize Alternative 1, with the construction of the temporary road above Pierce Creek, rather than Alternative 2, which would necessitate helicopter logging in that area.

8. Lemhi County recognizes the collaborative efforts of the Lemhi Forest Restoration Group, and intends to continue its participation with the group in the future.

Yours,

R. E. Cope

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
620 SW Main Street, Suite 201
Portland, Oregon 97205-3026

9043.1
IN REPLY REFER TO:
ER14/0172

Electronically Filed

May 2, 2014

Maggie Seaberg
P.O. Box180
11 Casey Road
North Fork, Idaho 83466

Dear Ms. Seaberg:

The Department of the Interior has reviewed the Draft Environmental Impact Statement for the Upper North Fork Healthy Forest Restoration Act Ecosystem Restoration Project, Salmon-Challis National Forest, Idaho. The Department has no comments on the document at this time.

We appreciate the opportunity to comment.

Sincerely

Allison O'Brien

Allison O'Brien
Regional Environmental Officer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ECOSYSTEMS,
TRIBAL AND PUBLIC
AFFAIRS

May 5, 2014

Maggie Seaberg
Upper North Fork ID Team Leader
P.O. Box 180
11 Casey Road
North Fork, Idaho 83466

RE: EPA Comments on the Upper North Fork HFRA Ecosystem Restoration Project Draft Environmental Impact Statement, EPA Project # 11-4119-AFS

Dear Ms. Seaberg:

We have reviewed the above-mentioned Draft Environmental Impact Statement (DEIS) in accordance with our responsibilities under National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Under our NEPA Review policy and procedures, we rate DEIS documents by considering both the adequacy of the document and the potential environmental impacts of the action.

The DEIS evaluates two alternatives (Alternative 1-Proposed Action and Alternative 2-No New Temporary Roads) for an integrated hazardous fuels and forest restoration project for the purposes of reducing hazardous natural fuels, restoring plant communities and improving fish and wildlife habitat diversity, while returning resilient conditions to the fire adapted landscape. The DEIS also evaluates the impacts if no activities relative to the proposal were taken, as required by the Healthy Forest Restoration Act.

We find the DEIS does a good job in evaluating the effects of the proposed action, and that overall sufficient efforts have been made to avoid and minimize the adverse effects of the action. Therefore, we rate the document "LO" (Lack of Objections). Please see the enclosed description of our rating system for more information. We have identified some recommendations for your consideration as you move from the Draft to the Final EIS.

Overall we appreciate the Forest Service's responsiveness to our scoping comments, namely considering an alternative that does not include new temporary road construction (Alternative 2). We believe Alternative 2 as designed is the environmentally preferable alternative as it does not include new temporary roads, and also entails less tractor and skyline logging. Should the Forest Service proceed with Alternative 1 (the Proposed Action), we note that there are some units (such as Units 93, 98, 103 and 233) where it appears that temporary road construction does not influence the harvest method (i.e., those units are proposed for tractor logging under both action alternatives). Where this is the case, we recommend that the Forest Service avoid temporary road construction unless it can be demonstrated that temporary road construction would result in less potential environmental impact, particularly in the long-term. We also recommend that the monitoring of any road sites with the potential for adverse impacts to water

Printed on Recycled Paper

quality impacts be included in the Record of Decision (site-specific monitoring instead of sample monitoring as identified in Appendix A).

We are supportive of the use of the ICO (individual, clumps and openings) approach to thinning developed by Larson and Churchill (2012) and are pleased to see the trend toward creating species and spatial heterogeneity within the project area. We also support the proposed amendment to allow for wildfire use to achieve management objectives. We believe the associated analyses of air quality and airshed impacts is satisfactory.

Also, while we do not oppose the proposed amendment to modify road buffer widths for Pacific Anadromous Fish Strategy Riparian Habitat Conservation Areas to allow for mechanical treatment above the road outside of the modified riparian habitat, we believe that of the eleven sites, some sites may incur adverse impacts to water quality. We recommend site-specific monitoring for these sites.

Finally, we believe that the Final EIS would benefit from additional information concerning future plans for replanting. We generally support lower density planting than what has been proposed in past projects under the HFRA. We believe this will result in a more resilient landscape that will self-maintain for decades and require less intervention into the future. If this is the goal of the project, the Final EIS should clearly state this and include appropriate monitoring to ensure this goal is being met. If, however, additional burns are expected in the future, this should be included in the cumulative effects analysis, and impacts to air quality should be identified.

We appreciate the opportunity to review this DEIS. If you have questions concerning our comments, please contact me at (206) 553-1601 or reichgott.christine@epa.gov, or you may contact Jennifer Curtis of my staff in Anchorage at (907) 271-6324 or curtis.jennifer@epa.gov.

Sincerely,

Christine B. Reichgott

Christine B. Reichgott, Manager
Environmental Review and Sediments Management Unit

Enclosure

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections

The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns

EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections

EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory

EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

IDAHO DEPARTMENT OF FISH AND GAME
SALMON REGION
99 Highway 93 North
Salmon, Idaho 83467

C.L. "Butch" Otter / Governor
Virgil Moore / Director

May 19, 2014

Maggie Seaberg – IDT Leader
Salmon-Challis National Forest
PO Box 180
North Fork, ID 83466

Re: Comments on the Upper North Fork HFRA Ecosystem Restoration Project DEIS

Dear Maggie:

Idaho Department of Fish and Game (IDFG) staff reviewed the Draft Environmental Impact Statement ("DEIS") for the Upper North Fork HFRA Ecosystem Restoration Project ("Project") proposed by the Salmon-Challis National Forest ("SCNF"). The Upper North Fork HFRA Ecosystem Restoration Project proposes to conduct fuel and vegetation treatment activities across approximately 41,423 acres ("Project Area"). Proposed Activities would include commercial harvest and thinning, non-commercial thinning, ladder fuel reduction, shaded fuel breaks and prescribed burning; meadow, aspen and white-bark pine enhancement; culvert replacement and riparian habitat restoration treatments ("Proposed Actions"). IDFG understands the stated purpose of the Proposed Actions are to reduce hazardous natural fuels, restore plant communities, and improve fish and wildlife habitat diversity in the upper North Fork River drainage while returning resilient conditions to this fire adapted landscape. We have been involved with this project since 2008, and we served as a member of the Lemhi County Forest Restoration Group. We are very familiar with the fish and wildlife resources found within and adjacent to the Project Area. We commend the Forest Service for taking a collaborative approach to a challenging project.

Fish and wildlife are property of all Idaho citizens. The IDFG and the Idaho Fish and Game Commission are expressly charged with statutory responsibility to preserve, protect, perpetuate, and manage all fish and wildlife in Idaho (Idaho Code 36-103 (a)). In fulfillment of our statutory charge and direction as provided by the Idaho Legislature, we offer the following technical information, comments, and recommendations concerning fish and wildlife resources which are intended to augment previously submitted IDFG scoping comments dated October 6, 2011; technical comments on "big game habitat security considerations in cover-deficient treatment areas" dated April 12, 2012; and many presentations and discussions conducted in our capacity as a member of the Lemhi County Forest Restoration Group. Our staff spent considerable time and effort devising past comment letters, presentations, and discussions. It is our desire that the

DEIS review team consider all past and present comments and recommendations. IDFG is providing these comments and any recommendations to maintain the public interest benefits to protect the public trust values associated with Idaho's fish and wildlife resources. It is not the intention of IDFG to support or oppose the proposed Project.

