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Avery Fuels Reduction Project

Environmental Assessment

St. Joe Ranger District
Idaho Panhandle National Forests

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Healthy Forest Restoration Act - Objection Process

The Responsible Official's (District Ranger Chuck Mark) preferred alternative (Alternative C) would reduce hazardous fuels on 3,387 acres near Avery, Idaho, an at-risk community within the wildland-urban interface. Specific actions include 3,022 acres of shrubfield burning; 253 acres of a combination of slashing, burning, and planting in areas with off-site ponderosa pine trees; and 112 acres of commercial thinning. These activities are proposed to reduce the existing fuel loads, reduce stand densities, reduce vertical continuity of fuels, improve browse for wildlife, and increase forest resiliency.

This project is an authorized fuel reduction project as defined by the Healthy Forest Restoration Act of 2003, section 101(2) and is subject to the Pre-decisional Administrative Review Process (referred to as the 'objection process') pursuant to 36 CFR 218, subpart A. This process is not subject to notice, comment, and appeal provisions pursuant to 36 CFR 215 (see 36 CFR 218.3).

Objections must be filed with the Reviewing Officer in writing. The Reviewing Officer is Ranotta K. McNair, Forest Supervisor of the Idaho Panhandle National Forests. Objections must be submitted by mail to: USDA Forest Service, Northern Region, P.O. Box 7669, Missoula, MT 59807; by FAX: (406) 329-3411; or by Email: appeals-northern-regional-office@fs.fed.us. The acceptable formats for submitting an electronic objection are: MS Word, Word Perfect, or RTF. Please type "Avery Fuels Reduction Objection" in the Email subject line. Hand-delivered objections will be accepted at the Regional Forester's Office, 200 E. Broadway, Missoula, MT, between the hours of 8:00 a.m. and 4:30 p.m. Monday through Friday excluding federal holidays. All objections shall be open to public inspection during the objection process (36 CFR 218.7(a)).

Objections will be accepted only from those who submitted written comments specific to the proposed project (36 CFR 218.6). The publication date of the legal notice in the Coeur d'Alene Press is the exclusive means for calculating the time to file an objection (36 CFR 218.9(a)). Those wishing to object should not rely upon dates or timeframe information provided by any other source. An objection, including any attachments, must be filed (regular mail, fax, Email, hand-delivery, express delivery, or messenger service) as stated above within 30 days of the date of publication of the legal notice for the objection process (36 CFR 218.9(a)). Incorporation of documents by reference shall not be allowed in the objection (36 CFR 218.7(c)).

At a minimum an objection must include the following (36 CFR 218.7(d)): 1) The objector's name and address, with a telephone number, if available; 2) a signature or other verification of authorship upon request (a scanned signature for Email may be filed with the objection); 3) when multiple names are listed on an objection, identification of the lead objector (verification of the identity of the lead objector shall be provided upon request); 4) the name of the proposed authorized hazardous fuel reduction project, the name and title of the Responsible Official, and the name(s) of the National Forest(s) and/or Ranger District(s) on which the proposed authorized hazardous fuel reduction project will be implemented; and 5) provide sufficient narrative description of those aspects of the project that are objected to (36 CFR 218.7(b)) by identifying specific issues and suggested remedies which would resolve the objection.

If an objection is received on this project the Reviewing Officer and objector may meet and/or converse by telephone to discuss issues raised in the objection and 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. These meetings would take place soon after the closing date for filing an objection. All meetings are open to the public. If you are interested in attending any resolution discussions, please contact the Responsible Official or monitor the following website for postings about current objections in the Northern Region of the Forest Service: http://www.fs.fed.us/r1/projects/appeal_index.shtml.

CHAPTER 1 – PURPOSE AND NEED

INTRODUCTION

With the Avery Fuels Reduction Project, the St. Joe Ranger District proposes to burn 3,497 acres of shrubfields north of the St. Joe River; treat 253 acres that have off-site ponderosa pine near the town of Avery, Idaho; and thin 112 acres using commercial timber harvest in Roundhouse Gulch southwest of Avery. The entire 12,740-acre project area falls within the wildland-urban interface designated in the Shoshone County Wildland Urban Interface Fire Mitigation Plan. By reducing fuels and decreasing stand densities, the project would reduce the effects of future wildfire and increase the margin of safety for firefighters. It would also convert areas with off-site ponderosa pine to more resilient, native tree species; and it would improve big game browse.

Wildland-Urban Interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

The project was developed in collaboration with Shoshone County and adjacent land owners and land managers. The proposed activities are for National Forest System lands, but during the process possible fuels reduction activities were identified for other land in the project area. Some of those activities have already been accomplished, and others are still in the development phase.

This EA discloses the foreseeable environmental effects of implementing three alternatives for National Forest System lands within the Avery Fuels Reduction Project Area. The documents cited in this EA can be obtained from the St. Joe Ranger District office in St. Maries, Idaho. This EA is not a decision document. The deciding officer (District Ranger of the St. Joe Ranger District) will select an alternative based on information in this document; how well the preferred alternative meets the purpose and need of the project; public comments and issues; and how well the alternative complies with applicable state and federal laws, agency policy and Forest Plan direction.

NEED FOR THE PROPOSAL

Purpose and Need for Action

The need for the proposed action in the Avery Fuels Reduction Project Area is based on the:

- Administrative and regulatory framework:
  - National Fire Plan
  - Healthy Forest Restoration Act
  - Shoshone County Wildland Urban Interface Fire Mitigation Plan
  - Forest Plan for the IPNF
- Differences between the existing condition and the desired condition in the project area
- Maintaining fire as a disturbance within the project area

The three different parts of the project (prescribed burning in shrubfields, off-site ponderosa pine treatments, and commercial thinning) are proposed by the Forest Service for the following reasons:

Prescribed Burning in Shrubfields (3,497 acres)

- Reduce fuels to:
  - reduce the potential effects of wildfire to adjacent land owners, the communities of Avery and Hoyt Flat, the Dunn Peak electronic site, and the Bonneville Power Administration electrical transmission line
  - change potential fire behavior by reducing rate of fire spread, fire intensity, firebrand production (spotting), and resistance to control
  - increase the margin of safety for firefighters in case of a wildfire
- Improve browse for wildlife

- Meet forest plan objectives for Management Areas 1, 4, 5, 6, and 9.

Off-site Ponderosa Pine Treatments (253 acres)

- Reduce fuels to:
  - reduce the potential effects of wildfire to adjacent land owners and the community of Avery
  - change potential fire behavior by reducing the rate of fire spread, fire intensity, firebrand production (spotting), resistance to control, and probability of crown fire
  - increase the margin of safety for firefighters in case of a wildfire
- Increase forest resiliency by:
  - reducing the number of live off-site ponderosa pine trees in the project area
  - reducing off-site ponderosa pine regeneration because of its poor genetic adaptability to northern Idaho's environmental conditions
  - replanting with western larch and western white pine from local seed sources
- Meet forest plan objectives for Management Areas 4, 5, and 9.

Commercial Thinning (112 acres)

- Reduce stand density to:
  - Reduce potential for active crown fire
  - Reduce the potential effects of wildfire
  - Increase the margin of safety for firefighters in case of a wildfire
- Reduce the vertical continuity of fuels to reduce the chances of crown fire initiation
- Meet forest plan objectives for Management Areas 1, 4, and 5.

Administrative & Regulatory Framework

The purpose and need for the project was developed in accordance with the National Fire Plan, the Healthy Forest Restoration Act, the Shoshone County Wildland Urban Interface Mitigation Plan, and the Idaho Panhandle National Forests (IPNF) Forest Plan.

National Fire Plan

Under the National Fire Plan, activities in the Inland West focus on the wildland urban interface to reduce risk to people and property and improve forest conditions. In response to the risks posed by heavy fuel loads the National Fire Plan established an intensive, long-term hazardous fuels reduction program. Hazardous fuels reduction treatments are designed to reduce the risks of catastrophic wildland fire to people, communities, and natural resources while restoring forest to closely match their historical structure, function, diversity, and dynamics. Such treatments accomplish these goals by removing or modifying wildland fuels to reduce the potential for severe wildland fire behavior, lessen the post-fire damage, and limit the spread or proliferation of invasive species and diseases. Treatments are increasingly focused on the expanding wildland/urban interface areas.

Healthy Forest Restoration Act

The Healthy Forest Restoration Act (HFRA) provides direction to help reduce hazardous fuels and restore healthy forest conditions. It provides for expedited environmental analysis of HFRA projects and requires administrative review before decisions are issued. This project meets the objectives of the Healthy Forest Restoration Act by reducing hazardous fuels around communities determined to be at risk, and it is authorized under the HFRA because it falls entirely within the wildland-urban interface as designated in the Shoshone County Wildland Urban Interface Fire Mitigation Plan.

Shoshone County Wildland Urban Interface Fire Mitigation Plan

The entire 12,740-acre project area is located within the Shoshone County designated Wildland Urban Interface which encompasses the communities of Avery and Hoyt Flat, Idaho. The Shoshone County

Wildland Urban Interface Fire Mitigation Plan ranks the wildland urban interface around Avery as "high" for fuel hazards. It identifies a need to reduce the hazardous surface fuels, reduce stand density, and reduce ladder fuels to lower the risk of catastrophic wildland fire occurrence and improve forest health.

About 66 structures in Avery are concentrated near the community center. All of these buildings are considered at risk to loss if a wildfire were to threaten this area because of the characteristics of the surrounding area which has dense forests, logging debris, and limited access surrounding the community. There is no rural fire department protection in the community of Avery. Wildland fire protection is provided by the St. Joe Ranger District of the U.S. Forest Service. Approximately 11,487 acres or 90% of the 12,740-acre project area are National Forest System lands.

The IPNF Forest Plan

The IPNF Forest Plan objective for fire management is to implement efficient fire protection and use programs based on management objectives, site-specific conditions, and expected fire occurrence and behavior (Forest Plan p. II-10). In addition the "Fire Management Plan" states that human life and property are to be protected (Forest Plan p. II-38). Firefighter and public safety are first priority.

Management area (MA) standards define requirements for fire protection and fire use. The fire protection standards are to use initial attack strategies (confine, contain and control) as appropriate to achieve the best benefit based on commercial timber values and, where appropriate, big-game summer/winter range values in these management areas. Fire use objectives are to utilize prescribed fire to achieve silvicultural and ecological objectives for the management areas as appropriate.

The stands within this project area fall within MA-1, MA-4, MA-5, MA-6 and MA-9. Each management area has a designated emphasis:

- MA-1: timber production;
- MA-4: timber production within big game winter range;
- MA-5: big game winter range;
- MA-6: timber production within important elk summer range; and
- MA-9: lands designated as non-forest or lands not capable of producing industrial products.

Although MA-1 consists of lands designated for timber production there are approximately 21,000 acres of non-forest or lands across the IPNF that are not capable of producing industrial products (Forest Plan p. III-2). Approximately 1,322 acres of the proposed shrubfield burns are within areas mapped as MA-1. These areas, however, are currently not supporting conifer regeneration adequate for timber production. Treatment needs were based on a comparison of the existing conditions with the desired conditions.

Existing Condition

Shrubfields

The portion of the project area that lies north of the St. Joe River burned twice in the last century: once in 1910 and again in 1934. As a result, this part of the project area has large areas dominated by shrubfields. Shrub foliage is not particularly flammable when green; but hot, dry winds during drought conditions can drive severe fires through the brush layer (Smith and Fischer 1997). Without disturbance the larger stems of these decadent shrubs will continue to die and add to existing dead and down fuel loads over time. The treatment areas have relatively high dead to live shrub ratios. Surface fuel loads are between 19 and 39 tons per acre with moderate to high potential surface fire severity. The shrubs are old and tall; so the new stem growth which is the best browse is out of reach for big game animals.

Off-Site Ponderosa Pine

The areas proposed for off-site ponderosa pine treatment have pockets of off-site ponderosa pine and are predominately occupied by a mix of mature and regenerating Douglas-fir, grand fir and/or shrubs. These pockets have heavy fuel loads which could contribute to high-intensity fires. This off-site ponderosa pine is dying due to insect and disease activity which is increasing downed and dead fuel loads. Off-site ponderosa pine regeneration is adding to the accumulation of ladder fuels. The lack of pruning and duff and litter reduction by fire exclusion has increased the potential for crown fire and severe under burning in the off-site ponderosa pine treatment areas. Surface fuel loads are between 8 and 30 tons per acre with moderate to severe potential surface fire severity.

Commercial Thins

The portion of the project area south of the St. Joe River burned in the 1910 fire but was not burned in the 1934 “re-burn”. Subsequent fire suppression increased the representation of the more shade-tolerant, less fire-adapted tree species over time. These areas have increased stand densities and are developing closed, or nearly closed, crown canopies and are displaying reducing growth rates and vigor. Stands are dominated by grand fir, Douglas-fir, lodgepole pine, and western larch. Surface fuel loads are between 3 and 5 tons per acre with low to high potential surface fire severity. The density of surface, ladder and canopy fuels is increasing. These conditions present the potential for larger fires and more intense crown fires that are very resistant to fire control efforts and could threaten life and property.

Desired Condition

Shrubfields

Fuel accumulations would not result in a high-intensity wildfire should one occur. The areas would have more live shrub stems than dead shrub stems for a more fire-resistant condition. Surface fuel loads would be between 7 and 14 tons per acre with low to moderate potential surface fire severity. New growth on the shrubs could be reached by big game for browse, and there would be more redstem ceanothus regenerating. There would be improved habitat complexity within drainages where conifers and shrubs within the riparian zone grow, die, and fall into the stream creating new pool habitat and maintaining old pool habitat.

Off-Site Ponderosa Pine

In shrub-dominated areas there would be more live shrub stems than dead shrub stems for a more fire-resistant condition. Surface fuel loads would be between 5 and 12 tons per acre with low to moderate potential surface fire severity. Tree species would include all existing species except for off-site ponderosa pine, and there would be a higher percentage of western larch and rust-resistant western white pine. Ponderosa pine trees would be from local seed sources, and the stands would not include genetic material from off-site ponderosa pine. There would be enough snags and coarse woody debris to protect soils and provide wildlife habitat. There would be more shade along riparian areas.

Commercial Thins

The area would have a reduced crown fire potential and a forested appearance. Surface fuel loads would be between 4 and 8 tons per acre with low to moderate potential surface fire severity. Predominately long-lived, early-seral tree species would exist throughout the area. These fire-resistant trees would have more chance to survive low- and moderate-intensity fires. The area would have enough snags and coarse woody debris to protect soils and provide wildlife habitat.

CHAPTER 2 - ALTERNATIVES

ALTERNATIVE DEVELOPMENT

Public Involvement & Collaboration

The Avery Fuels Reduction Project was developed through a collaborative effort with Shoshone County to identify and mitigate wildfire risk on federal and private lands. Public scoping for the Avery proposal began in January 5, 2005 when District Ranger, Chuck Mark, sent a letter to the adjacent landowners and to people on the St. Joe Ranger District NEPA mailing list describing a proposal in the Avery Fuels Reduction Project Area. This letter explained the need to concentrate planning efforts adjacent to the community of Avery, Idaho. The letter was also posted on the IPNF's website. The Avery Fuels Reduction Project was listed on the IPNF's January 2005 Quarterly Schedule of Proposed Actions.

The project was discussed with representatives of the Coeur d'Alene Tribe during meetings in March 2005 and March 2006 (PI-22, PI-25). A flyer announcing the February 12, 2005 public meeting was mailed to the Coeur d'Alene Tribe on January 18, 2005 (PI-5). A letter with updates about the project was mailed to the Coeur d'Alene Tribe on November 20, 2006 (PI-29).

On January 11, 2005 the Forest Service; Idaho Department of Lands; Forest Capital, Incorporated; and Avista Corporation met with Shoshone County representatives to share information and discuss fuels reduction issues around Avery, Idaho.

On February 12, 2005 the St. Joe Ranger District hosted a public meeting with representatives from the U.S. Forest Service and the Shoshone County Fire Mitigation Program to discuss the Avery Fuels Reduction Project and fuels treatment options available to private landowners. As a result of this initial scoping the St. Joe District received comments from 12 individuals and organizations, and collaboration with adjacent land owners resulted in possible fuels reduction projects for their lands. On June 5, 2006 the District Ranger sent a letter to the people on the Avery Fuels Reduction Project mailing list notifying them of changes in the proposed actions for the project. On November 20, 2006 the District Ranger sent another letter to the people on the Avery Fuels Reduction Project mailing list with a general update for the project.

Issue Resolution

Design features were developed upfront to anticipate and reduce the effects from the proposed action on the environment and address and resolve the main issues (see below). The proposed action was designed to address issues with unit locations, riparian buffers, logging methods, silvicultural prescriptions, design features, and timber sale contract provisions for protection of resources.

Council of Environmental Quality (CEQ) guidance recommends listing and only briefly describing the proposed action and any alternatives which meet the project purpose. There is discretion regarding the number of alternatives (CEQ, 12/2002). It is possible that an EA may include only the proposed action and a no action alternative. The number of alternatives is left to the discretion of the responsible official and should be based on agency experience with the environmental issues involved.

The following preliminary issues were identified during scoping for the Avery Fuels Reduction Project over the last two years. They were considered during development and analysis of the proposed action.

Shrubfield Burning

- Will these treatments be adequate to reduce the potential effects of wildfire, change potential fire behavior, and increase the margin of safety for firefighters in case of a wildfire?
- Potential to spread existing noxious weeds as a result of proposed prescribed burning
- Soils:
    - Prescribed burning on areas with high mass failure potential
    - Prescribed burning with lower soil moisture

Off-Site Ponderosa Pine Treatment

- Potential to spread existing noxious weeds as a result of proposed prescribed burning

ALTERNATIVE DESCRIPTIONS

No Action (Alternative A)

This alternative continues standard protection and maintenance activities such as fire suppression, access management, and road maintenance. Ecosystem processes such as insects and diseases in trees, and vegetation succession with fire exclusion would continue their current trends. No commercial timber harvest or road construction would occur. Some incidental tree removal would occur through firewood cutting. This alternative does not propose activities included in the proposed action. It provides a baseline for comparison of environmental consequences of the proposed action to the existing condition and is a management option that could be selected by the Responsible Official. The results of taking no action would be the current condition as it changes over time due to natural forces.

Proposed Action (Alternative B)

Alternative B proposes three types of activities on a total of 3,862 acres: shrubfield burning north of the St. Joe River, off-site ponderosa pine treatment near the community of Avery, and commercial thinning near Roundhouse Gulch southwest of Avery (see Map 1). No new road construction or reconstruction would occur.

Shrubfields

Treatments in the shrubfields include broadcast burning 3,497 acres of shrubfields using aerial ignition (see Proposed Action Map).

Off-Site Ponderosa Pine

Treatments in the off-site ponderosa pine units include broadcast burning 83 acres of shrubs with pockets of regenerating off-site ponderosa pine, 105 acres of slashing off-site ponderosa pine followed by jackpot burning, and 65 acres of slashing off-site ponderosa pine with no further treatment. Portions of the 253 acres would be planted with more sustainable, resilient, western larch and rust-resistant western white pine from local seed sources.

Commercial Thin

Treatment includes commercial thinning using helicopters on approximately 112 acres. This would increase the percent of western larch and western white pine by removing other species (listed by priority) such as grand fir, lodgepole pine, Douglas-fir, western hemlock, and western redcedar. Between 40% and 60% of the existing stand canopy would be removed. This commercial thinning would primarily be a thinning from below, where the smaller diameter class trees (8” to 15” d.b.h.) are the priority for removal. The larger diameter trees along with enough of the smaller diameter class trees would be retained to meet the desired residual basal area for each stand. Tops of the commercial timber would be removed from the site and would be burned at landings on Road 3465. This helicopter thinning activity could occur at any time of the year or season.

Table 1 - Proposed Action (Alternative B) Treatment Summary

Treatment	Management Area	Treatment Acres	Treatment	Management Area	Treatment Acres
Shrubfield Burning	1	1,323	Commercial Thin	1	10
	4	428		4	101
	5	351		5	1
	6	1,176		subtotal	112
	9	219		Total Acres	3,862
	subtotal	3,497			
Off-Site Ponderosa Pine Treatments	4	39			
	5	201			
	9	13			
	subtotal	253			

Alternative C

Alternative C proposes treatment on a total of 3,387 acres. It is similar to the proposed action, but it proposes fewer acres of shrubfield burning: 3,022 acres in Alternative C instead of 3,497 acres in Alternative B (see Map 2). Alternative C does not include shrubfield burning in areas that are mapped as having high mass failure potential.

Table 2 - Alternative C Treatment Summary

Treatment	Management Area	Treatment Acres
Shrubfield Burning	1	1,108
	4	428
	5	351
	6	1,176
	9	219
subtotal		3,022
Off-Site Ponderosa Pine Treatments	4	39
	5	201
	9	13
subtotal		253
Roundhouse Gulch Commercial Thin	1	10
	4	101
	5	1
subtotal		112
Total Acres		3,387

Design Features

1. Air Quality

a. All prescribed burning activities would be designed and conducted following the Memorandum of Understanding established between the states of Idaho and Montana to comply with state and federal air quality standards.

b. Burning would only occur when weather and air conditions are favorable for smoke dispersal. No burning would be initiated during times when air quality restrictions are in place.

2. Heritage Resources

a. Project activities would avoid the drainage bottom of Roundhouse Gulch and the upper end of the bottom of Storm Creek Drainage.

b. Project activities would avoid the ridge top running through Section 34, T46N, R5E.

c. The heritage site at Dunn Peak Lookout would be protected, taking into account the flammability of the old structure.

d. If additional heritage sites are discovered, the sites would be inventoried and then protected if found to be of historic significance. The decision to avoid, protect or mitigate impacts to these sites will be in accordance with the National Historic Preservation Act. Timber sale contract provision, *Protection of Cultural Resources*, would be included in the timber sale contract to ensure protection of heritage sites located during project implementation.

3. Water, Soils and Fish – Aquatic Environment

a. Off-site ponderosa pine treatment within RHCAs would be directed by a fisheries specialist. All off-site ponderosa pine felled within the RHCAs would be left on the ground and used to enhance the riparian area as directed by a fisheries specialist.

b. Some of the proposed tree planting would occur in Riparian Habitat Conservation Areas where off-site ponderosa pine trees are felled.

c. All Inland Native Fish Strategy (INFS) standards and guidelines that apply to activities in the Avery Fuels Reduction Project would be utilized. This project would utilize the standard widths described for the Riparian Habitat Conservation Areas (RHCAs) described in Table 3 except the RHCA buffer on main Roundhouse Gulch would be expanded from the INFS recommended 150 feet to 300 feet either side of channel.

Table 3 - Standard Riparian Habitat Conservation Area (RHCA) Widths

INFS Category	Description	RHCA Width
1	Fish-bearing streams	300 feet from either side of channel
2	Permanent, flowing, non-fish bearing stream	150 feet from either side of channel
4	Seasonally flowing or intermittent streams Wetlands <1 acres Landslide prone areas	50 feet on either side of channel (priority watersheds)

d. Stands with high mass failure potential areas would be burned during the spring season. No other areas in that drainage would be burned during that same burn season. Monitoring would be conducted before and after shrubfield burning in areas with mass failure potential to identify indicators of potential mass failure. This post-burn monitoring would be conducted after a period of heavy precipitation before any additional burning would be done in those drainages. Additional burning would proceed only if no mass failure indicators are identified.

e. No ignition of prescribed fire would occur in RHCAs, timbered areas, or rocky areas with low or minimal vegetation (upper portions of stands 20903017 and 20904010).

f. Prescribed fire would be ignited only when soil moisture content is greater than or equal to 15%. Soil monitoring would occur after the first 500 acres (but not more than 800 acres) have burned to evaluate the results of burning at the prescribed soil moisture conditions on the soil resource. If soil monitoring results are acceptable burning would continue. If soil monitoring indicates unacceptable effects from burning at 15% soil moisture content, the minimum soil moisture content would be increased and burning would continue.

g. Best management practices (BMPs) would be implemented. *Soil and Water Conservation Practices for the Avery Fuels Reduction Project* (SW-29) discusses the BMPs that would be used for the selected alternative.

h. An emergency spill clean-up kit would be on site for the unlikely event of a fuel spill outside the containment system.

4. Wildlife

a. Threatened, Endangered, and Sensitive (TES) Species: Management activities would be altered, if necessary, to protect TES species located during project implementation. Any TES species found during implementation would be reported to the Sale Administrator and the District Wildlife Biologist. Timber sale contract provisions *Protection of Threatened, Endangered and Sensitive Species* and *Limited Operating Period* or their equivalents would be used in timber sale contracts for Roundhouse Gulch commercial thinning.

b. Goshawk:

i. Nests: Nests found during project implementation would be protected with a 30-acre, no-activity buffer.

ii. Post Fledging Areas (PFA): Proposed project activities would be suspended in the PFA of active goshawk nests between March 15 and August 15. Restrictions may be removed if the nest is determined by the district biologist to be inactive or unsuccessful after June 30.

c. Canada Lynx: All harvest activities would follow standards and guidelines established in the Canada Lynx Conservation Assessment and Strategy.

d. Wildlife Travel and Movement Corridors: A timbered ridgeline travel corridor would be maintained by maintaining 40% canopy cover along the ridge on the west edge of Roundhouse Gulch Unit 1 (boundary between stands 24901131 and 24807001).

e. Small Mammal Habitat: Slash piling is not proposed, but this is included in case some piles are created with activities. One pile would be left unburned per five acres to supply potential fisher rest sites, provide cover for small animals (prey habitat), and serve as potential lynx den sites in harvest units where slash piles are created. Piles left should be those closest to standing timber, such as the unit edge or a large cluster of leave trees.

f. Cavity Nesting Species: Specific details on snag and leave tree selection from the Reserve Tree Guide (IPNF, 1995) and the Snag and Woody Debris Guidelines (IPNF Forest Plan, Appendix X) would be followed in commercial thin units to reach objectives of the Northern Region Snag Management Protocol and worker safety. See snag numbers and sizes required in Table 4 below. Snags not presenting a safety hazard would be left standing in the units. Snags cut for safety reasons would be left in the unit where they fall unless they interfere with the operations or management of the National Forest.

Table 4 - Snag Guidelines for Commercial Thin Units

Forest Type	Snags / Acre
Cool, wet, & dry spruce, grand fir, hemlock, & subalpine fir	6-12 total, with 2 >20” d.b.h.

g. If an active wolf den were discovered in the project area during implementation, appropriate management authorities would be notified and project activities would be modified as needed to avoid adverse effects.

h. Spring burns (those planned for implementation before June 1st) would not be ignited after green up to reduce potential impacts on nesting birds.

5. Roadless, Recreation, and Trails

a. Trail tread would be protected and the trail way would be cleared on Roundhouse Trail 520 if needed once other activities are completed. Dunn Peak Trail 58 would be cleared after burning.

b. Slash piles would be burned as soon as possible or within two years where piles are within view of the trails.

c. The public would be notified with news releases and signs regarding the operations and dates and whether or not access to the area would be limited by management activities.

6. Visual and Scenic Quality

a. Commercial Thin (CT): Unit boundaries would be blended with surrounding vegetation patterns and topographic features such as natural openings (use similar shapes and avoid straight line boundaries).

b. Prescribed Burning: Shapes of units would be blended with existing topography, natural openings, and surrounding vegetation texture. Straight firelines, if needed for fire suppression, would be revegetated.

7. Noxious Weeds

A number of preventative measures would be taken to reduce the risk of noxious weed introduction and spread in accordance with the St. Joe Weed Control EIS (ROD, 10/12/99). Measures include:

a. All off-road heavy equipment would be cleaned prior to entering the project area to remove soil, plant parts, and material that may carry weed seeds. A provision would be included in the sale contract.

b. Mulching agents, such as hay or straw, would be certified weed-free.

c. Any seed used for re-vegetation and erosion control purposes would be certified noxious weed-free.

d. Appropriate action would be taken if new populations of noxious weeds were discovered within the project area.

e. Opportunities for integrated weed control would be examined and implemented according to the St. Joe Noxious Weed Project EIS (ROD, 10/12/99).

8. Rare Plants

a. Plant surveys have been conducted, however newly documented occurrences would be evaluated, and specific protection measures would be implemented to protect population viability.

b. In the event that any Threatened, Endangered and Sensitive plant populations are found prior to or during project implementation, an agency botanist would implement mitigation measures to protect population viability.

9. Roads and Access Management

a. Warning signs would be posted and flaggers or temporary closures of roads would be used to provide safety when logging activity and prescribed burning activities occur adjacent to Dunn Peak Road 1934 and on other roads when and where needed.

b. National Forest System roads would be left in a stable condition after their use for project implementation.

c. Existing access would be maintained. The amount or type of access currently provided in the project area would not change.

d. Access on Road 3465 would be returned to pre-treatment conditions immediately after completion of treatment activities. The existing gate would be closed and locked after passage of every vehicle. During periods of inactivity roads would be returned to pre-treatment condition.

e. Existing travel management would not change (ie. roads currently not available or open for motorized vehicle use would continue to become more overgrown and inaccessible).

10. Prescribed Burning

a. Prescribed burning would be conducted as established in Forest Service Manual 5140 – Prescribed Fire Management. A site-specific burn plan would be prepared for each area to be burned to meet specific objectives.

b. Burning would only occur when weather, fuel conditions, and available resources are at levels specified in the prescribed burn plan.

c. Prescribed fires would not be ignited within aspen stands.

Mitigation

The Proposed Action includes design features to avoid the need for mitigation. No mitigation actions are required to implement the proposed action because analysis of effects did not indicate a need for any mitigation.

Monitoring

The following monitoring would be included as part of the proposed action:

- Soil monitoring would occur after the first 500 acres (but not more than 800 acres) are burned to evaluate the results of burning at the prescribed soil moisture conditions on the soil resource. If soil monitoring results are acceptable burning would continue. If soil monitoring indicates unacceptable effects from burning at 15% soil moisture content, burning would only continue at a higher soil moisture content.

- Monitoring would be conducted before and after shrubfield burning in areas with mass failure potential to identify indicators of potential mass failure. Post-burn monitoring would be done after a period of heavy precipitation before any additional burning would be done in those drainages. Additional burning would proceed only if no mass failure indicators are identified.
- Representative monitoring of best management practices (BMPs) would be conducted by the sale administrator and reviewed by resource specialists (SW-29).
- Representative monitoring of noxious weeds by district personnel to help identify any areas needing treatment and follow-up treatments.