Big Game

We reviewed the proposed big game winter range Amendment 2 described on page 16 of the DEIS. We understand the proposed deletion would only apply to the Upper North Fork HFRA Ecosystem Restoration Project. Our assessment of the proposed alternatives suggests that elk security cover will be maintained consistent with Christensen et al. (1993). IDFG recommends at least 25% of hiding and/or thermal cover, or as close to this number as possible, is maintained throughout the project area.

The IDFG Elk Management Plan (2014-2024) classifies the Salmon Zone as "highly limited by predation" and recommends projects that "Promote well designed forest management projects that closely resemble natural disturbance." Thus, timber harvest strategies that provide quantity and quality forage and adequate security cover need to be balanced and considered in the Final EIS. Given that the Salmon Forest Plan Standards and Guidelines related to big game winter range is dated (> 25 years old) as it pertains to current knowledge of elk management, we recommend the Final EIS incorporate habitat suitability elements that reflect current body of scientific literature and management direction outlined in our 2014 Idaho Elk Management Plan. Our staff is willing to work directly with the Forest Service during final development of the EIS to ensure big game habitats are protected and enhanced while achieving the stated purpose of this project.

We are concerned that ladder fuels treatment along ingress/egress routes would reduce big game security cover along roads. Alternative 1 of the DEIS states that in non-mechanical treatment units, ladder fuels would be reduced to 400 feet on either side of access roads. IDFG recommends this distance be reduced to a maximum of 200 feet on either side of the road. This would closely approximate the standard that states security cover is adequate at a distance of 200 feet when 90 percent of an adult elk is hidden from view by vegetation (Thomas et al. 1979). We also recommend that the DEIS specify to which access roads this type of treatment will be applied and present that information in a table format. In addition, we recommend the SCNF evaluate the level of travel use of SCNF system roads and only apply treatments to those roads with the highest fire-start risk or potential.

Travel management of temporary and existing closed roads during project implementation will be crucial to big game security and vulnerability, particularly during hunting seasons. Integrated Design Feature #19 (Appendix A page 349) addresses control of public access on some routes in a general sense, but not specifically for big game security. The IDFG recommends enhancing the design feature to include the importance of maintaining road closures for big game security and vulnerability. Integrated Design Feature #141 (Appendix A page 363) is more specific, but only mentions three roads. We recommend the Integrated Design Feature be expanded to explicitly state how and when all temporary and existing closed roads will be managed to mitigate potential effects to big game security and vulnerability. We also recommend that for

temporary roads the final EIS specify if these roads will be gated or otherwise travel-restricted during project implementation.

The DEIS and subsequent Final EIS needs to ensure fuel treatment projects avoid or minimize disturbance on big game populations, as well as ensuring big game animals have ample opportunity to avoid and escape treated watersheds and have security cover in adjacent watersheds not actively treated. The IDFG recognizes the desire to implement various fuel treatment strategies over several years. How these treatments are applied spatially and temporally will affect big game displacement and security. We recommend that fuel treatments are implemented in stages by watershed to minimize disturbance. One of the bullet points under Integrated Design Feature #132 (Appendix A pages 360 and 361) states that logging and road building activities will be planned to provide suitable displacement areas for big game. We recommend this be revised to be specific about timing of treatment applications at the watershed level, as well as the individual unit level within a watershed. Ideally, the IDFG would recommend that adjacent watersheds are not treated simultaneously during the same year.

Mountain Goat Disturbance Considerations

Mountain goats are classified in Idaho as a Species of Greatest Conservation Need and are considered a big game animal. There is a population of 12-15 mountain goats that occupy cliff complexes in the headwater drainage of the North Fork Salmon River. This is a unique subpopulation genetically related to mountain goats inhabiting the Idaho/Montana divide near Horse Creek to the west. There is general consensus in the literature that mountain goats are sensitive to aircraft disturbance, and helicopter traffic is more disruptive than fixed-wing over-flights (Wilson and Shackleton 2001). Response behavior of goats is correlated with distance to disturbance, distance disturbance is visible, and distance to security cover, but not dependent on time of year (Foster and Rahns 1983). Studies on helicopter disturbance effects to mountain goats conducted in British Columbia and Alberta independently suggested 2-km buffers around mountain goats to completely avoid harassment (Foster and Rahns 1983, Côté 1996). Given the proximity of this subpopulation to proposed helicopter treatment units, we recommend flight paths, distance from heli-treatment units, and line-of-sight distances provide a 2-km buffer from known mountain goat areas. In addition the IDFG recommends that the final DEIS flight paths, distance from heli-treatment units, and line-of-sight distances be evaluated to avoid or minimize disturbance impacts to mountain goats.

Forest Carnivore Linkage Zones

Lost Trail and Chief Joseph passes, at the north end of the project area, are identified as lynx linkage areas. Lynx linkage areas in the western U.S. were defined by Claar et al. (2004) as:

> *"Habitat that provides landscape connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas where blocks of lynx habitat are separated by intervening areas of non-lynx habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between blocks. Connectivity provided by linkage areas can be degraded or severed by human infrastructure such as high-use highways, subdivisions or other developments."*

Linkage areas are not simply "travel routes"; they are broad areas of habitat where animals find food, shelter, and security. Preserving these connectivity corridors is particularly important to the conservation of boreal species at the southern edge of their distributions in the U.S. Rocky Mountains, including lynx, wolverine, fisher, grizzly bear, gray wolf, and other forest carnivores. In this landscape, movement corridors for lynx show reasonable correspondence with dispersal path models for wolverine (Schwartz et al. 2009, Squires et al. 2013).

Potential impediments or barriers to lynx movement in the Lost Trail/Chief Joseph linkage area include highways US 93 and Montana 43, a state visitor's center, Lost Trail Ski Area, dispersed motorized/non-motorized snow sport amenities at Chief Joseph Pass, and completed fuel treatments associated with the Lost Trail Salvage Timber Sale. Additional fuel treatments proposed in the DEIS and those associated with Chief Joseph ski trail maintenance have the potential to further impede movement of lynx, wolverine, and other forest carnivores along this divide. Lynx in the U.S. Rockies are sensitive to changes in forest structure, tend to avoid forest openings, and select older forests with high canopy cover during winter (Squires et al. 2013). Wolverine may avoid areas with human infrastructure and disturbance (Copeland 1996, May et al. 2006), though likely not to the degree shown by lynx. Design features to mitigate project impacts in wolverine linkage zones include maintaining contiguous forest cover that links habitat patches, minimizing distance between cover, and removing discord elements that affect wildlife movement (e.g., bright metal objects, signing, construction debris, over-confining fencing) (Ruediger 2005).

Given the existing, cumulative human footprint on Lost Trail/Chief Joseph passes proper, we recommend a modification of fuel treatments proposed in units immediately south of these passes to create a strategic east-west linkage corridor with vegetative attributes suitable for lynx, wolverine, and other forest carnivores. This would entail modification of fuel treatments to retain ≥40-50% canopy cover (Poole et al. 1996, Lofroth et al. 2010) and judicious use of broadcast burning to minimize loss of down woody material (i.e., blowdown, deadfall) and dense, shrubby understory. In the Chief Joseph vicinity, we recommend these modifications be applied to units 36, 38a, 38b, 39, 40, and 42. In the Lost Trail Pass vicinity, we recommend these modifications be applied to units 16, 35, and 184. These changes will mitigate existing and proposed impacts to the Lost Trail/Chief Joseph lynx linkage area, will facilitate present and future movement opportunities for a wide range of wildlife, and will direct wildlife use to relatively undisturbed habitats within Inventoried Roadless Areas.