Alternatives Eliminated From Detailed Study

Fuelbreak - Avery Community Protection:

Originally proposed clearcut would not meet visual quality objectives. The project was modified to meet VQOs; but the area is under an electrical transmission line, and yarding is not possible there. Coeur d'Alene salamanders were found which would require buffers to protect their habitat.

Avery Work Center:

Fuel reduction work completed by Shoshone County included fuels the areas around and adjacent to the structures in the town of Avery and the Avery Work Center (Forest Service administrative site), so there was no need to include that work in this proposal. These activities were conducted in 2005 and 2006. See the Vegetation section in Chapter 3 for details.

Shrubfields:

Fireline construction for shrubfield burning: The use of natural breaks, wet areas, and shaded timbered areas would be adequate for controlling prescribed burns without the added cost and soil disturbance of fireline construction. Also the shrubfields burned in spring would serve as fuelbreaks for areas burned in the fall. Constructing fireline along private property boundary was considered, but the straight line would not meet VQOs. The adjacent landowner does not require a fireline, and no fire would be ignited on the private property.

Fuelbreak to protect aspen: The possibility of fire moving through and burning the shrub layer may promote aspen regeneration without being hot enough to take out all the larger aspen trees.

Burning in shrubfields with tree regeneration: Originally more shrubfield areas were proposed for burning, but the areas with small trees were eliminated from the proposal, so they could progress toward timbered stands.

No shrubfield burning during the fall: One of the objectives for burning is to regenerate redstem ceanothus. Soil temperatures between 85 and 100 degrees Celsius (185 to 212 degrees F) one cm below the surface are required to activate the ground-stored seed for redstem ceanothus (PD-23. These temperatures are more likely to occur in the fall.

Grapple piling in off-site ponderosa pine treatment areas: There would probably not be enough continuous fuels to warrant opening the road to get machinery to the area, and we didn't want to unnecessarily risk scorching soils when burning concentrated fuels.

Other Concerns Addressed with Design of Proposed Action

The proposed action was designed to address concerns by adjusting unit boundary locations and size of units, riparian buffers, logging methods, silvicultural prescriptions, and design features. The concerns included air quality, fish, heritage resources, spread and introduction of noxious weeds, potential effects on rare plant species, soils, visual quality (scenery), water, and wildlife.

CHAPTER 3 – AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

This section provides a summary of the environmental impacts of the alternatives considered in detail. It provides the necessary information to determine whether or not to prepare an environmental impact statement. Further analysis and conclusion about the potential effects are available in reports for each resource and other supporting documentation cited in those reports. As noted above, these documents are online at www.fs.fed.us/ipnf/eco/manage/nepa/index or in the project file located at the St. Maries office of the St. Joe Ranger District.

The proposed action was not designed to address fire occurrence across the landscape or the effects of fires outside the proposed treatment areas. The potential exists for wildfire somewhere in the landscape with all alternatives, including the No-Action Alternative. This analysis does not attempt to predict when or where a fire might occur or what type of fire that may be. In some cases resource specialists did consider what the effects of a fire would be if one were to occur, but the proposed action does not address fire occurrence or fire effects outside the proposed treatment areas.

In *Lands Council v. Powell*, the U.S. Court of Appeals for the 9th Circuit held that, under the circumstances presented in the case, proper cumulative impact analysis required some cataloguing of past projects and their effect on the current project area. Furthermore, such cataloging should provide sufficient detail to allow for analysis of the differences between prior projects and proposed projects, which could provide the information necessary to consider alternatives that might have less impact on the environment. This chapter and the project file for this project provide information of relevant past, present and reasonably foreseeable projects/activities that have occurred, are occurring, or are proposed to occur within each of the resource cumulative effects areas examined in this analysis.

The Council on Environmental Quality (CEQ), whose responsibility it is to coordinate federal environmental efforts and work closely with agencies and other White House offices in the development of environmental policies and initiatives, provided guidance to federal agencies on the consideration of past actions in cumulative effects analysis (ACT-4). CEQ stated that "generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historic details of individual past actions" (ACT-4 p. 2). Cumulative impact is defined in CEQ's NEPA regulations as the "impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions…" (40 CFR 1508.7). CEQ has interpreted this regulation as referring only to the cumulative impact of the direct and indirect effects of the proposed action and its alternatives when added to the aggregate effects of past, present, and reasonably foreseeable future actions (ACT-4 p. 2).

With respect to past actions, during the scoping process and subsequent analysis of this project, the Forest Service determined what information regarding past actions was useful and relevant to the analysis of cumulative effects. While CEQ found that cataloging past actions and specific information about the direct and indirect effects of a past project's design and implementation could in some contexts be useful to predict the cumulative effects of the proposal, the regulations do not require the Forest Service to catalogue or exhaustively list and analyze all individual past actions (ACT-4 p. 3).

The project file for this project provides a description of known past activities and their effects. There are, however, marked differences between past and current land management practices and policies. The evolution that has occurred in land management practices is the result of science, our ongoing monitoring actions, and changing public values.

On the Idaho Panhandle National Forests (IPNF), early to mid 20th century road construction activities focused construction mainly through river valleys, riparian areas, floodplains, and adjacent hillsides. The roads efficiently provided access but decreased the land's effectiveness as wildlife habitat and constricted stream channels, while providing a new avenue for erosion and discharge of sediment into streams. Roads on National Forest System lands were often an expansion of existing trails and paths that provided access so that they would accommodate newer equipment and current land uses. In some situations, roads were developed on abandoned railroad beds. In both cases, the location and design were predetermined from the previous use and era. As time progressed, roads were "designed" and located to achieve their primary purpose, which was to provide access and haul product at a minimal cost. In the decades following World War II (1950s –'70s), the road network was rapidly expanded to support the domestic need for lumber in housing construction.

Over the last twenty years, both road design and location have evolved as necessary tools to not only provide efficient access; but also to protect valuable watershed resources. Forest Service Best Management Practices (FSH 2509.22 Soil and Water Conservation Practices Handbook) currently incorporated into road construction/reconstruction activities on the forest include:

- Road surfacing (gravel, etc…) was incorporated to not only provide better travel conditions but also to prevent and control erosion from the road surface.
- Road drainage controls are now being incorporated into designs that:
    - Reduce the erosive flows in ditches by providing frequent cross-drains to relieve ditch flows;
    - Avoid water movement down the road by dispersing the drainage quickly by crowning or out-sloping the road surface;
    - Stabilize ditches by lining; and
    - Disperse drainage water (that often carries sediment) onto stable forested slopes before ditches discharge into waterways.
    - Allow new and existing stream crossings to safely pass extreme events (i.e. 100-year flood event).
- Special construction techniques and designs are utilized (i.e., full- or partial-benching of roads to avoid unstable side casting of waste materials; windrowing clearing slash to prevent sediment delivery to streams from construction activities themselves as well as from erosion of road fills and treads that are not yet protected with erosion control vegetation).
- Some roads now are designed to take advantage of the non-uniformities of the slopes they cross by "rolling grades" and grade breaks to prevent the potential for accumulations of water or excessive ditch-flows that have destabilized the road bed or cause surface erosion in the past.
- Designers and planners develop road networks that avoid highly erosive or unstable slopes utilizing the land system inventory, hydrologists, soil scientists, and geotechnical engineers.
- Road crossings are located at more stable sites; and crossing designs are now considering water quality and fish passage as primary design criteria, rather than criteria that just account for costs and traffic efficiency.
- Roads are located well away from streams and their riparian areas where ever practicable; and the number of crossing sites is minimized. These features are in stark contrast to past road locations that sometimes resulted in chronic sources of sediments, extended exposure of streams to direct sunlight resulting in temperature elevations, and nearly permanent reductions of the replacement sources of the structural components of streams and aquatic cover, riparian deadfall.
- In the past, when a road's utility ended, the road was simply abandoned. Some of these abandoned roads created water quality and slope stability issues as they deteriorated, especially without any maintenance. Current practice is to restore key abandoned or no longer useful roads to a "hydrologically neutral" condition where its remnants are self-maintaining and are no longer disturbing slope stability or the movement of slope water, either on or below the soil surface or the natural functions and adjustments of streams, wetlands, and other water bodies.

Impacts to forest water and soil resources from logging practices and road activities have also been reduced over the past 20 years with the introduction of Best Management Practices (BMPs) and Inland Native Fish Strategy (INFS) management direction. Based on research studies, current BMPs and INFS Riparian Habitat Conservation Areas (RHCAs) can reduce sediment yields compared with historical practices (Lee and others 1997, USDA 1995).

In 1972, Section 208 of the Clean Water Act Amendments established the regulatory framework for non-point source pollution control thorough use of BMPs. BMPs are defined in Idaho as a practice or combination of practices determined to be the most effective and practicable means of preventing or reducing the amount of pollution generated by non-point sources (IDAPA 20.02.01). BMP monitoring is conducted annually by the IPNF to validate the implementation and effectiveness of BMPs associated with land management activities. Monitoring results are used to adapt future management actions where improvements in meeting water quality objectives are indicated. Forest monitoring of BMPs indicates that in most cases they continue to function as expected and are meeting their intent (IPNF 2002, 2003).

At the time the IPNF Forest Plan was approved (1987), the emphasis was on developing a commodity production strategy while minimizing impacts to watersheds and aquatic resources, including fish. The strategy for watershed management was constructed in the forest plan as a "maintenance" objective. In some situations, thresholds, or "minimum impact" standards defined the criteria for maintenance. To ensure that watersheds and aquatic resources were maintained during forest management activities, BMPs were applied. Despite the existing forest plan standards and BMPs, the condition of fish habitat on the forest was declining, primarily due to timber harvest and road building activities (IPNF 1992).

In 1995, the Forest Plan was amended to include Inland Native Fish Strategy (INFS) management direction (USDA 1995). The implementation of INFS gave greater protection to aquatic resources, especially riparian-dependent systems. The management direction provided by the INFS amendment is designed to protect and maintain the structure and function of riparian and aquatic systems. INFS contains goals for healthy, functioning watersheds, riparian areas, and associated fish habitats; Riparian Management Objectives (RMOs), and performance-based standards and guidelines for land management activities (i.e., timber, roads, grazing, recreation, minerals, fire/fuels, lands, riparian area management, watershed restoration, fisheries and wildlife restoration). Instead of allowing some "acceptable" level of effects on riparian and aquatic systems, INFS aims to protect aquatic resources from detrimental effects. INFS gives riparian-dependent resources priority over other resources in the Riparian Habitat Conservation Areas (RHCAs), so that while RHCAs are not "lock out" zones, activities that occur in them must either benefit riparian and aquatic resources or at least "not slow the rate of recovery below the near natural rate of recovery if no additional human caused disturbance was placed on the system" (USDA 1995). Incorporation of the Inland Native Fish Strategy (INFS) management direction into the forest plan has led to improvement in the condition of aquatic resources by offering greater protections to the critical riparian areas. In addition, INFS allows for and encourages watershed restoration. Restoration has occurred over the years across the IPNF. Over 1,300 miles of roads were decommissioned on the IPNF from 1991-2003 (IPNF 2003).

Harvest methods and removal of timber products from the national forest changed substantially over time. Early harvest methods (1950s, '60s, and '70s) focused primarily on financial objectives of providing low-cost wood products. Harvest placement often occurred in the highest volume, easily accessible stands and often occurred within riparian areas and adjacent to streams. Most of the harvest prescriptions were primarily designed to produce healthy young stands with shorter rotation ages.

Modern timber harvest prescriptions and design emphasize desired conditions of the forest after the harvest. This usually results in the retention of various amounts of trees in a post-harvest stand, addressing objectives that may include wildlife habitat, watershed conditions, hazardous fuels, visual quality, soil productivity, forest health and others. On sites determined suitable for timber production, timber harvest may also produce timber products on a regulated basis while compatible with these other resource objectives and values. Some examples where timber production and resource objectives can be achieved simultaneously are:

- Managing tree canopies and ladder fuels to limit fire spread from the forest floor to the tree crowns;
- Designing harvest patterns across the landscape to facilitate wildlife movement, such as providing corridors and preserving travel routes for ungulates. Also, using harvest prescriptions and landscape patterns as part of a wildfire hazard reduction strategy;
- Increasing the amount of native western white pine, western larch and ponderosa pine, which generally are insect- and disease-resistant and are long-lived, as well as increasing western redcedar in valley bottoms, where it historically was more abundant than today;
- Using variable retention harvests to meet scenic quality objectives and wildlife habitat objectives.

Other elements of modern harvest prescriptions that address specific resource objectives include retention of snags for cavity nesters, retention of down wood for soil nutrition and wildlife habitat, maintaining sediment filtering vegetation near riparian areas, and maintaining vegetation diversity through hardwood retention and protection of rare plants.

Increased environmental awareness has also lead to improvements in logging systems that we use to remove trees from the forest. Early harvests emphasized cheap, labor-intensive logging methods, such as railroad, horse, short distance jammer systems, and tractor logging. Logging systems were selected primarily by the least expensive method to transport the trees from the forest to the mill. This sometimes involved harvesting on steep slopes, creating excessive soil disturbance and increasing the risk of erosion. Streams were sometimes used as a method to transport logs from the harvest site, causing impacts to the

aquatic system and adjacent riparian habitat. Road systems were sometimes dense (10 miles per square mile) to facilitate rapid and inexpensive removals, in some cases compromising water quality.

Today's logging systems recognize and reduce the threat of environment harm in a number of ways. Tractor logging generally occurs on slopes 35% or less, and is limited to designated locations, reducing soil impacts. Skyline and other cable yarding systems are used on steeper slopes, which greatly reduces the amount of soil disturbance. Increasingly, helicopter logging is used, which extends yarding distances and thereby reduces road densities. Tractor dozer piling was once a common practice. Monitoring showed that it resulted in heavily disturbed soils, so dozer piling is no longer used to treat fuels. Instead, the Forest Service uses grapple piling which causes much less results soil disturbance (see Soils section). A suite of best management practices and forest plan standards and guidelines aids in the development of the least impactive design possible. Monitoring during and after harvest provides a valuable feedback loop that identifies and corrects variances should they occur.

The forest ceased regeneration harvest of allocated old growth stands a number of years ago. Presently, our focus is on maintaining the old growth stands that we have and allocating additional stands for future old growth as they mature.

For the above stated reasons (changes in road construction/reconstruction and maintenance practices; implementation of INFS management direction and watershed BMPs; and changes in harvest practices and objectives) an individual analysis of past projects cannot be clearly compared to analysis of the proposed actions. However, the incremental effects of proposed action when added to the effects of the past, present, and reasonably foreseeable actions is displayed and provides a complete assessment of cumulative effects.

Analysis of cumulative effects presented in this chapter consider past, present, and reasonably foreseeable activities that could affect the issues pertinent to this analysis. Reasonably foreseeable actions include those management activities that are on-going or scheduled to occur and that we have developed a proposed action. These activities may occur regardless of which alternative is selected for implementation.

Following is a description of activities identified by resource specialists as being pertinent to some resource(s) for analysis of environmental cumulative effects for the Avery Fuels Reduction Project.

Wildfires burned in the project area in 1910 and 1934. See Fire History Map (Map 3). Wildfires are discussed in the following sections in this environmental assessment: *Air Quality*, *Fire and Fuels*, *Fisheries*, *Rare Plants*, *Soils*, *Vegetation*, *Visual Quality*, *Watershed Resources*, and *Wildlife*.