Prescribed Burning Treatments

A stated primary objective of this Project is to improve habitat diversity for fish and wildlife. This can be accomplished if treatments are implemented in stages, in space and time, across the Project Area (as mentioned above under Big Game). Prescribed burning objectives call for treatment of the entire 41,423 acres within a five to ten year period. This would entail construction of up to 200 miles of hand line along unit perimeters and an overall reduction of surface fuel loading by up to 70%. From a wildlife habitat perspective, burn treatments conducted at this magnitude will result in a landscape with reduced vegetative and structural heterogeneity for most state- and forest-sensitive species. This concern is especially relevant for

fisher, an at-risk species known to occur in the project area. Fishers use forests with a high percentage of canopy closure, abundant large woody debris, large snags and cavity trees (aspen, cottonwood, conifers), and understory vegetation. They are highly selective of large decadent or dead trees for natal den sites. They select rest sites characterized by a greater number of vegetation layers, higher percentage of dead and down woody material, and a greater percentage of shrub cover than random sites (Powell 1993). Aggressive treatments to reduce canopy cover, ladder fuels, and surface fuels across the entire project area will not be compatible with fisher habitat requirements. This concern is heightened due to the significant and cumulative loss of fisher habitat in the North Fork Ranger District from the 2012 Mustang Fire. We have similar concerns with potential lynx denning habitat and foraging habitat for boreal owl and northern goshawk.

Integrated design features in Appendix A of the DEIS give procedural direction for burns conducted in designated old growth (#140), but do not address retention of key structural elements of fisher (or lynx) habitat (down woody material, snags) in the remaining treatment units. We suggest a design feature be developed and implemented to retain a greater portion of surface fuels than proposed. This might be addressed by selective prescribed burning in smaller acreage units (e.g., ≤500 acres). This would have the advantage of reducing impacts and costs associated with hand line construction. Burning, conducted in early spring (ideally timed prior to bird nesting initiation), would result in lower fire intensities and mosaic burn patterns that conserve structural elements that contribute to habitat diversity.

We observed inconsistencies between the Proposed Action and integrated design features for designated old growth referenced in Appendix A. The Proposed Action states "all of the designated old growth stands within the project area would be treated through ladder fuel reduction in the form of low intensity fire, thinning of the small diameter trees, or a combination of both." Yet, design feature objectives call for maintaining log debris and snags and shrub understory. We are concerned that under-burning in old growth units may remove structural characteristics unique to this mature forest class and important for a range wildlife species reliant on old growth habitat. We recommend the final EIS better define old growth objectives and strategies.

Cumulative Effects of Recent Wildfires

Since 2000, several large (>1,000 acres) wildfires burned portions of the North Fork Ranger District and neighboring Bitterroot and Beaverhead-Deerlodge National Forests within and surrounding the project area. We recommend that the DEIS recognize the occurrence of these wildfires and analyze the action alternatives cumulatively with these wildfire effects in mind. Absence of this analysis is concerning given the scale of the Mustang Fire Complex and its proximity to the project area. We request that the Final EIS evaluate the proposed fuel treatment's interaction with previous wildfires (e.g., Mustang, Saddle, Black Frog, Rombo, Frog Pond, Elkhorn, Bear Spring) for cumulative effects on populations and habitat for lynx, wolverine, fisher, boreal owl, flammulated owl, northern goshawk, black-backed woodpecker, and pileated woodpecker. As referenced above in the case of fisher, we are concerned that proposed fuel treatments may further reduce habitat suitability for several forest-sensitive species already affected by large-scale wildland fire disturbance in the surrounding landscape.

Aspen and Whitebark Pine Treatments

The DEIS recognizes aspen and whitebark pine as important elements of habitat diversity within the project area. Proposed actions call for enhancing these species through opportunistic treatments (prescribed burns, removal of competitive species) wherever they occur. While this approach is practical, it does not provide quantifiable targets to ensure landscape restoration goals for aspen and whitebark pine will be met. Presuming a baseline inventory of either species is unavailable, a viable approach is to require that stewardship contractor's record and track all locations, restoration actions, and acres of aspen/whitebark pine treated. This will facilitate post-treatment monitoring efforts of SCNF staff and Lemhi County Forest Restoration Group collaborative members. An alternative would be to work with agencies who may have vegetation maps that identify or model where aspen and whitebark pine may occur.

Riparian and Stream Restoration

Our main concern is to limit, as best as possible, sedimentation impacts on fish habitat in the Project Area. The Upper North Fork Salmon River drainage within the Project Area contains populations and all life stages of ESA-listed Chinook Salmon, Steelhead Trout, and Bull Trout, as well as resident populations of Westslope Cutthroat Trout, Brook Trout, and Mountain Whitefish. While the stream restoration and culvert/barrier replacement portions of the Proposed Action support IDFG fisheries management goals, sedimentation impacts of fuel treatment activities may adversely impact fish populations in both the short term and long term. Best Management Practices in the DEIS found in Appendix A. Integrated Design Features (Pages 352-359) appear robust enough to help minimize fine sediment from entering stream channels. However, there will be instances when intense precipitation events will occur on bare soils and the Forest Service and/or timber harvest contractors will have to take expedited measures using appropriate BMPs are being implemented and followed to limit and control sediment movement. The final EIS needs to be explicitly clear that BMP and/or turbidity monitoring and enforcement will occur during Proposed Action activities. Additionally, monitoring fine sediment in known fish habitat and at historic sample locations should be ongoing throughout the length of the Project.

We have reviewed the Proposed Site Specific Amendment #3 and have general concerns in its overall effectiveness given the relative small size (approximately 75 acres) compared to the size of the overall project (41,423 acres). The Draft EIS proposes to amend Pacific Anadromous Fish Strategy ("PACFISH") riparian habitat conservation area buffer widths to allow mechanical fuel treatment within PACFISH buffers. Riparian Habitat Conservation Areas ("RHCA") and PACFISH standards are intended to provide sediment filtering as well as significant stream ecological functions such as large woody debris recruitment, riparian habitat, and floodplain function, all which contribute to excellent fish habitat. Riparian areas, typically with dense vegetation, also provide important habitats for many wildlife species. We recommend not altering or amending the PACFISH buffer designations unless you are only enhancing aspen stands. Additionally, the SCNF should consider moving roads (if at all possible given expense,

valley width and topography) out of PACFISH buffer areas. By limiting RHCA fuel treatments to only aspen areas and considering the possibility of moving roads the SCNF will be focusing on stated fishery objectives of: "1. Provide habitat of sufficient quantity and quality to sustain populations of management indicator species. 2. Manage classified threatened and endangered species habitat to maintain or enhance their current status. 3. Maintain aquatic habitat capability at a level sufficient to meet State water quality and species production goals for both resident and anadromous fisheries." If the SCNF is adamant about thinning 75 acres of RHCA and PACFISH buffer habitat we recommend you provide scientific evidence (peer-reviewed literature) or results of successful projects that show the desired outcome of fuel treatments in these areas to help further justify this Proposed Action.

Monitoring

The Upper North Fork project will involve implementing a wide variety of coordinated and integrated forest restoration treatments, including forest thinning, prescribed fire, road closures and rehabilitation, riparian zone restoration projects, and fisheries improvement projects. Managing for and monitoring wildlife communities is a vital part of forest restoration efforts. Monitoring results can be used to evaluate the degree to which restoration actions improve fish and wildlife habitat and other key ecosystem attributes, such as snags, down woody material, and stand structural diversity. These components may be overlooked if monitoring and forest management is focused exclusively on vegetation. Monitoring can also be designed for large-scale analyses to determine if the cumulative effects of all treatments create the desired landscape outcome with the resilience to withstand and adapt to long-term environmental changes.

The DEIS does not establish fish/wildlife monitoring as a priority, nor is there clear guidance on fish/wildlife monitoring elements. Therefore, we recommend that SCNF and partners develop and implement a comprehensive and spatially extensive monitoring program for the Upper North Fork project to assess responses to treatments by multiple taxa (fish, birds, mammals, amphibians, invertebrates) in a statistically robust and scientifically integrated fashion with short (implementation monitoring) and long-term (effectiveness monitoring) goals in mind.

Comments or Recommendations Specific to DEIS

Big Game

Page 192: No motorized hunting access (the normal operating procedure) during hunting season on newly established project access routes using Kelly humps, berms, or gates or other appropriate technique.

Page 192: Inconsistency with table 58 and text for 21,344 acres of forage or cover. It should read "there remains 21,344 acres of cover in the management area."

Page 193: Elk security cover is calculated by considering 250 acre coniferous patches in a non-linear configuration at least one-half mile from an open road for security areas of over 30 percent the area (Hillis et al. 1991). Pre-treatment there are four such patches, totaling 12,873 acres or

31 percent of the project area. Post-treatment there would be 10,351 acres or 25 percent cover which meets the LRMP standards and guidelines.

Page 361: Cover patches will be designed to be at least 600 feet wide, in a non-linear configuration, and should be at least 250 acres.

Lynx

Page 155: the recent verified observation of a male lynx on the Salmon/Cobalt Ranger District occurred on January 26, 2012.

Wolverine

-IFWIS database contains several recent, verified records of wolverine utilizing SCNF habitats as low as 4,000-5,000 ft. elevation encompassing mixed conifer forest, riparian forest, and mountain shrub communities.

-There are several recent, verified wolverine observation records within the project area and documented movement of telemetry-instrumented wolverine between the Anaconda-Sapphire/Flint Creek ranges of Montana and the Beaverhead/Bitterroot ranges of Idaho.

-A wolverine population estimate for Idaho can be extrapolated from predicted habitat modeled by Inman et al. (2013). A conservative estimate for Idaho is 140 wolverines, with a much lower number comprising the effective population size (the proportion of the actual population that contributes to future generations).

-The wolverine population in the contiguous U.S. is currently a "proposed" Distinct Population Segment. Please insert as appropriate throughout DEIS.

Raptors

-IFWIS database contains 28 boreal owl records within the project area. Surveys for boreal owls were conducted by IDFG in 2011, resulting in 9 detections within the project area. Effects determinations based on "no known boreal owls in the project area" should be reevaluated.

-IFWIS database contains 8 flammulated owl records within the project area. Surveys for flammulated owls were conducted by IDFG as part of a SCNF Challenge Cost Share in 2012. Effects determinations based on "no records of flammulated owls in the project area" should be reevaluated.

-Page 185: Under Action Alternatives, Direct and Indirect Impacts to northern goshawk, based on Scott et al. (2002) habitat suitability model and literature review, suitable goshawk nesting and foraging habitats are widely distributed and relatively abundant in the project area. Presumption that goshawks do not occupy the project area in the absence of protocol-based surveys is not supported by IDFG.

Aquatic

Pages 140, 141 and 166: There are significant discrepancies in the DEIS about if there will or will not be commercial thinning in RHCA areas. Please clarify throughout document.

Page 133, Table 49: The temperature data presented do not clearly state when these data were collected or if they were averaged for a given month. Please provide clarification to state exactly what the temperature data represent.

Recommended Language for Additional BMP's for Inclusion in Appendix A

Management Guidelines for Logging
-Restrict logging of winter ranges to times when elk and deer are absent. The Department recommends no logging activities be permitted in known winter range from December 1 to April 15 to avoid potential effects to wintering big game species.
-If logging is conducted in the winter, concentrate activities into the shortest time and smallest area possible.
-Provide "security areas" in adjacent watersheds where no management activities are underway to active timber sales. Provide an area at least as large as the sale area, with line-of-sight topographic barriers, and closed to vehicular traffic.
-Do not log adjacent drainages simultaneously.
-Plan logging to provide a diversity of cover classes throughout the winter range area.

Management Guidelines on Providing Forage
-A diversity of forage conditions (in terms of forage structure; that is, grazed, burned, forage nside cover, ungrazed) will provide an array of grazing opportunities under varying climatological and snow conditions.
-Prescribed burning, judiciously applied, holds promise for improvement of forage quality on winter range if management objectives provide an array of forage conditions.
-Seed disturbed areas to prevent re-establishment or introduction of noxious weed species.

Management Guidelines for Roads on Winter Range
-Restrict human access to winter ranges if the welfare of big game is a primary concern.
-Big game welfare should be a primary consideration in the design and management of roads on winter ranges.

Management Guidelines for Post-treatment Habitat Improvements
-Promote aspen regeneration for important seasonal cover and protect from livestock browsing with fencing or strategic placement/falling of existing trees for at least 5 years post-treatment.
-Monitor for and actively control noxious and invasive plant species.

Summary

Idaho Department of Fish and Game appreciates and thanks the Salmon-Challis National Forest for the opportunity to identify potential fisheries and wildlife issues and concerns associated with the Draft Environmental Impact Statement for the Upper North Fork HFRA Ecosystem Restoration Project. Again, IDFG commends the Forest Service for using a collaborative approach with various stakeholders for taking on a challenging and important project. It is our desire that the Salmon-Challis National Forest will consider these and past comments and recommendations to improve the subsequent Final Environmental Impact Statement. We offer our assistance to provide fish and wildlife data and to craft final language in the EIS. If you have questions or require further assistance, please contact our Environmental Staff Biologist, Tom Bassista, at 208.525.7290.

Sincerely,

Tom Curet
Regional Supervisor

cc: Sharon Kiefer (IDFG Directors Office)
Greg Painter (IDFG Region 7)
Beth Waterbury (IDFG Region 7)
Jeff Cook (IDPR-Boise)

Literature Cited

Claar, J. J., T. Bertram, R. Naney, N. Warren, and W. Ruediger. 2004. Wildlife linkage areas: an integrated approach for Canada lynx. *In*: Proceedings of the 2003 international conference on ecology and transportation, Eds. C. L. Irwin, P. Garrett, and K. P. McDermott. Center for Transportation and the Environment, North Carolina State University, Raleigh, USA.

Christensen, A.G., L. Jack Lyon, J.W. Unsworth. 1993. Elk management in the northern region: considerations in forest plan updates or revisions. Gen. Tech. Rep. INT-303. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT.

Copeland, J. P. 1996. Biology of the wolverine in central Idaho. Dissertation, University of Idaho, Moscow, USA.

Côté, S. D. 1996. Mountain goat responses to helicopter disturbances. Wildlife Society Bulletin 24:681–685.

Foster, B. R., and E. Y. Rahs. 1983. Mountain goat response to hydroelectric exploration in northwestern British Columbia. Environmental Management 7:189–197.

Hillis, J.M., M.J. Thompson, J.E. Canfield, L. Jack Lyon, CC.L. Marcum, P.M. Dolan, and D.W. McClerrey. 1991. *Defining elk security: the Hillis Paradigm*. Pages 38-43 *in* Proceedings of a symposium on elk vulnerability. Montana Chapter of The Wildlife Society, Montana State University, Bozeman, MT. April 10-12, 1991.