Timber has been harvested on 246 acres of National Forest System lands in the project area (ACT-1). Of that, regeneration harvest systems were used on 34 acres in the Kelley Creek Timber Sale in 1992 and 15 acres in the Hoyt Creek Timber Sale in 1992. Records indicate timber was salvaged in 1913 and 1914 on 74 acres. In 1992 timber was salvaged on ten acres with the Hoyt Creek Timber Sale, and in 2001 off-site ponderosa pine was salvaged on 113 acres with the Avery Hill Service Contract. Timber harvest is discussed in the following sections in this environmental assessment: *Air Quality*, *Fisheries*, *Noxious Weeds*, *Rare Plants*, *Soils*, *Vegetation*, and *Wildlife*.

Prescribed burning for site preparation, fuels treatment, and wildlife habitat improvement has been done on 2,020 acres of National Forest System lands (ACT-1). Previous prescribed burning is discussed in the following sections in this environmental assessment: *Air Quality*, *Noxious Weeds*, *Soils*, *Vegetation*, and *Watershed Resources*.

Chemical site preparation was used by itself and prior to prescribed burning on 397 acres in the project area (ACT-1). Approximately 339 acres of this was done between 1958 and 1965. In 1982, 58 acres were sprayed with herbicide for site preparation. This is discussed in the *Vegetation* section in this environmental assessment.

Trees have been planted on 1,696 acres of National Forest System lands in the project area (ACT-1), and 225 of those acres were replanted to ensure regeneration success. According to FS records (FACTS), in the project area 691 acres were planted in 1935 and 1936, 397 acres were planted between 1959 and 1966, 436 acres were planted in the 1980s, 59 were planted after timber harvest in the 1990s, 113 acres were planted in association with Avery Hill Service Contract between 2002 and 2006. Four years later, 36 acres of the Avery Hill Service Contract were replanted. Between 1960 and 1986, 189 acres of previously planted areas were re-planted. See the *Vegetation* section of this EA for more discussion about planting.

Between 1981 and 2009, 322 acres were treated with some type of timber stand improvement work (ACT-1). This includes precommercial thinning, pruning, and other projects to control understory vegetation.

In 1981 41 acres were treated to control pocket gophers (ACT-1).

Fuel reduction work around the Avery Work Center, adjacent to privately owned land, was completed in 2005 (*Fire and Fuels* section). This work was completed in conjunction with Shoshone County as part of the facility maintenance program for the work center to reduce hazardous fuels around the community of Avery.

Fires have been suppressed in the project area for the last 96 years south of the river and for the last 72 years north of the river. Several small fires have been put out in the project area in the last 72 years (*Fire and Fuels* section). Effects of fire suppression are discussed in the following sections in this environmental assessment: *Air Quality*, *Fire and Fuels*, *Fisheries*, *Soils*, *Vegetation*, *Visual Quality*, *Watershed Resources*, and *Wildlife*.

Weeds were treated in the project area manually and through herbicide spraying along roadsides in 2001-2006. Biological control agents for spotted knapweed were released in 2003 and 2005 (Noxious Weeds section of EA). Future weed treatments would be conducted in accordance with the St. Joe Noxious Weed Control FEIS (USDA 1999). Weed control is discussed in the following sections of this EA: *Air Quality*, *Noxious Weeds*, *Old Growth*, and *Vegetation*.

In 2006 the water drainage system at the Avery Work Center was reconstructed. During excavation for that work a previously unknown petroleum spill was found and cleaned up (ACT-3).

Timber harvest and related fuel treatment activities and other fuel treatment activities have occurred in the project area on lands other than National Forest System lands. Future harvest activities are planned for the east half of Section 11, T 45 N, R 4 E northeast of the Avery Ranger Station. This will include regeneration/salvage harvests in 2007 with possible site preparation and planting in the River Face Unit and overstory removal in 2007 and possible precommercial thinning in 2010 in the Northern Unit (ACT-2). Fuel reduction activities on privately owned land in Section 2 and Section 11, T45N, R4E are reasonably foreseeable. The Forest Service worked with private land owners to identify projects that may reduce fuels on their land. Activities on other lands are discussed in the following sections of this EA: *Air Quality*, *Fire and Fuels*, *Fisheries*, *Soils*, *Vegetation*, *Watershed Resources*, and *Wildlife*.

Table 5 - Past, Present, and Reasonably Foreseeable Actions

Action	Past	Present	Reasonably Foreseeable
Activities on National Forest System Lands			
Wildfires	X		unknown
Timber harvest Fire salvage (1913 - 1914) Regeneration harvests - Kelley Creek Timber Sale (1992) Regeneration & salvage - Hoyt Creek Timber Sale (1992-1994) Salvage off-site ponderosa pine - Avery Hill Timber Sale (2001)	X		
Prescribed burning for site preparation, fuels treatment, & wildlife habitat improvement	X		
Chemical site preparation for planting (1960s & early 1980s)	X		
Tree planting	X		
Pre-commercial timber stand improvement	X		X
Rodent control for reforestation (early 1980s)	X		
Fuel reduction at Avery Work Center	X		
Petroleum spill discovered & cleaned up at Avery Work Center (2006)	X		
Avery Work Center water drainage construction (2006)	X		
Public activities: firewood cutting, driving roads, camping, snowmobiling, hunting, hiking, berry picking	X	X	X
Road construction	X		
Road maintenance	X	X	X
Fire suppression	X	X	X
Trail maintenance	X	X	X
Removing large woody debris from St. Joe River	X	X	X
Spraying herbicides to control noxious weeds under the St. Joe Noxious Weed EIS	X	X	X
Two year-round outfitting permits with one including fishing on the North Fork of The St. Joe River and the St. Joe River from Avery to Red Ives	X	X	X
Clearing brush and trees to maintain heli-spots	X	X	X
Activities on Other Lands			
Road construction	X		
Fuel reduction projects	X		X
Timber harvest & related activities fuel treatment	X	X	X

AIR QUALITY

(Project File Volume I, Section AQ)

Regulatory Requirements

Current direction to protect and improve air quality on National Forests is provided by the:

- the Forest and Rangeland Renewable Resources Act of 1974 (16 U.S.C. 1601), as amended by the National Forest Management Act (16 U.S.C. 1602)
- the Federal Land Management Policy Act of 1976 (43 U.S.C. 1701)
- the Clean Air Act as amended in 1977, 1990, 1999 (42 U.S.C. 7401-7626) requires states to develop State Implementation Plans (SIPS) which identify how states will attain and maintain air quality standards.

The Clean Air Act amendment of 1977 sets up a process that includes designation of Class I, II, and III areas for air quality management (see project file for Idaho and Montana web page address to view designation map). Airshed designations are defined in Table 6.

The Clean Air Act requires the Environmental Protection Agency (EPA) to identify pollutants that have adverse effects on public health and welfare and to establish air quality standards for each pollutant. The EPA has issued National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, lead, and particulate matter less than or equal to 10 microns (PM 10). Idaho and Washington also have standards for these pollutants. The EPA particulate standards apply to small particulates less than 10 microns in diameter (PM 10) and less than 2.5 microns in diameter (PM 2.5). These particulates can cause respiratory problems, especially in smoke-sensitive portions of the population such as the young, elderly, or those predisposed to respiratory ailments. The Act defines NAAQS as levels of pollutant above which detrimental effects on human health and welfare could occur. An area that is in violation of NAAQS standards is called a “non-attainment area”. Pollution sources in these areas are subject to tighter restrictions. A portion of Kootenai County, Idaho (Coeur d’Alene) is a proposed non-attainment area for PM 10.

Airshed groups are assembled in North Idaho and Montana to work cooperatively to “minimize or prevent” accumulation of smoke in Idaho and Montana to such a degree as necessary to meet state and federal ambient air quality standards when prescribed burning is necessary to conduct accepted forestry practices, i.e. hazard reduction, site preparation, and wildlife habitat improvement (MOA, 1090). As monitoring units, the airshed groups may limit burning, cease burning in specific areas, or cease entirely when meteorological or existing air quality conditions so warrant. Forest management burning is regulated during the months of September through November (North Idaho Cooperative Smoke Management Plan). The Idaho Panhandle National Forests, including the St. Joe Ranger District, is a member of the North Idaho Memorandum of Agreement and adhere to the North Idaho Smoke Management Plan.

Table 6 - Airshed Classification Definitions

Airshed Classifications
Class I – These area include all international areas and National Parks greater than 6000 acres, and national wildernesses greater than 5000 acres, that existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional man-made air pollution, which can be added to these areas. The nearest federally designated Class 1 area are the Cabinet Wilderness (located near the Idaho-Montana border just south of the Canadian-USA boarder), the Selway-Bitteroot Wilderness (approximately 70 miles south of the St. Joe Ranger District), and the Flathead Tribal Reservation (60 miles northeast) The intrusion of smoke into Class I airsheds from prescribed burning operations in the Avery Fuels Reduction Project Area would be minimal due to distance, the smoke dispersion, and the prevailing southwest to northeast air flow.
Class II – These areas include all other areas of the country. These areas may be upgraded to Class I, pending further legislation. A greater amount of additional man-made air pollution may be added to these areas, as opposed to Class I airsheds. All Forest Service lands that are not designated Class I are Class II airsheds. All of the lands in the Avery Fuels Reduction Project Area are designated Class II.
Class III – These areas have the least amount of regulatory protection from added air pollution. To date, no Class III areas have been designated in the country.

Affected Environment

The Avery Fuels Reduction Project Area is within North Idaho Airshed 12B. The boundaries of 12B encompass the area from Dworshak Reservoir east to the Montana state line (roughly 60 miles wide east to west) and from the St. Joe/Coeur d'Alene Divide south to the Clearwater/Nez Perce Forest Boundary (55 miles long north to south).

All areas on the IPNF are designated as Class II. Class II areas can be described as having good air quality with no additional air quality restrictions other than NAAQS.

The air quality of the Avery Fuels Reduction Project Area is generally good throughout the year due to good air dispersion. Human-caused and natural events inside and outside the project area do occasionally affect air quality. Human influences such as campfires, vehicle exhaust and road dust are very minimal. Regional haze, however, occasionally occurs due to agricultural dust, agricultural field burning, and private land forest slash burning. Natural events such as dust storms and wildland fires contribute to reduced air quality at times.

The wind direction in northern Idaho is generally from the southwest to west. Smoke dispersion is to the east and northeast. Long-duration, low-intensity frontal systems commonly occur in the fall and spring, aiding atmospheric mixing and improving air quality.

The effects of smoke within this project area and surrounding areas are dependant upon a number of factors such as season, topography, atmospheric conditions and time of day of the burning.

Spring and early summer seasons have the best dispersion and mixing atmospheric conditions. Daytime heating lifts smoke high into the atmosphere and seasonal instability disperses smoke down wind. Daytime heating lifts smoke out of valley inversions, but can be difficult under stable high pressure systems. Inversions in the fall can potentially create the worst smoke problems of prescribed burning. Spring and fall are the seasons monitored and regulated by the North Idaho Airshed Group. Cold winter months, however, are when the air quality can be poorest. The EPA specified non-attainment areas have the poorest air quality in winter due to local smoke and dust trapped in valley locations. Prescribed burning rarely occurs at all during this season and, as always, is regulated by the state.

The topographic location of a prescribed fire will either aid smoke dispersion if high on the ridge and exposed to free air wind or increase the potential of smoke impacts if down in a valley bottom. Smoke produced low on the slope and not lifted up an out of the valley can become subject to nighttime down-slope winds and then be trapped by nighttime inversions and contribute to valley smoke pooling until the next daytime heating.

Environmental Consequences

No Action

Direct and Indirect Effects

This alternative would have no immediate adverse effect on air quality, except in the event of a wildfire. Current management activities in the project area contribute little additional pollutants to the local airsheds. The primary source of pollution would be from vehicular exhaust, occasional campfires, and dust from motor traffic in the area. Air quality would remain good until the occurrence of a major wildfire event near or down-wind of the area, after which a return to pre-existing conditions could be expected within a matter of days.

A wildfire scenario would not be regulated and could result in significant particulate production per acre and more severe concentrations without fuel reduction through timber harvest and prescribed fire. Historically, this area was characterized by very large stand-replacing fires every 100-200 years on average.

Cumulative Effects

Smoke from wildfires from outside the project area may decrease air quality during summer fire seasons. Wildfire smoke has naturally been a part of the analysis area ecosystem, however, the amount of smoke generated from forest fires has decreased since the 1930s with the advent of effective fire suppression. Air quality would remain good until the occurrence of a major wildfire event near or down-wind of the area, after which a return to pre-existing conditions would be expected within a matter of days. Prescribed fire from outside the project area generates smoke during the spring and fall months. Agricultural burning restrictions in northern Idaho and eastern Washington have reduced levels of seasonal regional haze caused by grass field burning, and these levels will be further reduced with the current Idaho ban on grass field burning except on Tribal lands.

Noxious weed spraying would have a short-term, localized affect in the area of spraying. The impact from spraying would be very minimal to the air quality in the project area. The smell of herbicides may also persist at a spray site for several days following spraying.

Alternatives B and C

Direct and Indirect Effects

Alternatives B & C would have similar effects. Effects of Alternative C would be slightly less than those of Alternative B because it would include 475 fewer acres of shrubfield burning. Both alternatives would have limited immediate adverse effect on air quality, and these effects would be localized and last for a short duration. Proposed prescribed burning would be monitored and controlled by airshed regulations to avoid violation of air quality standards. The amount of smoke generated from prescribed fire would be reduced by burning when atmospheric conditions are favorable for dispersion as compared to burning during poor air quality and atmospheric conditions.

Aerial ignitions can reduce smoke impacts on an airshed compared with hand ignition by reducing ignition time which reduces the amount of time of smoldering combustion. This constrains smoke production to a shorter time period than is possible with hand ignition, reduces total emissions, and improves smoke dispersal by generating greater convective lifting within the smoke column (Hardy et al., 2001).

The smoke emissions from prescribed burning activities could adversely affect air quality on a temporary basis if predicted weather conditions within planned burning parameters change after ignition has taken place. The probability of this occurring would be greater during fall conditions when forecasted up-slope, optimum ventilation winds may turn down-slope, down-canyon after night fall, or when a stable air mass moves into the area.

The proposed prescribed burning would occur over a period of three to five years and would be conducted only when atmospheric conditions are favorable. The proposed burns would result in less smoke produced per acre than high-intensity wildfire because less fuel would be available for consumption and subsequent smoke production.

Direct effects would be limited within the project area because of the transient nature of smoke emissions from forestry burning. Smoke would be dispersed generally to the northeast by prevailing winds over unpopulated forest lands. It would be lifted above the 6,000-foot elevation state line divide and would not likely be in any harmful concentrations except to contribute to general haze. Proposed activities could temporary affect air quality at Avery, Idaho (immediately adjacent to the project area) and Wallace, Idaho (15 miles to the north). This affect would be from the down-canyon winds at night, bringing smoke into the area until day time heating lifts air currents. These areas are generally down canyon of the project area. Forest visitors use the developed and undeveloped campgrounds along the North Fork and main St. Joe River corridors. Diurnal temperature inversions within the canyon may allow pooling of smoke to affect these sites.

Dust may increase slightly from road maintenance as well as project-associated vehicular traffic. Road dust is primarily a minor and temporary local nuisance settling near the source.