Idaho Department of Fish and Game (IDFG). 2014. Idaho elk management plan 2014-2024. Idaho Department of Fish and Game, Boise, USA.

May, R., A. Landa, J. van Dijk, J.D.C. Linnell, and R. Andersen. 2006. Impact of infrastructure on habitat selection of wolverines *Gulo gulo*. Wildlife Biology 12(3):285–295.

Poole, K. G., L. A. Wakelyn, and P. N. Nicklen. 1996. Habitat selection by lynx in the Northwest Territories. Canadian Journal of Zoology 74:845-850.

Powell, R. A. 1993. The fisher: life history, ecology, and behavior. Second edition. University of Minnesota Press, Minneapolis, USA.

Ruediger, W. 2005. Management considerations for designing carnivore highway crossings. Wildlife Consulting Resources, Missoula, Montana, USA.

Schwartz M. K., J. P. Copeland, N. J. Anderson, J. R. Squires, R. M. Inman, K. S. McKelvey, K. L. Pilgrim, L. P. Waits, S. A. Cushman. 2009. Wolverine gene flow across a narrow climatic niche. Ecology 90:3222–3232.

Squires, J. R., J. N. J. DeCesare, L. E. Olson, J. A. Kolbec, M. Hebblewhite, and S. A. Parks. 2013. Combining resource selection and movement behavior to predict corridors for Canada lynx at their southern range periphery. Biological Conservation 157 (2013):187-195.

Wilson S.F., and D. M. Shackleton. 2001. Backcountry recreation and mountain goats: a proposed research and adaptive management plan. B.C. Ministry of Environment, Lands and Parks, Wildlife Branch, Victoria, BC. Wildl. Bull. No. B-103.

Thomas, J. W., H. Black, Jr., R. J. Scherzinger, and R. J. Pedersen. 1979. Deer and elk. *In* Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington, *ed*. J. W. Thomas, 104127. U.S. Department of Agriculture, Forest Service, Agricultural Handbook No. 553. Portland, Oregon.

From:	Jeff Cook
To:	FS-comments-intermtn-salmon-challis-northfork
Subject:	Upper North Fork HFRA Ecosystem Restoration Project DEIS
Date:	Tuesday, May 20, 2014 12:35:08 PM
Attachments:	Upper North Fork HFRA DEIS Comments.docx

I have attached IDPR comments. Our comments are in Microsoft Word (.docx) format.

If you have any questions about our comments, please let me know.

Jeff Cook, Outdoor Recreation Analyst
Recreation Bureau
Idaho Department of Parks and Recreation
P.O. Box 83720
Boise, ID 83720-0065
(208) 514-2483

C. L. "Butch" Otter
Governor

Nancy C. Merrill
Director

……..……

IDAHO PARK AND
RECREATION BOARD
……..……

Tom Crimmins
District One

Randy Doman
District Two

Susan Buxton
District Three

Charles H. Correll
Board Chair
District Four

Jean S. McDevitt
District Five

Robert Hansen
District Six

……..……

DIRECTOR'S OFFICE
……..……

5657 Warm Springs Avenue
P.O. Box 83720
Boise, Idaho 83720-0065

Phone (208) 334-4199

www.parksandrecreation.idaho.gov

May 20, 2014

Maggie Seaberg, Supervisory Forester
North Fork Ranger District
P.O. Box 180
North Fork, ID 83466

RE: Upper North Fork HFRA Ecosystem Restoration Project DEIS

Dear Ms. Seaberg:

The Idaho Department of Parks and Recreation (IDPR) staff reviewed the Upper North Fork HFRA Ecosystem Restoration Project draft Environmental Impact Statement (DEIS). The Salmon-Challis National Forest is proposing a variety of management activities including timber harvest and road decommissioning in the Upper North Fork drainage.

We previously commented on this project during the Notice of Intent comment period in August 2011. We were concerned about the effects this project would have on system trails, visual quality and the roadless resources.

The DEIS presents two different action alternatives. Alternative 1 would have temporary construction of roads in the roadless areas while Alternative 2 would not. Any temporary road construction in the roadless area would require consultation with the Idaho Roadless Commission.

The DEIS presents the Recreation Analysis starting on Page 219. The DEIS fails to mention that off-highway vehicle (OHV) recreation is a summer activity in the project area. Our Trail Ranger crews have been maintaining trails in the project area for the past 25 years. The project area is one of the only trail systems on the North Fork Ranger District where off-highway motorcyclists can experience a multi-day riding experience with the Divide Trail and other connecting trails.

We were pleased to see that none of the road decommissioning will impact any existing motorized route opportunities under each of the proposed alternatives. The DEIS mentions that the Pierce Creek Trail #6121 would be reclassified from a single-track motorized trail to a non-motorized trail on Page 227. The Salmon-Challis Travel Plan SEIS decision already made this change in designation. This paragraph is mostly likely unnecessary in the FEIS.

The DEIS disclosed that the Hammerean Creek Road #449 would not be available as a connecting route under Alternative 2. This road provides OHVs access from Gibbonsville to Twin Creek. The SCNF should consider downgrading this road from open to full size motor vehicles to an ATV trail through the existing rock slide.

The IDPR Trail Cat Program can help fix the rock slide through this road section. The Trail Cat Program constructs ATV and single-track motorized trails. Mike Robinson, East Region Trails Specialist, can schedule work for this project. We encourage the North Fork Ranger District to keep the Hammerean Creek Road open to at least ATV use as a through route.

The Recreation analysis in the DEIS did a good job of disclosing the current condition and the alternative impacts. If you have any questions about our comments, please contact me at (208) 514-2483.

Sincerely,

Jeff Cook, Outdoor Recreation Analyst
Recreation Bureau

Index

A

air quality, xi, xxv, xxix, xxx, xxxii, xxxvi, 24, 70, 88, 89, 90, 91, 93, 94, 95, 96, 97, 246, 329, 343, 360, 363, 382, 455
smoke, xi, xviii, xxxiv, 66, 88, 90, 91, 92, 94, 95, 96, 175, 246, 247, 329, 340, 381, 383, 457, 462, 494
airshed, 89, 92, 96, 455
aspen, i, ii, iii, vi, viii, xii, xix, 5, 7, 13, 19, 29, 41, 43, 45, 48, 56, 57, 62, 126, 170, 190, 202, 260, 268, 269, 272, 273, 274, 277, 278, 283, 284, 287, 288, 289, 292, 293, 295, 297, 305, 313, 315, 321, 325, 329, 333, 339, 364, 381, 385, 392, 396, 458, 463, 471, 472, 480, 483, 487, 488, 492, 495

B

best management practices, xiv, xviii, 101, 113, 118, 132, 144, 147, 150, 153, 154, 156, 157, 236, 237, 238, 333, 339, 381, 398, 488
biomass, iii, 6, 12, 14, 65, 66, 67, 68, 69, 70, 119, 354, 381, 382, 468, 478, 481
broadcast burning, ix, xxiv, 23, 46, 49, 63, 64, 69, 86, 87, 88, 176, 186, 191, 195, 197, 201, 202, 210, 222, 268, 269, 270, 272, 273, 283, 284, 285, 287, 288, 383, 459, 464, 469, 476, 485, 496

C

canopy, ii, iii, ix, x, xii, xiv, xvii, xxiv, xxvii, xxxiii, xxxiv, xxxvi, 6, 19, 23, 26, 29, 31, 32, 33, 42, 43, 44, 46, 49, 51, 52, 53, 56, 57, 64, 74, 75, 76, 77, 79, 83, 85, 86, 105, 114, 115, 148, 155, 170, 176, 177, 184, 186, 187, 188, 189, 190, 192, 193, 197, 198, 204, 205, 206, 210, 227, 231, 233, 234, 235, 236, 237, 257, 264, 268, 271, 272, 275, 279, 283, 286, 287, 290, 294, 311, 313, 314, 317, 320, 338, 339, 396, 403, 404, 459, 464, 470, 485, 486, 495, 496
canopy base height, x, xxxvi, 77, 79, 85, 86
canopy bulk density, xxxiv, 79, 86
carbon, 60, 61, 65, 66, 67, 68, 69, 89, 90, 92, 96, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 477, 478
Class 1 Wilderness, 88
Clean Air Act, 38, 89, 90, 95, 96, 97, 340
collaboration, i, iii, 3, 202, 466
Columbia spotted frog, xv, 198, 199, 200, 374, 475
Community Protection Zone, v, xxviii, xxxii, xxxvii, 2, 5, 9, 15, 16, 17, 27, 28, 248, 250, 251, 259, 260, 261, 262, 266, 272, 280, 282, 287, 295, 296, 297, 338, 413, 417, 418, 419, 420, 457, 462, 470, 471, 474, 493, 533
Continental Divide National Scenic Trail, xix, xx, xxxv, xxxvi, 239, 242, 245, 254, 255, 256, 264, 273, 275, 277, 288, 290, 292, 299, 301, 303, 304, 311, 316, 318, 319, 320, 321, 323, 324, 325, 341, 378, 385
County Wildfire Protection Plan, ii, 2, 5, 418, 471
crown fire, ii, x, 6, 7, 12, 19, 20, 44, 70, 71, 73, 75, 76, 77, 79, 81, 83, 84, 85, 86, 87, 112, 132, 148, 155, 160, 175, 338, 357, 363, 364, 413, 419
active, x, 19, 20, 44, 79, 83, 85
passive, 83, 86
Cultural Resource Inventory, iv, xxi, 8, 336, 337
Cultural Resources, 258, 301, 302
cumulative watershed effects, 105, 161, 339, 366

D

Department of Environmental Quality, xiii, 90, 98, 102, 103, 130, 363, 365, 367, 391
disease, viii, ix, xi, xvi, xviii, xx, xxiii, xxiv, 2, 22, 23, 31, 32, 36, 37, 38, 40, 42, 43, 46, 50, 51, 52, 63, 64, 66, 75, 85, 105, 107, 112, 120, 123, 125, 164, 174, 177, 188, 189, 191, 193, 194, 197, 199, 201, 203, 213, 222, 225, 253, 254, 258, 262, 263, 268, 272, 283, 287, 296, 302, 306, 309, 313, 314, 319, 320, 338, 351, 358, 381, 410, 414, 469
diversity, i, ii, xix, xxviii, 5, 12, 13, 19, 27, 40, 41, 44, 63, 70, 74, 129, 132, 137, 138, 145, 155, 157, 160, 166, 167, 176, 182, 186, 191, 202, 228, 231, 232, 255, 256, 258, 262, 297, 300, 305, 313, 315, 320, 321, 325, 332, 333, 339, 396, 404, 410, 458, 463, 483, 486, 487, 491

E

emissions, xi, xxxiv, 60, 62, 65, 66, 67, 68, 69, 88, 90, 91, 92, 94, 95, 96, 340, 353, 356, 381, 477
erosion, xii, xiii, xiv, xvi, xxv, xxxiv, xxxvi, 11, 24, 97, 98, 100, 101, 104, 105, 106, 107, 108, 109, 110, 112, 113, 114, 115, 117, 119, 124, 140, 141, 145, 149, 150, 151, 152, 153, 154, 156, 157, 160, 163, 223, 225, 230, 299, 333, 384, 386, 387, 388, 390, 391, 393, 454, 475

F

fire
passive crown fire, 83, 86
stand-replacing, xii, xviii, 65, 68, 70, 76, 110, 186, 236, 263, 265, 309, 351, 354
surface, x, 44, 71, 73, 76, 77, 83, 86, 87, 338

wildland, i, ii, xii, xx, 2, 3, 5, 15, 67, 70, 71, 73, 77, 80, 83, 85, 88, 91, 92, 95, 120, 159, 238, 259, 260, 262, 263, 264, 265, 268, 269, 270, 272, 273, 274, 277, 278, 283, 284, 285, 287, 288, 289, 292, 293, 295, 297, 309, 315, 327, 329, 337, 338, 399, 400, 401, 417, 418, 419, 459, 464, 469, 487, 497
fire behavior, i, ii, v, x, xi, xxxiv, 3, 6, 11, 19, 44, 70, 73, 74, 76, 77, 81, 85, 86, 87, 88, 90, 127, 160, 309, 349, 352, 363, 399, 401, 414, 459, 464, 471
fire hazard, x, xv, 70, 73, 84, 85, 259, 260
fire history, 5, 53, 271, 275, 279, 286, 290, 294, 355, 409
Fire Management Plan, 81, 341, 401
fire regime, ii, ix, xxiv, xxxiii, xxxvi, 2, 3, 4, 5, 6, 12, 23, 32, 33, 39, 42, 44, 46, 49, 51, 63, 67, 68, 70, 73, 74, 75, 76, 83, 123, 152, 160, 161, 162, 177, 223, 297, 302, 306, 338, 349, 356, 419, 473
fire regime condition class, ix, xxiv, xxxvi, 3, 4, 5, 23, 32, 33, 39, 42, 49, 51, 75, 76, 302, 338, 362
departure, 362
fire severity, xxiv, xxxiv, 23, 32, 44, 49, 75, 76, 77, 85, 86, 110, 119, 156, 174, 189, 264, 309, 338, 355, 472
high, x, xvi, xvii, xviii, xx, 33, 43, 44, 70, 74, 75, 76, 77, 83, 85, 87, 107, 110, 111, 119, 132, 145, 147, 149, 151, 158, 161, 174, 210, 222, 233, 245, 262, 269, 273, 284, 288, 382, 406, 414, 419
fire suppression, i, ii, v, viii, x, xiii, xix, xxxiv, 3, 5, 6, 11, 19, 32, 40, 42, 44, 53, 67, 68, 69, 73, 75, 77, 80, 87, 94, 107, 110, 111, 126, 152, 160, 175, 238, 263, 264, 268, 273, 283, 288, 313, 319, 321, 325, 351, 399, 409, 414, 419, 445, 449, 473, 483
fire type, x, 83, 84, 87, 90
fisher, xv, 50, 51, 187, 188, 189, 190, 371, 372, 374, 479, 485, 486, 487, 495
flame length, x, 12, 73, 77, 80, 83, 84, 85, 87, 90
Foreground, 299, 314, 316, 318, 324
fuel load, xi, xii, xviii, 5, 7, 16, 31, 40, 67, 73, 75, 76, 83, 85, 86, 94, 95, 107, 132, 160, 175, 176, 236, 315, 338, 403, 447, 457, 462, 493, 494
fuel model, x, 19, 85, 86, 91
fuels
surface, x, 13, 68, 77, 79, 80, 85, 86, 235, 458, 463, 486, 495