Cumulative Effects

Proposed prescribed burning would be monitored and controlled by airshed regulations to avoid individual or cumulative violations of air quality standards. Current management activities in the project area contribute little additional pollutants to the local airsheds. The primary source of pollution would be from vehicular exhaust, dust from motorized traffic and occasional campfires in the area. Prescribed fire from outside the analysis area generates smoke during the spring and fall months. Agricultural burning restrictions have reduced regional haze levels and will continue to reduce smoke with the current ban on grass field burning in Idaho except on tribal lands. Other prescribed burning on federal and other lands within the affected airshed that may occur at the same time are monitored cumulatively on a daily basis and contribute to the local Smoke Management Unit's decision to approve a prescribed burn request on a given day. Wildfires occurring outside or inside the analysis area would generate smoke during the summer months and may affect air quality during that time period. Wildfire smoke has naturally been a part of the analysis area ecosystem, however, the amount of smoke generated from forest fires has decreased since the 1930s with the advent of effective fire suppression. Air quality would remain good until the occurrence of a major wildfire event near or down-wind of the area, after which a return to pre-existing conditions could be expected within a matter of days.

Noxious weed spraying would have a short-term localized effect in the immediate area of spraying. The impact from spraying would be very minimal to the air quality in the project area. Weed treatment would

have short-term, localized impact on air quality because of the drift of spray particles. Generally the greatest part of this drift would settle within 25 feet of the site, although small amounts could carry greater distances (USDA Forest Service 1993). The smell of herbicides may also persist at a spray site for several days following spraying. Human inhalation environmental exposures would be less than occupational exposures since spray operators, involved with activities on the spray units, are more likely to be subject to spray mist than is a casual visitor. Therefore a casual forest visitor should be expected to receive an inhalation exposure that would be orders of magnitude less than that of a backpack sprayer (USDA Forest Service 1984).

Dust may be generated at the same time or at different times than prescribed fire activity and is not considered to be a significant cumulative impact. Other reasonably foreseeable future activities (Table 5) would have no effect on air quality.

FIRE AND FUELS

(Project File Volume II, Section FF)

Regulatory Framework

Forest Plan Direction

The IPNF Forest Plan provides a basis to implement efficient fire protection and use programs based on management objectives, site-specific conditions, and expected fire occurrence and behavior. Fire Management Plans are guided by the following standards:

- Management area standards and goals provide direction for appropriate response.
- Human life and property are to be protected. Firefighter and public safety are first priority.
- Hazardous fire risk activity fuels will be treated to reduce the potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.
- Management area (MA) standards define requirements for fire protection and fire use. The project area includes Management Areas 1, 4, 5, 6 and 9 (Map 4). The fire protection standards are to use initial attack strategies (confine, contain and control) as appropriate to achieve the best benefit based on commercial timber values and, where appropriate, big-game summer/winter range values in these management areas. Fire-use objectives are to utilize prescribed fire to achieve silvicultural and ecological objectives for the management areas as appropriate.

Forest Service Manual 5100

Forest Service Manual (FSM) 5105 defines fuel as combustible wildland vegetative materials, living or dead. The objective of fuel management as stated by FSM 5150.2 is to identify, develop, and maintain fuel profiles that contribute to the most cost-efficient fire protection and use program in support of land and resource management direction in the Forest Plan. Methods used for controlling flammability and reducing the resistance to control of a fire may include mechanical, chemical, biological, or manual means, including the use of prescribed fire and wildland fire use (FSM 5150).

Federal Fire Policy

Federal fire suppression policy from the early 1900s until the late 1970s has been that of total suppression. Only recently has fire policy been modified to recognize the importance of fire in balancing vegetation cycles within the temperate forest. The Federal Wildland Fire Management Policy and Program Review was chartered by the Secretaries of the Interior and Agriculture to examine the need for modification of and addition to federal fire policy. The review recommended a set of consistent policies for all federal wildland fire management agencies. In adopting the policy, the federal agencies recognized the role of wildland fire as an essential ecological process and natural change agent that will be incorporated into the planning process (USDI and USDA 2001a). The severe wildfire seasons in recent years throughout the country have made it clear that fire cannot be excluded from fire-dependent ecosystems. On the other hand, because of developed areas, commercial forests, sensitive watersheds, and existing vegetative conditions,

fire cannot be fully restored to its historic character without potentially severe consequences to humans, except perhaps in a few of the largest wilderness areas (Brown and others 1994, Arno and others 2000).

Healthy Forest Initiative

President Bush launched the Healthy Forests Initiative (HFI) in August 2002 with the intent to reduce the risks severe wildfires pose to people, communities, and the environment. HFI helps improve the condition of our public lands, increases firefighter safety, and conserves landscape attributes valued by society by protecting forests, woodlands, shrublands, and grasslands from unnaturally intensive and destructive fires.

Healthy Forests Restoration Act

The Healthy Forest Restoration Act (HFRA) was passed in December 2003. It provides direction to help reduce hazardous fuels and restore healthy forest conditions and provides for expedited environmental analysis of HFRA projects. The HFRA directs the Forest Service to use a special pre-decisional review process in place of the standard administrative appeal process for authorized hazardous fuel reduction projects.

Analysis Methods

The information used in this analysis is a combination of the available data, research material, literature, field reviews and assessments. Diagnosis and analysis of stands within the Avery Fuels Reduction Project Area were accomplished using stand summary data, basic stand data, stand component data, stand activity data and aerial photo interpretation.

Fuel load inventories conducted by the Missoula Fire Sciences Laboratory near the Avery Ranger Station were used for the shrubfield fuels analysis (Table 7). Fuels and wildlife specialists developed the proposed treatments based on existing and desired stand conditions, considering the existing hazardous fuels conditions and wildlife browse availability. Existing conditions were determined by reviewing all the stand data for this area, with particular emphasis on aerial photo interpretation and area field reviews conducted during 2004 and 2005.

Habitat types were used for the project planning and site-specific considerations in this environmental assessment. Forest Habitat Types of Northern Idaho: A Second Approximation (Cooper and others 1991) outlines the classification and characteristics of the habitat types. Fire Ecology of the Forest Habitat Types of Northern Idaho (Kapler Smith and Fischer 1997) and Fire History on the Idaho Panhandle National Forest (Zack and Morgan 1994) were also used to assess the current and historic fire regime of the project area.

Habitat types were separated to facilitate individual treatment analysis and planning because of different treatment methods and vegetation characteristics such as productivity, disturbance regimes, stand dynamics, susceptibility to insect and disease, forest cover types, structural stages and succession pathways. Prescribed fire and fuels treatments were identified based on existing and desired stand conditions and the historic fire history of the analysis area. Considerations included stand composition, stand size class, stand structure, estimates of existing fuel loads, and qualitative estimation of future fire effects based on estimates of potential fuel loading and literature review.

Affected Environment and Existing Conditions

Current records, derived from old, hand-drawn maps that were later digitized for use in a GIS, indicate two distinct large fires occurred in the project area. The portion of the project area that lies north of the St. Joe River burned twice in the last century: once in 1910 and again in 1934. The portion of the project area south of the St. Joe River burned in the 1910 fire but did not burn in the 1934 “re-burn”. The extent and severity of these fires contributed to the existing vegetation and fuels conditions. Low existing down woody fuel loads within the timbered portions of the project area may be evidence of this. Several small fires were suppressed , but no other large fires are recorded within the analysis area other than the 1910 and 1934 fires (Map 3). Therefore the ongoing wildfire-free period within these stands is 72 years north of the St. Joe River and 96 years to the south. Prior to the 20th century the stands in lower elevations and on the south and west aspects of the project area most likely were burned frequently by low or mixed severity fires. Where these fires occurred at relatively short intervals (less than 25 years), they were mostly nonlethal. At the higher elevations and on the east and north facing slopes fire return intervals most likely ranged from 35 to 100 years with mixed-severity fires. These low and mixed severity fire events have been precluded by fire suppression for approximately the last 96 years.

Surface, ladder and canopy fuels in the Avery Fuels Reduction Project Area are increasingly dense due to suppression of fire from the area. In addition, shrubfields have become decadent with tall, old brush. These conditions have led to the potential for larger fires, and for more intense crown fires that are very resistant to fire control efforts and which threaten life, property and resources.

There are fewer large, long-lived, fire-resilient western larch, white pine, and ponderosa pine in the Avery Fuels Reduction Project Area than there were historically (see Vegetation section). These species have been replaced by Douglas-fir and grand fir which are more susceptible to insects, disease and fire. As a result of these trends, there is risk of increased fire severity and a lower level of resilience in the ecosystem. Landscapes in the area are generally in the middle-aged stage, largely as a result of the 1910 and 1934 fires. There are few acres of old and mature or large trees that provide habitat and large wood.

Shrubfields

In south and west facing shrubfields surrounding Cook Mountain on the Clearwater National Forest, Barrett (1982) documented fire return intervals averaging about 31 years. In recent times, fire exclusion may have reduced reburning and thus limited the expansion of seral shrubfields (Wellner 1970a). If surface fuels are continuous and dry, spring fires can spread readily prior to green up. In late summer shrubfields are often hot and very dry with conditions exacerbated where nighttime temperature inversions occur. Shrub foliage is not particularly flammable when green; but hot, dry winds during drought conditions can drive severe fires through the shrub layer (Smith and Fischer 1997). Trees regenerate slowly, if at all, in these persistent shrubfields.

Shiplett and Neuenschwander (1994) suggested that persistent shrubfields in northern Idaho can regenerate very slowly to mixed stands containing western white pine, Douglas-fir, ponderosa pine, and grand fir. Lodgepole pine may also occur, but lodgepole pine and western larch do not regenerate well under the shade of, and in competition with, dense brush (Hann 1986). The larger stems of decadent brush continue to die and add to existing dead and down fuel loads over time. Fuel load inventories conducted by the Missoula Fire Sciences Laboratory (Smith and Fischer 1997) near the Avery Ranger Station were used for this portion of the analysis (see table below).

Table 7- Shrubfield Fuel Loads (tons/acre) on Two Areas Near Avery Ranger Station

Dead and downed load by size class (inches)									
Site No.	Duff depth	Duff load	0- ¼”	¼ -1”	1-3”	3”+ sound	3”+ rotten	Total dead & downed	Total brush load
Inches		**Tons per Acre**							
1	0.8	14.4	0.3	1.8	1.2	0.0	0.0	3.3	16.0
2	0.5	9.8	0.2	0.9	1.0	0.0	0.0	2.1	23.4
Mean	.65	12.1	.25	1.35	1.1	0.0	0.0	2.7	19.7

Off-Site Ponderosa Pine

Development of the off-site ponderosa pine treatments resulted from review of the stand data for this area, with particular emphasis on area field reviews conducted during 2004 and 2005. Existing surface fuel loads were estimated based on Anderson’s *Aids to Determining Fuel Models* (1982) 8 to 20 tons per acre but were not formally inventoried. A portion of this proposed treatment area can be characterized the same as the shrubfields mentioned above (see Shrubfields discussion above and Table 7 for conditions analysis and fuel loadings). Within these shrubfields are a few mature off-site ponderosa pine trees with scattered regenerating ponderosa pine. Mature and regenerating Douglas-fir and grand fir trees and shrubs with pockets of off-site ponderosa pine occupy the remainder of this treatment unit. These pockets have a heavy down and dead component which could contribute to high-intensity fires. This off-site ponderosa pine is decadent and dying which is increasing downed and dead fuel loads and is also regenerating itself which is adding to the accumulation of ladder fuels. The lack of pruning and duff reduction by fire exclusion has increased the potential for crown fire and severe under-burning in this treatment area.

Forest succession in this fire group (Fire Group 2) varies with seed source, presence and vigor of pathogens and disturbance history. Fire often maintained these stands as mature ponderosa pine and Douglas fir with later succession dominated by Douglas fir. The portion of this proposal that lies adjacent to Road 1934 was treated under the Avery Hill Timber Sale. Due to a default on the timber sale contract there are

approximately 250 live off-site ponderosa pine left within this area. If this off-site ponderosa pine is left untreated and allowed to establish it will have an undesirable effect on future fire behavior.

Commercial Thinning

Existing conditions for commercial thinning areas were determined using stand data collected in 2005 and 2006 and field reviews conducted in 2005 and 2006 (V-1, V-2). The proposed treatments were developed by fuels specialists based on existing and desired stand conditions, with consideration for the existing hazardous fuels conditions. Existing surface fuel loads were estimated based on Anderson's *Aids to Determining Fuel Models* (1982) but were not formally inventoried because there was no perceived hazard due to low existing values. This fire group (Fire Group 7) includes most of the habitat types in the western red cedar and western hemlock series. Fire hazard remains low to moderate during most summers in this area due to aspect and higher humidities in this habitat type (Larsen 1922). These young stands support understory vegetation that may remain green throughout the summer. Under very dry conditions, however, duff and woody fuels become dry fuels. Surface and ground fires may smolder for months, and severe fire behavior (surface and crown fire) becomes possible. Tree regeneration adds to ladder fuels and lichen-covered branches on mature trees enhance the potential for crown fire. Portions of these stands are also very dense with overlapping tree canopies which will also contribute to the possibility of severe crown fire behavior.

Environmental Consequences

Fuel Loads and Potential Fire Severity

The following tables summarize the effects of the alternatives on fuel loading and potential fire severity in the Avery Fuels Reduction Project Area. These tables show the differences in fuel loading and potential future fire severity between alternatives for the project area.

Table 8 - Shrubfield Fuel Load Estimates Based on First Order Fire Effects Model

Measurement Parameters	Alternative A No Action	Alternative B 3,524 Acres	Alternative C 3,050 Acres
Estimated Existing Surface Fuel Loading (tons/acre)*	Min. 19-39 Max. Mean: 29	Min. 7-14 Max. Mean: 11	Min. 7-14 Max. Mean: 11
Future Surface Fire Severity	Moderate to High	Low to moderate	Low to moderate

**Totals include live and dead material, but do not include duff loads.*

Table 9 - Off-Site Ponderosa Pine Fuel Load Estimates Based on *Aids to Determining Fuel Models* (Anderson 1982)

Measurement Parameters	Alternative A No Action	Alternative B	Alternative C
Estimated Existing Surface Fuel Loading (tons/acre)*	Min. 8 - 30 Max. Mean: 19	Min. 5 -12 Max. Mean: 9	Min. 5 -12 Max. Mean: 9
Future Surface Fire Severity	Moderate to Severe	Low to moderate	Low to moderate

**Includes dead and down material within proposed treatment areas.*

Table 10 - Commercial Thinning Fuel Load Estimates Based on *Aids to Determining Fuel Models* (Anderson, 1982)

Measurement Parameters	Alternative A No Action	Alternative B	Alternative C
Estimated Existing Surface Fuel Loading (tons/acre)*	Min. 3 - 5 Max. Mean: 4	Min. 4 - 8 Max. Mean: 6	Min. 4 - 8 Max. Mean: 6
Future Surface Fire Severity	Low to High	Low to Moderate	Low to Moderate

**Includes dead and down material. Increased dead fuel loadings due to treatment are attributed to limb breakage during harvest. Reduced fire severity is attributed to the reduction of canopy fuel.*

Fire Behavior Factors

Fire behavior is primarily affected by three elements: fuels, weather and topography. The topography of the Avery Fuels Reduction Project Area is generally described as very steep slopes along a narrow river drainage with gentler slopes near and on the higher ridges. Surface fire behavior and crown fire potential are generally higher on steep slopes than on gentle slopes due to flame angle and convective influences which pre-heat fuels upslope and ahead of a flaming front. Typical surface fire rates of spread on steep slopes may be twice the rates of those on flat terrain under equivalent fuel and climatic conditions. When individual trees or groups of trees torch on steep slopes, fire travel can continue uphill through the crowns with little wind influence. The majority of the project area (excluding the proposed commercial thinning areas) is composed of shrubfields, has little canopy cover, and is on south to west aspects or ridge tops. The existing lack of canopy cover combined with the alignment of slopes with the prevailing southwest winds results in little sheltering of surface fuels from the prevailing winds. The lack of sheltering on these aspects would contribute to both fire intensity and severity on any given burn day. Drought periods act to regulate wildfire occurrence. Research indicates that common regional drought occurrence corresponds with many major fire episode years (Zack and Morgan 1994).