H

Healthy Forest Restoration Act (HFRA), 1, i, ii, iii, iv, v, vii, xi, xvi, xxxiii, xxxiv, xxxv, xxxvii, 1, 2, 5, 6, 7, 8, 11, 16, 38, 40, 42, 44, 53, 60, 61, 70, 75, 80, 98, 99, 104, 106, 125, 162, 163, 182, 213, 223, 248, 249, 250, 251, 252, 253, 255, 259, 261, 262, 263, 264, 265, 268, 271, 272, 277, 280, 283, 286, 292, 295, 297, 298, 309, 331, 336, 337, 340, 368, 373, 377, 378, 381, 399, 403, 405, 413, 414, 417, 418, 443, 447, 449, 453, 456, 461, 466, 470, 471, 479, 487, 488
Heritage Resources, xx, xxi, xxix, xxxi, xxxii, 335, 336, 337, 339, 379, 394

I

Idaho Roadless Area, iii, v, vi, xi, xii, xxviii, xxix, xxxi, xxxii, xxxv, xxxvii, 6, 9, 13, 14, 15, 17, 18, 19, 27, 28, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 266, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280,282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 364, 411, 417, 449, 451, 456, 457, 461, 462, 468, 470, 479, 493
Idaho Roadless Rule, xi, 250, 258, 259, 268, 411, 449, 451, 457, 462, 493
insects, viii, xi, xiii, xix, 2, 31, 32, 36, 38, 42, 43, 44, 46, 50, 51, 52, 53, 59, 61, 62, 63, 64, 66, 68, 75, 105, 107, 113, 164, 174, 177, 185, 186, 188, 189, 191, 194, 197, 199, 201, 222, 225, 230, 253, 258, 262, 263, 265, 268, 271, 272, 276, 283, 286, 287, 291, 296, 306, 309, 313, 314, 320, 338, 352, 353, 354, 358, 381, 406, 407, 410, 469
integrated design features, xxxii, 18, 162, 339, 381, 458, 463, 484, 486, 488
issue, ii, iii, iv, xxxiii, 9, 28, 90, 92, 118, 205, 213, 261, 280, 295, 349, 450, 452, 467, 471, 476, 487, 497

L

ladder fuels, i, ii, vi, x, xi, xxxv, 6, 12, 13, 14, 20, 45, 67, 73, 75, 77, 80, 81, 83, 85, 86, 87, 148, 155, 160, 211, 314, 315, 318, 331, 338, 405, 410, 459, 464, 480, 483, 486, 490, 495
LANDFIRE, 32, 79, 362
Landscape, i, ii, iii, v, viii, ix, xi, xii, xviii, xix, xxiv, 1, 2, 3, 5, 6, 7, 10, 11, 13, 14, 19, 20, 23, 31, 36, 40, 43, 44, 46, 49, 50, 63, 64, 68, 74, 75, 77, 80, 85, 86, 100, 149, 155, 160, 164, 166, 167, 168, 169, 174, 187, 189, 190, 203, 210, 214, 220, 225, 238, 253, 258, 262, 263, 264, 265, 269, 270, 271, 273, 275, 277, 279, 284, 285, 286, 288, 290, 292, 294, 295, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 309, 310, 312, 313, 314, 315, 316, 318, 319, 320, 321, 324, 325, 349, 353, 354, 356, 362, 385, 386, 400, 403, 411, 450, 459, 464, 467, 469, 470, 471, 472, 473, 481, 482, 485, 486, 487, 489, 490, 495, 496, 497
large woody debris, xiii, xvi, xxvi, 25, 51, 97, 113, 114, 132, 133, 144, 145, 150, 155, 156, 158, 160, 162, 391, 392
Lemhi County, 1, i, ii, iv, v, xx, xxxii, xxxiii, 1, 2, 5, 6, 8, 9, 10, 11, 71, 77, 80, 96, 165, 218, 230, 231, 232, 238, 326, 327, 328, 329, 330, 331, 332, 333, 334, 341, 345, 347, 362, 379, 381, 398, 413, 414, 418, 419, 443, 450, 460, 465, 469, 470, 471, 473, 474, 476, 492

Lewis and Clark National Historic Trail, xix, xx, 300, 302, 304, 316, 321, 322, 341, 378

M

management indicator species, xv, xxv, 24, 125, 129, 136, 138, 142, 163, 166, 200, 201, 202, 368, 373, 459, 464, 475, 479, 480, 484, 497
meadows, i, iii, vi, xii, xxiii, 7, 13, 22, 48, 97, 175, 183, 184, 191, 198, 210, 214, 216, 217, 220, 224, 230, 235, 237, 245, 246, 254, 256, 257, 260, 262, 268, 269, 272, 273, 274, 277, 280, 283, 284, 287, 288, 289, 292, 295, 297, 304, 305, 314, 316, 317, 319, 324, 325, 329, 332, 339, 389, 396, 397, 424, 425, 431, 470, 476
Middleground, 314
migratory birds, xxv, 24, 163, 202, 203, 341, 373, 397
mortality, viii, ix, xvii, xviii, 30, 31, 36, 37, 38, 43, 44, 50, 61, 63, 65, 67, 68, 70, 75, 83, 85, 105, 112, 174, 213, 221, 222, 236, 253, 263, 264, 270, 271, 284, 286, 309, 349, 351, 359, 449
mountain pine beetle, ii, xxiv, 5, 19, 23, 36, 37, 47, 49, 68, 112, 263, 306, 350, 351, 355, 357, 358, 359, 360, 361, 362, 363, 364, 410, 467, 481

N

National Ambient Air Quality Standards, xi, 89, 90, 94, 95, 340, 341
National Historic Preservation Act, 335, 336, 340
northern goshawk, xv, 196, 197, 198, 370, 372, 395, 476, 480, 486, 487, 490
noxious weeds, xvii, xviii, xxvii, xxxii, xxxv, xxxvii, 5, 10, 26, 120, 123, 125, 161, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 252, 254, 320, 327, 343, 366, 375, 376, 377, 384, 390, 398, 479, 482, 492

O

off-highway vehicles, 499

P

particulate matter, xi, xxv, 24, 66, 88, 90, 91, 92, 94, 95, 96, 340
Pierce Creek Trail, 206, 239, 240, 245, 246, 280, 493, 499
pileated wooodpecker, xv, 192, 200, 201, 372, 373, 475, 479, 487
pollutants, 88, 89, 90, 94, 96, 102
prescribed burning, i, iii, vi, xi, xii, xiii, xiv, xv, xvi, xvii, xxiii, xxiv, 6, 12, 13, 22, 23, 39, 51, 53, 65, 67, 69, 85, 87, 88, 90, 91, 94, 95, 96, 105, 107, 110, 112, 115, 117, 124, 126, 145, 148, 152, 156, 159, 160, 162, 175, 178, 190, 197, 198, 201, 202, 203, 210,213, 215, 219, 220, 222, 233, 234, 235, 236, 237, 245, 246, 256, 260, 266, 268, 269, 272, 273, 277, 278, 282, 283, 284, 287, 288, 292, 293, 296, 297, 306, 315, 316, 317, 318, 319, 324, 325, 331, 333, 338, 340, 367, 382, 384, 386, 396, 397, 398, 400, 404, 410, 457, 458, 462, 463, 466, 472, 473, 475, 480, 481, 483, 486, 489, 490, 494, 495
Prevention of significant deterioration, 90, 457, 462, 494

R

Recreation Opportunity Spectrum, xviii, xxvii, xxxvii, 26, 241, 242, 243, 244, 245, 246, 247, 248, 378
Roaded Natural, 239, 241, 242
Research Natural Area, iii, 6, 7, 15, 16, 248, 252, 253, 256, 259, 260, 264, 269, 270, 277, 284, 292, 296, 341, 399, 411, 449
riparian habitat conservation area, viii, xiii, xxxii, xxxv, xxxvi, 8, 16, 54, 59, 60, 103, 112, 113, 114, 128, 129, 132, 143, 144, 145, 146, 148, 149, 150, 151, 152, 154, 155, 156, 157, 158, 160, 162, 163, 390, 391, 392, 396, 405, 406, 424, 449, 455, 474, 488, 489, 491
roads
construction, xx, 19, 118, 124, 145, 154, 159, 234, 237, 238, 249, 259, 260, 280, 298, 330, 331, 337, 384, 385, 446, 449, 454, 457, 462, 472, 477, 480, 492, 493
decommissioning, vi, vii, xii, xiv, xxii, xxvi, xxxv, 14, 15, 17, 18, 21, 25, 28, 95, 111, 118, 120, 124, 143, 145, 146, 148, 154, 156, 157, 159, 163, 234, 236, 246, 266, 268, 270, 272, 273, 274, 277, 278, 280, 282, 283, 285, 287, 289, 292, 293, 295, 316, 330, 333, 383, 393, 429, 430, 435, 445, 447, 448, 450, 451, 454, 459, 464, 467, 472, 474, 478, 480, 495, 499
density, xiii, xiv, xvi, 105, 108, 111, 117, 123, 143, 146, 159, 161, 169, 205, 371, 408, 474
reconstruction, 148, 153, 154, 158, 260, 296, 417
stream crossing, 157, 158, 369, 370
temporary, i, v, vi, vii, xi, xxii, xxviii, xxix, xxx, xxxv, xxxvii, 9, 14, 17, 18, 19, 21, 27, 28, 46, 86, 95, 106, 123, 124, 125, 143, 145, 148, 154, 156, 158, 159, 163, 227, 234, 236, 237, 246, 247, 256, 260, 261, 266, 268, 269, 270, 272, 273, 274, 280, 281, 282, 283, 285, 287, 289, 295, 296, 297, 298, 316, 322, 330, 331, 335, 383, 384, 385, 393, 394, 417, 446, 449, 451, 454, 456, 457, 459, 460, 461, 462, 464, 465, 467, 477, 479, 484, 492, 493, 495, 498

S

Salmon River Scenic Byway, i, ii, xix, 1, 5, 302, 303, 304, 311, 316, 318, 321, 322, 324, 325, 378, 470
scenery, xix, xx, 252, 255, 256, 277, 292, 298, 300, 301, 302, 303, 315, 316, 317, 320, 321, 322, 324, 325, 326, 344, 385
Section 106, 335, 336, 340
sediment, xii, xiii, xiv, xvi, xxv, xxvi, 14, 24, 25, 55, 97, 98, 99, 101, 104, 105, 106, 107, 108, 110, 111, 112, 113, 114, 115, 117, 118, 119, 123, 124, 129, 132, 133, 140, 141, 142, 143, 144, 145, 146, 147, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 161,162, 199, 200, 223, 230, 333, 343, 366, 368, 370, 376, 382, 390, 392, 406, 449, 454, 455, 474, 475, 481, 488
shaded fuel break, i, ii, vi, xx, xxxvii, 6, 12, 13, 17, 19, 83, 145, 148, 150, 160, 175, 197, 199, 204, 205, 208, 210, 212, 234, 235, 256, 264, 268, 269, 270, 272, 273, 280, 283, 284, 285, 287, 288, 312, 317, 330, 331, 332, 338, 406, 424, 435, 439, 440, 441, 457, 459, 462, 464, 483, 493, 495
smoke management, 90, 96, 340, 383
snags, iii, 6, 31, 126, 187, 188, 189, 191, 196, 201, 202, 213, 314, 382, 396, 397, 452, 480, 481, 486
State Implementation Plan, 89, 90, 382
stream shade, xvi, 145, 148, 162
suppression, viii, x, xiii, 30, 31, 40, 42, 53, 67, 68, 69, 73, 80, 83, 85, 87, 107, 110, 111, 126, 127, 128, 160, 168, 225, 262, 263, 264, 320, 356, 358, 361, 401, 402, 409, 410, 473
surface fuel, i, x, xi, 3, 13, 68, 77, 79, 80, 83, 85, 86, 87, 235, 458, 463, 486, 495

T

torching index, x, 83, 84, 85, 87, 90

U

understory, 160, 176, 197, 213, 471

V

Viewpoint, xxxvii, 305, 306, 308, 309, 311, 317, 318, 321, 322, 323, 325
Visual Quality Objectives, xix, xx, xxviii, xxxv, xxxvi, 27, 299, 300, 302, 303, 309, 310, 311, 312, 313, 314, 315, 316, 318, 319, 320, 321, 322, 323, 324, 325, 385, 386
    Modification, 16, 310, 311, 313, 314, 323, 324, 406
    Partial retention, 314
    Retention, 310, 311, 313, 314, 318, 322, 323, 324, 386
visual simulations, 317, 318

W

water quality, xii, xiii, xiv, xvi, xxv, 24, 30, 55, 64, 98, 99, 100, 101, 102, 103, 106, 107, 112, 117, 123, 124, 125, 129, 130, 140, 143, 144, 145, 147, 148, 225, 230, 233, 339, 341, 366, 367, 382, 386, 389, 390, 454, 455, 474, 475
watershed, ii, xiii, xiv, xv, xvi, xxv, xxxiv, xxxv, 2, 6, 11, 15, 24, 59, 80, 97, 100, 101, 103, 105, 106, 107, 110, 111, 115, 117, 118, 123, 125, 127, 128, 131, 133, 136, 140, 142, 143, 145, 152, 154, 156, 157, 159, 160, 161, 162, 183, 184, 189, 190, 191, 193, 195, 200, 202, 203, 213, 225, 233, 259, 331, 336, 339, 343, 344, 345, 346, 347, 365, 366, 368, 369, 370, 402, 405, 406, 460, 465, 474, 484, 491, 498
whitebark pine, ii, iii, vi, viii, xii, xvii, xxvi, 5, 7, 13, 19, 25, 29, 30, 36, 37, 41, 43, 47, 48, 56, 57, 62, 63, 202, 215, 221, 222, 224, 253, 255, 257, 260, 263, 268, 269, 270, 272, 273, 274, 277, 278, 283, 284, 287, 288, 289, 292, 293, 295, 297, 315, 333, 339, 410, 458, 463, 467, 471, 480, 487, 495
wildland-urban interface, i, ii, iv, v, x, xi, xxxii, xxxvi, xxxvii, 2, 5, 7, 10, 11, 70, 71, 72, 75, 76, 80, 81, 83, 85, 87, 90, 338, 361, 413, 414, 417, 470, 471, 533

Maps (separate)

Map 1 - Project area map displaying project area boundary, communities at risk, designated roadless areas, wildland-urban interface and the community protection zone

Map 2 – Alternative 1 large map

Map 3 - Alternative 1 - map index

Map 4 - Alternative 1 map 1

Map 5 - Alternative 1 map 2

Map 6 - Alternative 1 map 3

Map 7 - Alternative 1 map 4

Map 8 - Alternative 1 map 5

Map 9 - Alternative 1 map 6

Map 10 - Alternative 1 map 7

Map 11 – Alternative 2 large map

Map 12 - Alternative 2 - map index

Map 13 - Alternative 2 map 1

Map 14 - Alternative 2 map 2

Map 15 - Alternative 2 map 3

Map 16 - Alternative 2 map 4

Map 17 - Alternative 2 map 5

Map 18 - Alternative 2 map 6

Map 19 - Alternative 2 map 7