No Action

Direct and Indirect Effects

Direct effects to fire and fuel conditions would be minimal under the No-Action Alternative because no activities are proposed under the No-Action Alternative.

Large fire movement as witnessed in the 1910 and 1934 fires is the major concern within the project area. The current full fire suppression policy would continue; no unplanned ignitions would be allowed to burn as managed fires. Surface fuels would continue to accumulate. The successional changes in stand structure that affect fire behavior would also continue on their current trend. Fire severity would increase over time as the fuel loads build. Severe surface fires can damage soils by removing or altering soil organic matter, volatizing nutrients, decreasing water absorbing capacity, and by killing living plant parts and microorganisms. These effects are due to a combination of factors including duration of undesirable heating, depth of undesirable heating, and area affected by undesirable heating (Brown and others 2003). The First Order Fire Effects Model (FOFEM) predicts that fires in shrubfields with soil moisture levels of 5%, which could be the case with a wildfire, would result in soil temperatures above 150°C down to 2 cm below the soil surface (see Figure 1). FOFEM predicts a smoldering residence time of up to 48 minutes after the initial flame front when shrubfields are burned under very dry conditions with soils moistures of 5% (Figure 2).

Figure 1 - Soil Heating Predicted to Result from Burning Shrubfields with Soil Moistures of 5%

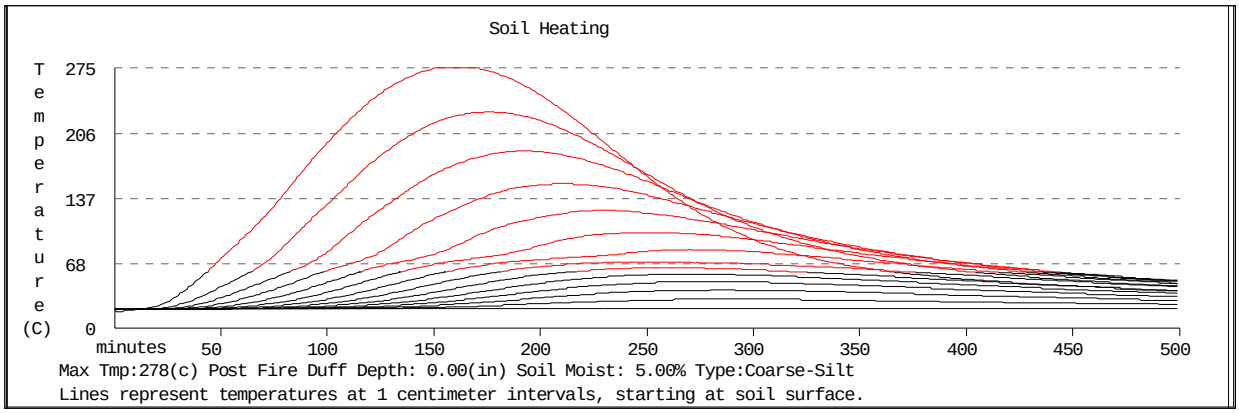
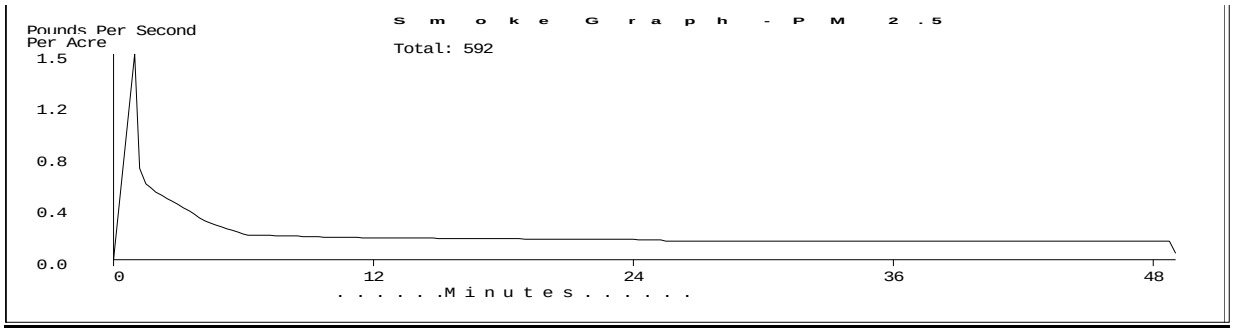


Figure 2 - Estimated Smoldering Residence Time from FOFEM Particulate Matter 2.5 Smoke Outputs



Cumulative Effects of the No Action Alternative

As discussed earlier, fire suppression is the primary factor in determining cumulative effect of this alternative. The No-Action Alternative represents the continuation of current management, which means the effects of 96 years of fire suppression would continue on their current trend. The No-Action Alternative would allow the continuation of surface fuel accumulation, as well as the changes in fire behavior associated with a change in forest structure and species. Successful fire suppression without prescribed fire causes an increase in amount and continuity of the living and dead material that would drive future fire behavior.

Under the No-Action Alternative fire behavior would maintain its trend away from historic conditions, creating an increasing challenge to fire suppression forces. Fires would continue to be more intense, and therefore more dangerous to firefighters. Forests where off-site ponderosa pine exists coupled by insect and disease problems are particularly dangerous for firefighters. These areas usually contain more snags and live trees with weakened root systems. Larger, more intense fires that threaten nearby homes and communities could have various unwanted effects.

Fire exclusion will heighten fire hazards to forest homes as people continue to develop and settle lands along the urban-wildland interface. The loss of homes and human life can escalate as the surrounding forest advances in succession because of the buildup of canopy and surface fuels. Moreover, multi-layered canopies and dense crowns will increase the chance of crown fires that are difficult to control. This could increase the harm to people who own the property and the firefighters who try to protect it.

Previous treatments on private land include activity by Shoshone County. The county completed a fuelbreak directly adjacent to the town of Avery in 2004 and 2005. This activity was on both sides of the river where homes and other structures are located. This fuelbreak is 100 feet in width and is present where structures share a common boundary with a timbered or brush covered area. Where brush occurred, it was cut, piled and burned. In areas where tree were present the site was thinned and the material was chipped and hauled away or piled and burned.

No current fuels activities are occurring within the project area, but wildfire suppression is continuing.

No other fuels treatment outside of this proposal is currently planned for the future on National Forest System land in the project area. Treatment on private land directly adjacent to proposed treatment units under this proposal may occur in concurrence or directly following the implementation of this project. Opportunities for treatment on these areas were collaboratively identified during the development of this project, and the landowners have been consulted.

Alternatives B and C

Direct and Indirect Effects

Alternatives B and C would directly result in the reduction of surface fuel loads by top killing the brush, removing stems and the crowns of standing, dying, at risk off-site ponderosa pine trees as well as reducing the crown bulk density in the thinning unit. The reduction of surface and aerial fuel loads would result in the effective reduction of future surface fire severity within the project area.

The action alternatives would use mechanical treatment and prescribed fire to help meet the goals of the management areas within the project, consistent with the Forest Plan. The Proposed Action would help develop cost-effective fire programs by making progress toward reducing potential intensities of wildfire in areas affected by past fire suppression. Of the three alternatives, Alternative B would best meet the goals, objectives and standards of the Forest Plan because it would do more to reduce the severity of fire effects, the costs of potential wildfire, and fire-caused changes in values. Treatments under these alternatives would begin to trend stands away from potential fire behavior that could threaten human life and property in the project area. The activity fuels created would be treated in a manner that is consistent with the standards of the Forest Plan.

Shrubfield Burning

Alternatives B and C would reduce fuels and fuel continuity, and thereby change potential fire behavior. The proposed shrubfield burning would result in an estimated surface fuel loading of 7 to 14 tons per acre. This would be a mean reduction of 18 tons per acre from the existing 19-39 tons per acre (Table 8). The treatments would result in conditions that would potentially support a low to moderate surface fire severity which is less severe than the existing potential surface fire severity of moderate to high (Table 8) . These benefits could last for approximately two to three decades, and would maintain more options to reduce fuels into the future. Prescribed burning would effectively decrease fuel loadings and associated fire behavior so new ignitions and fires burning into them could be more readily controlled.

Approximately 475 acres of the proposed shrubfield burning area are identified as having potential high mass failure potential. Prescribed burning these areas under early season moist conditions would effectively reduce fuel loadings in the brush and dead fuels while minimizing duff consumption and root crown mortality. Under these conditions the brush would readily re-sprout and grow vigorously through the growing season which could mitigate the potential of mass failure due to prescribed burning.

A secondary benefit would be to rejuvenate and regenerate the shrub species desirable for wildlife. To accommodate regeneration of preferred wildlife browse species (redstem ceanothus) some areas within these treatments may be burned under conditions with soils moistures of 15%. The First Order Fire Effects Model was used to determine potential soil heating effects under moderate burning conditions (see Figure 3). If these areas were to burn in late season the brush may not readily re-sprout until the following spring, leaving these areas exposed to erosion. The potential mass failure area is located adjacent to an open road. The road combined with burned shrubfields could be used as a tactically defensible area for wildland fire suppression which would reduce the risk to wildland firefighters during suppression operations. The 475-acre difference between the two treatments indicated that Alternative C would not meet the purpose and need or desired condition as well as Alternative B.

Figure 3 - Soil Heating Under Moderate Conditions

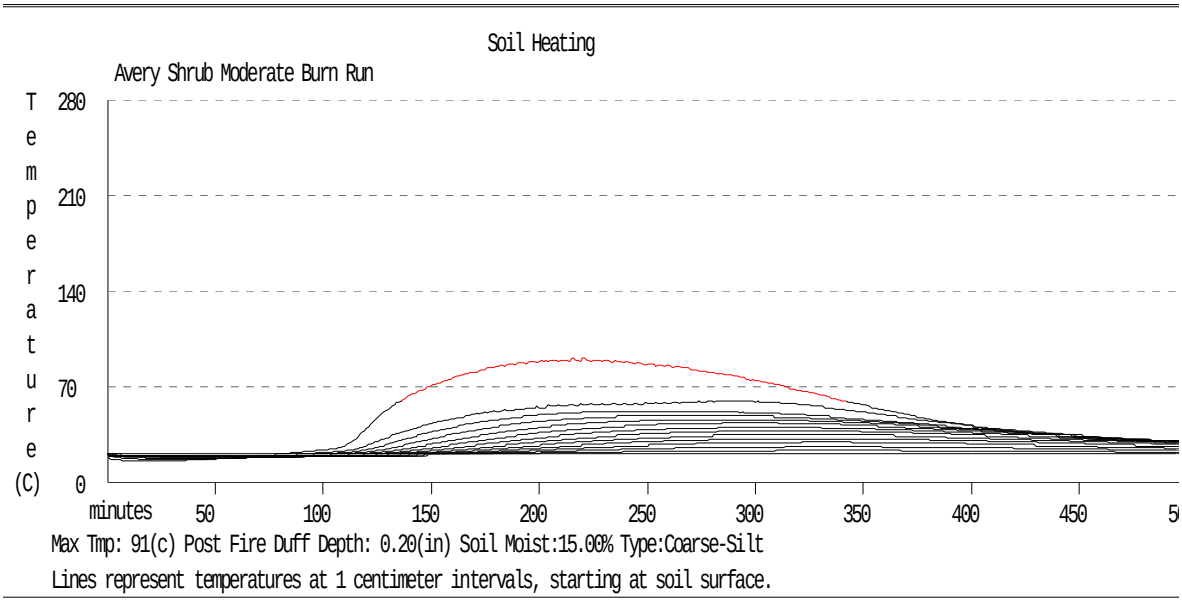
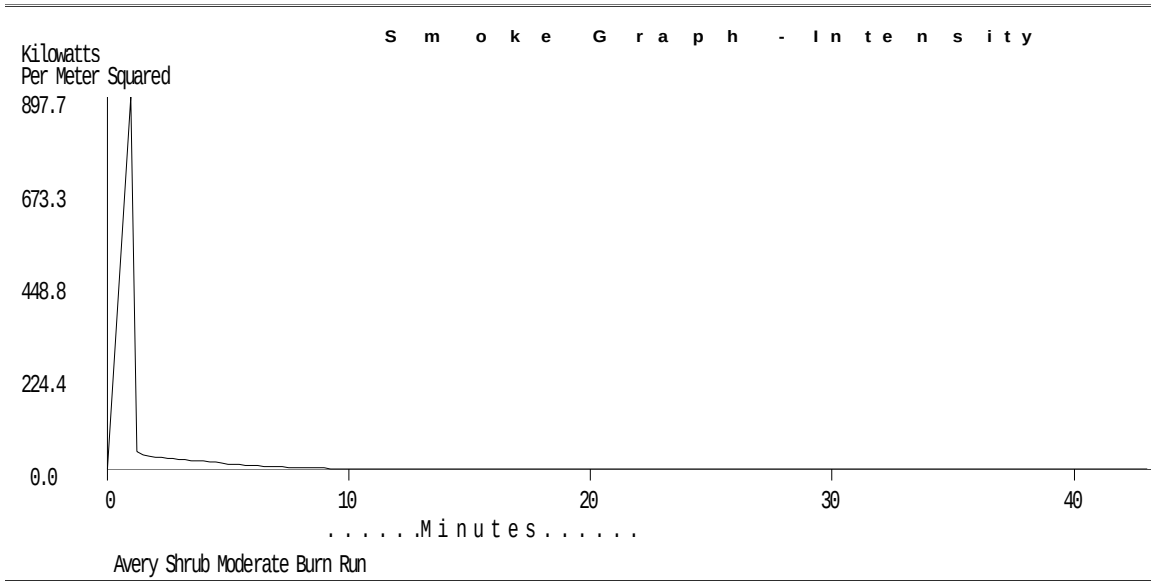


Figure 4 - Smoldering residence time of moderate burn generated from FOFEM (<10 minutes)



Off-Site Ponderosa Pine Treatment

Alternatives B and C would reduce fuels and fuel continuity, and thereby change potential fire behavior. The proposed off-site ponderosa treatments would result in an estimated surface fuel loading of 5 to 12 tons per acre. This would be a mean reduction of 10 tons per acre from the existing 8-30 tons per acre (Table 9). The treatments would result in conditions that would potentially support a low to moderate surface fire severity which is less severe than the existing potential surface fire severity of moderate to severe (Table 9). Prescribed burning would effectively decrease fuel loadings and associated fire behavior so new ignitions and fires burning into them could be more readily controlled.

Due to the scattered arrangement of the ponderosa pine pockets it is estimated that only 35% of this off-site ponderosa pine treatment units would actually be treated. Slashing and felling the off-site ponderosa pine followed by jackpot or broadcast burning would reduce current and future fuel loads accumulating from stand mortality, reduce the presence and reproduction of the poorly adapted stock, and enhance site

preparation for natural or artificial regeneration. Due to the potential of severe fire effects prescribed burning would take place under moist conditions to reduce duff consumption and excessive soil heating.

Commercial Thinning

This treatment would reduce the potential for a crown fire event by manipulating the current vegetation structure, stand density and species composition which would also reduce the potential effects of wildland fire to the community of Avery. These stands would be thinned to create spaces between the tree crowns which would reduce the possibility of severe crown fire. Larger, healthier, fire-adapted trees would be favored for retention.

Although tree crowns would not carry a fire as readily, the proposed thinning would actually increase estimated surface fuel loads by one to three tons per acre. The proposed thinning would result in an estimated surface fuel loading of 4 to 8 tons per acre. This would be a mean increase of 2 tons per acre from the existing 3-5 tons per acre (Table 10) due to limb breakage and trimming during logging. To reduce the amount of activity fuels created during harvest the tops of the harvested timber would be flown to landings and be burned. The treatments would result in conditions that would potentially support a low to moderate surface fire severity as opposed to the existing potential surface fire severity of low to high (Table 10).

Cumulative Effects of the Proposed Action

Fire suppression has been effective in the Avery Fuels Reduction Project Area for over 92 years, and although most of the area burned in stand-replacing fires in 1910 and 1934, the incremental effect of suppressing each small fire in the project area would have over time promoted late seral species rather than early seral species and changed the structure of those forests, which in turn would change the way they responded to fires (Zack and Morgan 1994).

Under the current IPNF Forest Plan, fire suppression would continue, and as a result it would allow fuels in the project area to accumulate over time as described above. Considering the project area's close proximity to communities and improvements, fire suppression will very likely continue in the future. The reduction in fuels under the proposed action would change potential fire behavior and fire severity.

Prescribed burning the shrubfields, treating the off-site ponderosa pine and thinning the area south of the St. Joe River would create a mosaic of vegetation. This mosaic would create fuel interruptions that reduce the potential for fast-spreading, high-intensity fires. Fuel mosaics can result in delayed fire spread or delayed fire build-up, reducing the risk of escaped fires. The spatial arrangement of treatments under the proposed action would likely disrupt the growth of a fire burning towards Avery, and modify fire behavior so that suppression might be more effective. The treatments would be strategically placed and overlapping, so that they would have the most substantial effect on a wildfire burning up the St. Joe River drainage towards Avery as witnessed in the 1910 fire (Finney 2001).

FISHERIES

(Project File Volume III, Section F)

Introduction

This section discusses the regulatory framework, analysis methods, the cumulative effects area, and environmental consequences for the fisheries resource in the Avery Fuels Reduction project area. It provides a comparison of potential effects between the three alternatives and also serves as the biological evaluation (BE), which documents the analysis and effects determination of the proposed action on sensitive species. Listed fish species are also addressed in a separate biological assessment (BA) (F-3).

Regulatory Framework

Five standards are listed in the Idaho Panhandle National Forests (IPNF) Forest Plan (USDA Forest Service 1987) for fisheries and additional standards are described in the Inland Native Fish Strategy (USDA 1995 Inland Native Fish Strategy DN and FONSI) which, are applicable to the fisheries resource (F-5). The Inland Native Fish Strategy (INFS) specified Riparian Goals and Riparian Management Objectives.

The National Forest Management Act of 1976 (NFMA) requires that the Forest Service to plan for diversity of plant and animal communities based on the suitability and capability of the specific land area and within multiple use objectives of a Land Management Plan.

Section 7 of the 1973 Endangered Species Act (ESA) includes direction that Federal agencies will not authorize, fund, or conduct actions that are likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat.

Executive Order 12962 (June 7, 1995) states objectives "to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities by: (h) evaluating the effects of Federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order."

Additional regulatory requirements related to fisheries resources (e.g. Clean Water Act and Idaho Water Quality Standards, Idaho 303(d) list) are addressed in the *Soil*s and *Watershed* sections.

Analysis Area

The proposed activity area includes approximately 3,862 acres of land within the project boundary that drain into the St. Joe River. The project area was delineated based on watershed boundaries encompassing the proposed shrubfield burns and the area affected by off-site ponderosa pine. The project area contains several small drainages that flow into the St. Joe River from the north and south between the communities of Avery and Hoyt Idaho. Included drainages are Avery, Setzer, Storm, and Rock Creek which flow into the St. Joe River from the north. The St. Joe River feeds into the southern portion of Coeur d'Alene Lake. Coeur d'Alene Lake and its tributaries form the upper Spokane River Basin, which occurs within the interior Columbia River Basin (F-1). The Kelly Creek Drainage, which flows into the St. Joe River from the south, is within the project area boundary. Because there is no planned or reasonably foreseeable action within the Kelly Creek Drainage it will not be analyzed for cumulative effects in this fisheries report.

Roundhouse Gulch flows into the St Joe River from the South and is within the project area but not in the analysis area. Activities within Roundhouse Gulch are not analyzed for cumulative effects in this fisheries report because it is a non fish-bearing stream (F-2) and the proposed activities within this drainage would have no effect on fish habitat. However, extended stream buffers would apply to the main stem due to past harvest, road building, and the large size of the stream channel (see *Watershed* section). Minimum INFS buffers would be 150 feet, but 300-foot buffers would be implemented with this project (Design Feature 3.c.).

Several other small drainages within the project area flow into the St. Joe River. These include Hoyt, Hamilton and Trego Creek as well as nine unnamed intermittent streams that are also not analyzed for cumulative effects in this fisheries report because they are small, intermittent and non fish-bearing streams (F-2). Standard INFS buffers would apply to these small streams therefore any effects from the proposed management in these areas would be diluted and have no effect on down stream fish populations.

For this analysis, the resource area was subdivided into manageable units referred to as “subwatersheds” (F-1). These units are smaller components to the larger watershed. If habitat is maintained in these smaller subwatersheds there would likely be limited or no effect to the fisheries resource on the larger watershed

level. One unit referred to as a "segment of the St. Joe River" approximately 7.5 miles long which flows through the project area (see F-1) is not a sub-watershed. This segment is analyzed for "cumulative effects" because this project includes the use of two existing landing/fueling sites, which are adjacent to the St. Joe River and within the RHCA. Furthermore, an appropriate area upstream and down stream of the landings are added to the analysis area to allow an analysis area for species with larger migratory home ranges such as bull trout and cutthroat trout.

The following discussions focus on the fisheries resource within the subwatersheds of the Avery Fuels Reduction Project Area and the previously mentioned segment of the St. Joe River. These discussions are arranged in the following order:

1) Avery Creek Subwatershed
2) Setzer Creek Subwatershed
3) Storm Creek Subwatersehd
4) Rock Creek Subwatershed
5) 7.5 mile Segment of the St. Joe River

The selection of the analysis area was based on that fact that these drainages contain fish habitat and because activities proposed for the Avery Fuels Reduction Project could potentially affect fish habitat in these areas (F-2). However, the project area is NOT identified as being within a "Priority watershed" as defined in INFS (USDA 1999: Internal Memo: Key and Priority Watershed Task Team Report) and the Idaho Panhandle National Forests (IPNF) Forest Plan (USDA Forest Service 1987). Priority watersheds are watersheds that have excellent habitat or strong populations of inland native fish (with a priority on bull trout), watersheds that could provide those, or degraded watersheds with high restoration potential.

Analysis Methods

The affected environment describes the current condition of the fisheries resource within the project area. It is used to develop fisheries issues, which have the potential to be affected by the proposed action. The proposed activities and their potential effects to water quality or changes to stream channels, and fish habitat, are the main concerns related to the fisheries resources.

Literature and Office Review

The assessment of existing conditions is critical to an environmental analysis because it describes the current condition of the Avery Fuels Reduction Project Area and provides a basis for comparing the effects of management alternatives. Information for the fisheries analysis was compiled using data from the field observations and data collected in 2003, 2004, 2005 and 2006 (F-2). Additional information was gathered from the Avery Fuels Reduction Watershed Report and Soils Report, district files, historical records, 2002 aerial photographs, and published scientific literature.

GIS Technology

Geographical Information System (GIS) technology was used to combine existing databases, proposed activities and data taken from aerial photos to create maps and summary tables of existing conditions. Landtype maps and updated fisheries habitat information were input into GIS layers to evaluate the existing condition and for the effects analysis. Stream miles are approximations based on GIS, map and aerial photo analysis (F-2).

Field Review

Project area streams were qualitatively assessed for habitat quality, habitat quantity, and fish presence (F-2). Perennial crossings where known fish presence occurred were inventoried and evaluated for fish passage using elements of the R-1 protocol for road-stream crossings evaluation (Clarkin and others 2003).

Management Indicator Selection (MIS)

The analysis of direct, indirect, and cumulative effects to fish is based on effects to sensitive and management indicator fish species (MIS). Under this concept, larger groups of organisms or communities are believed to be adequately represented by a subset of the group. The Forest Plan (IPNF 1987) identifies westslope cutthroat trout and bull trout as potential Management Indicator Species (MIS) for fisheries

(Forest Plan Appendix L, PF F-4). Currently, westslope cutthroat and bull trout are known to utilize streams within the Avery Fuels Reduction Project Area for spawning, rearing, over-wintering or migration. They have similar habitat needs. Consequently, westslope cutthroat and bull trout were selected as appropriate MIS for the fisheries analysis of this project.

Methodology Used in Determining Limiting Factors to the Fisheries Resource

Each of the subwatersheds in the Avery Fuels Reduction Project Area was analyzed as its own cumulative effects area using a limiting factor assessment to focus analysis efforts on those factors which are most important. A limiting factor is a factor which limits or reduces the ability of an area to produce the desired product (Everest and Sedell 1984). In this case the desired products are fish. The USFWS (1998) developed a list of indicators and measurement parameters (Table 11) (F-4), which were used to characterize fish habitat elements and assist in the determination of limiting factors. Some of these indicators and subsequent measurement parameters were not used to assess subwatershed or segment condition or to analyze alternatives because they were not selected as limiting factors or because they are elements that would not be altered by any proposed activity (i.e. the amount of the watershed at a certain elevation will not be altered by any proposed activity). Furthermore some issue indicators were not selected for detailed analysis based on conclusions of the Water and Soils reports.

Table 11 - Indicators Considered in Limiting Factor Assessment

Issue Indicator	Measurement parameters
Population Characteristics	population size, growth and survival, diversity, isolation, persistence
Stream Channel Conditions	width to depth ratio, stream bank condition, floodplain connectivity
Flow / Hydrology	change in peak/base flows
Watershed Condition	sensitive landtype, road density, riparian harvest, elevation
Water Quality	temperature, sediment, chemical contaminants/nutrients
Habitat Access	physical barriers
Habitat Elements	substrate embeddedness, large woody debris, pool frequency, large pools, off-channel habitat, refugia

The following indicators and subsequent measurement parameters were selected for use in analyzing the existing condition and the effects of the alternatives on the fisheries resource and habitat elements of listed subwatersheds and stream segment and for determining limiting factors. Only the issue indicators or measurement parameters, which are most important in determining limiting factors for the Avery Fuels Reduction analysis area were selected and are listed in tables below by subwatershed or stream segment (See Current Condition Section below for rational used to select issue indicators).

Methodology for Measurement Parameters Used for Current Condition and Effects

This section further discusses the methods used to measure and analyze key components of the fisheries resource in the analysis area. These measurements are important because they help to describe the existing condition and can give insight to the overall changes from a reference condition.

Population Characteristics

Fish species presence and distribution was determined based on a review of historical literature, electro-fishing surveys and incidental sightings during qualitative habitat surveys (F-2). Actual quantitative fish densities were not determined for this project. However, the analysis area subwatersheds population conditions were based qualitatively on relative abundance of fish caught or seen (number of fish and species per 100 feet of typical stream channel). Results of the relative abundance survey gives insight to the general fish population size and diversity relative to other streams of similar channel size, morphology, and available habitat.

Table 12 - Issue Indicators and Measurement Parameters by Subwatershed

Avery Creek Watershed and Segment of the St. Joe River	
Issue Indicator	**Measurement parameters**
Population Characteristics	Population Size
Stream Channel Conditions	Stream Bank Condition
Flow / Hydrology	Change In Peak/Base Flows
Watershed Condition	Road Density
Water Quality	Sediment, Chemical Contaminants/Nutrients, Temperature
Habitat Access	Physical Barriers
Habitat Elements	Large Woody Debris
Rock Creek, Setzer Creek, and Storm Creek Watersheds	
Issue Indicator	**Measurement parameters**
Population Characteristics	Population Size
Stream Channel Conditions	Stream Bank Condition
Flow / Hydrology	Change In Peak / Base Flows
Watershed Condition	Road Density
Water Quality	Temperature
Habitat Access	Physical Barriers
Habitat Elements	Large Woody Debris

Stream Channel Conditions

The condition of streambanks was qualitatively assessed through field observations (F-2). Qualitative information such as bank height, bank slope, channel width, and pool size was collected. The stability of a stream channel and morphology is dependent on variations of the stream channel type. Stream channels that are primarily alluvial systems (sediment deposited and formed) are the most susceptible to stream bank erosion, changes in sediment supplies, and large woody debris removal (Chamberlin and others 1991). A further estimate of streambank condition was done by reviewing information about past management within riparian areas (See Individual Subwatershed/Segment Discussions).

Flow / Hydrology (see *Watershed* section)

StreamStats is an online, integrated GIS application established by the United States Geological Survey (USGS) (http://streamstats.usgs.gov/html/idaho.html). This program provides estimates for reference peak flows and basin characteristics of major streams in the project area using the procedures outlined in Berenbrock's 2002 report (SW-5a). The equations used to estimate streamflow statistics for unguaged sites were developed through a process know as regionalization, which involves use of multiple-regression analysis to relate streamflow statistics computed for a group of selected stream gauging stations to basin characteristics measured for the stations. The estimates assume natural flow conditions at the site.

Watershed Condition

Road densities within watersheds can affect fisheries resources in several ways. Roads can increase sediment delivery to streams as well as increase the risk for mass failures. Roads within riparian zones can reduce stream shading due to the removal of streamside trees and reduce LWD recruitment due to the removal of trees. Riparian roads can also straiten stream channels which can cause changes in hydrology and stream/floodplain interaction. A steam's natural ability to interact with its floodplain can be important to a streams ability to withstand flood events while maintaining fish habitat (i.e. LWD, pools, streambanks and substrate). The influence of road density to the fisheries resource was based on research conducted for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) (Lee and others 1997). That research found that the "status of four non-anadromous salmonid species (which include bull trout and westslope cutthroat trout) are less likely to use moderate to highly roaded areas for spawning and rearing and, if found, are less likely to be at strong population levels" (Lee and others 1997 p. 1347). Table 13 provides the ICBEMP definitions for road density ratings (Quigley and others 1996 p. 67).

Table 13 - Total Road Density Ratings

Rating	Very low	Low	Moderate	High	Extremely High
Densities	0.02-0.1 mi/mi^2	0.1-0.7 mi/mi^2	0.7 – 1.7 mi/mi^2	1.7 – 4.7 mi/mi^2	4.7 + mi/mi^2

Water Quality

Water quality refers to the physical, chemical and biologic characteristics of water in reference to a particular use. The State of Idaho designated the following beneficial uses for this reach of the St. Joe River: (1) domestic water supply, (2) salmonid spawning, (3) cold-water biota, (4) primary contact recreation, and (5) special resource water (IDAPA 58.01.02.110.11). All tributaries in the project area are undesignated surface waters; therefore, they are assigned beneficial uses of cold-water aquatic life and primary or secondary contact recreation (IDAPA 58.01.02.101.01). Beneficial uses were designated by Idaho Department of Environmental Quality (IDEQ) based upon assessment of the historic and current value of the water in each stream segment as a function of nutrients, bacteria, pH, dissolved gas, toxic substances, dissolved oxygen, temperature, ammonia, habitat, sediment, and turbidity.

Sediment

None of the streams in the project area are listed for non-support due to sediment or other pollutants. A discussion of potential changes to sediment from the alternatives, which could affect the fisheries resource, is found in the effects analysis section. The watershed report uses the WEPP model (Flanagan and Livingston 1995), which is a physically-based soil erosion model that can provide estimates of soil erosion and sediment yield considering the specific soil, climate, ground cover, and topographic conditions (SW-4). Model outputs are primarily intended to indicate trends and to compare management alternatives, and secondarily to provide quantified estimates of sediment yield.

Temperature

The criteria used for temperature is typically based on Idaho State bull trout summer and fall criteria. No temperature data is available for the analysis area. IDEQ's 2002 Integrated 303(d) and 305(b) Report (IDEQ 2005) lists the middle St. Joe River assessment unit (from North Fork St. Joe River to St. Maries River), which lumps all the mapped tributaries in the project area, as impaired or not supporting assigned beneficial uses due to temperature (*Watershed* section). Increased stream temperature is a direct reflection of the amount and condition of riparian vegetation within riparian zones. This analysis is based on amount of proposed fuels reduction activities within the riparian habitat conservation areas. Timber harvest can have negative effects to stream temperatures by reducing canopy and thus exposing channels to solar radiation (Chamberlin and others 1991). Riparian harvest is not proposed, and there is no past riparian harvest documented for the analysis area.

Chemical Contaminants / Nutrients

Some of the proposed activities have the potential to result in chemical contamination, so that potential is considered in this analysis.

Habitat Access

There are known human-caused fish barriers in the Avery Fuels Reduction Project Area (F-2). Culverts or dams can create migration barriers, which decrease the opportunity for dispersal. Furthermore waterfalls, channel flow intermittency, and some debris jams are part of the reference conditions that naturally and continually fragment aquatic habitats for various periods of time. In general, the Avery Fuels Reduction Project Area high gradient stream reaches in headwater locations are the predominant form of natural barriers (F-2).

Habitat Elements

Stream habitats are influenced by woody debris constrictions and local confinement, which typically produce scour pools and riffles. The current conditions of large woody debris in the Avery Fuels Reduction Project Area were determined by utilizing professional interpretation of information from qualitative stream reviews (2003-2006), historical records, aerial photographs, an analysis of watershed conditions, published scientific literature and comprehensive knowledge of the fisheries resources in the St. Joe River Basin (F-2).

Methodology for Summarizing the Limited Factor Assessment

Following the descriptions of the individual drainages is a summary of the limiting factors to the fisheries resource identified for that drainage. The number and type of limiting factors are then considered in the determination of the overall condition of the fish habitat. The overall condition of the fish habitat is categorized as:

- Unaltered: Fish habitat is considered to be unaltered if no limiting factors are identified.
- Adequate: Fish habitat is considered to be adequate if no more than two limiting factors are identified (but neither are extremely high road density).
- Moderately Altered/Moderate Risk: Fish habitat is considered to be moderately altered from the historic range of variability and/or moderate risk of further undesirable change if two or three limiting factors are identified (including extremely high road density) or if 4 limiting factors are identified (none being Extremely high road density).
- Highly Altered/High Risk: Fish habitat is considered to be highly altered from historic range of variability and/or high risk of further undesirable change if extremely high road density and at least 3 other limiting factors are identified.

The scale of the Avery Fuels Reduction Project Area in relation to the much larger St. Joe River sub-basin would tend to render any effects immeasurable beyond the temporal and spatial boundaries of the analysis area. Indicators considered in the limiting factor assessment for the very large St. Joe River Basin, as it relates to the 7.5-mile section of the river found within the project area, have to be analyzed qualitatively to adequately depict potential effects of the proposed alternatives to the fisheries resource.

Table 14 - Overall Condition Summary by Drainage

Drainage	Overall Condition
Avery Creek	Adequate
Setzer Creek	Adequate
Storm Creek	Adequate
Rock Creek	Adequate
St. Joe River Segment (7.5 miles)	Moderately Altered/Moderate Risk

Affected Environment

Reference Condition

The following summarizes the reference conditions which were known to exist or which were expected in the Avery Fuels Reduction Project Area before modern human management activities began. Very little specific information is available for the project area because detailed descriptions were not completed prior to the beginning of management activities in the early 1900s. Reference conditions are therefore inferred based on the physical conditions which could occur in areas with topography, geology, rainfall, etc similar to the project area. Reference conditions are also based on the known habitat needs of the native species of the project area.

Fish Populations

Bull Trout (*Salvelinus confluentus*)

Bull tout are native to the St. Joe River system. The segment of the St Joe River found within the Avery Fuels Reduction Project Area was historically used as a fluvial or adfluvial bull trout migration corridor between the overwintering habitats in Coeur d'Alene Lake and the spawning/rearing habitat of the upper St. Joe. There is no historic record of bull trout found in any of the tributary streams (subwatersheds) within the project area. Historically, these tributaries likely did not have suitable habitat for fluvial or adfluvial bull trout because they are small high gradient streams that are not typically associated with quality pools for resting and riffles for spawning, which are requirements for bull trout persistence.

Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)

Westslope cutthroat trout are native to the St. Joe River system and have been well documented. It is also assumed, based on physical conditions, westslope cutthroat trout populations occasionally used the tributary streams selected for cumulative effects analysis prior to human disturbances. Although the historic distribution of westslope cutthroat in the tributaries within the Avery Fuels Reduction Project Area is speculated, 'natural' main stem barriers would have limited access especially due to headwater stream gradient.

Stream Channel Conditions (see *Watershed Resources* section and *Soils* section)

Stream channels throughout the project area have eroded north-south trending V-shaped valleys with little to no floodplain. The average channel gradient generally ranges between 10 and 20%, steepening (up to 65%) near their mouths as the tributaries plunge to meet the St. Joe River. Overall, the watershed has a dendritic drainage pattern.

Based on geomorphological characteristics like valley slope and dominate bed material, the named tributaries in the project area primarily are classified as Rosgen type "A" channels with a few reaches having type "B" channels (Rosgen 1996). The Montgomery and Buffington (1997) classification scheme classifies the project area tributaries as fluvial and colluvial bedrock (Bf and Bc), cascade (Ca), channeled colluvial (Cc), and step pool (SP) morphologies. These channel types are relatively confined and are capable of transporting moderate increases in water and sediment from their drainage areas without changing dimension, pattern or profile (Rosgen 1996; Montgomery and Buffington 1997).

Biologically preferred conditions of bull trout and westslope cutthroat trout also provide insight into reference conditions for aquatic resources in the analysis area. The preferred habitat of bull trout and westslope cutthroat trout can be generalized as cold, clear streams that possess rocky, silt-free riffles for spawning and slow, deep pools for feeding, resting, and over-wintering (Young 1995; Reel and others 1989). Therefore, the stream channels within the project area, which were historically used by fish, probably maintained the previously mentioned preferred habitat elements.

Flow/Hydrology (see *Watershed Resources* section)

Water yield is primarily a function of precipitation, landtype, vegetative cover, and drainage area. Natural disturbances such as wildfire would tend to increase water yields by reducing canopy cover and plant uptake of subsurface flows and by producing hydrophobic soils after severe burns (USDA 2002).

The reference condition for water yield in the Avery Fuels Reduction Project Area was likely similar to the existing conditions (see below) given that (1) there would have been similar precipitation conditions, (2) no change to the size of drainage area, and (3) the amount of sensitive landtypes and the amount of land within the rain on snow zone does not extensively change over time. Nevertheless, a range of varying water yield conditions could have been present in the project area through space and over time (*Watershed* section).

Watershed Condition

Roads did not exist, so road density was not a factor (See *Watershed Resources* and *Soils* sections for overall reference condition).

Water Quality

See Watershed and Soils sections. Before European management influences such as mining, grazing, road building each subwatershed or stream segment would historically have had natural amounts nutrients, bacteria, pH, dissolved gas, toxic substances, dissolved oxygen, temperature, ammonia, habitat, sediment, and turbidity levels that supported aquatic life.

Habitat Access

Fish would have had unimpeded access to all suitable habitat. However, waterfalls, channel flow intermittency, and some debris jams are part of the reference conditions that naturally and continually fragment aquatic habitats for various periods of time.

Stream habitats would have been influenced by woody debris constrictions and local confinement, which typically produce scour pools and riffles. Aquatic habitats would likely have included a diverse mix of fast and slow water habitats. It is expected that beavers would have had a minor influence on channel

morphology and associated habitat conditions in the area. Based on the forested nature of this area the reference conditions for instream cover would likely have consisted of a high percentage of undercut banks, over-hanging terrestrial vegetation, and accumulations of large woody debris.

Biologically preferred conditions of bull trout and westslope cutthroat trout also provide insight into reference conditions for aquatic resources in the Avery Fuels analysis area. The preferred habitat of bull trout and westslope cutthroat trout can be generalized as cold, clear streams that possess rocky, silt-free riffles for spawning and slow, deep pools for feeding, resting, and over-wintering (Young 1995; Reel and others 1989).

Existing Condition

Fish Populations

Bull Trout (Threatened)

Bull trout (*Salvelinus confluentus*) is listed as "sensitive" by Region 1 of the USDA Forest Service and as "species of special concern" by the State of Idaho. The U. S. Fish and Wildlife Service (USFWS) lists bull trout as a fish species that occur, potentially occur, and/or habitat exists within the St Joe River Basin portions of the Idaho Panhandle National Forests. Fish found in these river systems are categorized as part of the Columbia River Distinct Population Segment of bull trout (*Salvelinus confluentus*), which is listed as "threatened" (Biannual Species List for the Idaho Panhandle National Forest, FWS Reference No. 1-9-07-SP-0054 (105.0100), January 22, 2007) (F-3).

Bull trout population status reviews have found considerable reductions in the distribution and abundance throughout their historic range (USDA Forest Service 1996a: An assessment of the conservation needs of Bull Trout; Rieman and McIntyre 1993). The IPNF Forest Plan monitoring reports indicate that bull trout populations appear to be stable throughout most of northern Idaho (USDA Idaho Panhandle Forest Plan Monitoring and Evaluation Reports 1998, 2000 and 2002).

Genetic analysis has shown bull trout populations in the St. Joe River system to be a unique stock though they are closely linked to the upper Columbia River clad - one of three major groupings of bull trout throughout the Columbia and Klamath River drainages (Williams, unpublished). In a status review of bull trout on the Idaho Panhandle National Forests stocks from the St. Joe River system were considered to be at moderate risk of extinction (Cross 1992). Currently, bull trout are known to occupy habitat in the St. Joe River and many of its tributaries. However, there is no historic record of bull trout occurring in any of the St. Joe River tributary streams within the project area. No bull trout were located during recent surveys of the St. Joe River tributary streams in the project area (F-2).

Westslope Cutthroat Trout (sensitive)

Westslope cutthroat trout are listed as "sensitive" by Region 1 of the USDA Forest Service and are listed as a "species of special concern" by the State of Idaho. In addition, the U.S. Fish and Wildlife Service (USFWS) list westslope cutthroat trout as a "species of concern" with respect to section 7(c) of the 1973 Endangered Species Act (ESA; USDI 2002). The USFWS lists westslope cutthroat trout as to occur, potentially occur, and/or its habitat exists within the portion of the Idaho Panhandle National Forests where activities could be implemented in the Avery Fuels Reduction Project Area.

Population status reviews of the westslope cutthroat trout (WCT) within the United States, determined that currently WCT occupy an estimated 59% of the historically occupied habitat and in Idaho populations occupy almost 96% of the historical range (Shepard and others 2003). Idaho Fish and Game summarized 20 years of snorkeling data on four streams (including the St. Joe River) in Idaho which indicates “westslope cutthroat trout have maintained or increased their population abundance over a very large area within the state of Idaho during the past 15-34 years” (Idaho Fish and Game 2003 p. 2). Idaho Fish and Game surveyed the St. Joe River from 1969 until present, except for several years during the 1980s. These surveys indicated that current populations are lower than the peak years in 1977 and 1980, but higher than the earliest years of the survey (Idaho Fish and Game 2003 p. 43). IPNF Forest Plan monitoring reports indicate that westslope cutthroat trout populations appear to be stable throughout most of northern Idaho (USDA Idaho Panhandle Forest Plan Monitoring and Evaluation Reports 1998, 2000 and 2002). The actual westslope cutthroat trout densities were not determined for the Avery Fuels Reduction Project Area. However the analysis area subwatersheds population conditions were based on relative abundance of fish caught or seen (number of fish and species per 100 feet of typical stream channel).

Non-Native Species:

Rainbow and brook trout were planted several times in the St. Joe River near the project area since the early 1900s. However this planting no longer occurs. No brook or rainbow trout have been found within any of the tributaries of the project area other than the main stem of the St. Joe River, where there have been occasional sightings by fishermen.

Streambank Condition

The drainages in the Avery Fuels Project Area have steep, transport-efficient channels (Montgomery-Buffington Cc, Ca, SP; Rosgen type A & B) and are unlikely to respond to minor management-induced changes in sediment and water yield. All named tributaries are perennial streams, while the smaller, unnamed tributaries are intermittent and ephemeral streams. Most of the drainages in the analysis area are relatively unaffected by roads and logging activities (roadless area within project area) and appear to represent natural conditions; the exceptions are Avery Creek and Roundhouse Gulch. The lower reach of Avery Creek, near its confluence with the St. Joe River, has been channelized into a culvert (~250 feet long) beneath a parking lot (note: underground culvert replaced September 2006). In Roundhouse Gulch, which is a non-fish-bearing stream, the channel is aggraded, likely due to historic harvest practices in addition to more recent harvest activities and extensive road building on privately managed land in the upper part of the drainage (SW-8 and *Watershed Resources* section).

Road building (FH 50 and 50A) along the north and south side of the St Joe River within the 300-foot RHCA buffer has caused the river channel to lose connection with its natural floodplain.

Streambank conditions and habitats are influenced by woody debris constrictions and local confinement, which typically produce scour pools and riffles. Stream bank conditions and degradation rates are quite variable in Avery Fuels Reduction Project Area. Historically, the greatest natural agent of disturbance to streambanks in the project area was wildfire. Fire history of the area is explained in detail in the *Fire and Fuels* section. The portion of the project area that lies north of the St. Joe River burned twice in the last century: once in 1910 and again in 1934. The portion of the project area south of the St. Joe River burned in the 1910 fire but did not burn again in 1934. The extent and severity of these fires has contributed to the existing vegetation and fuels conditions. Low existing down woody fuel loads within the some timbered portions of the project area may be evidence of this (*Fire and Fuels* section). However, the very moist riparian stands likely burned less often and less severely, due to their topographic position and fuel moisture conditions during most fire seasons. This has led the condition where stream bottoms have maintained a good supply of large woody debris and excellent aquatic habitat. In-stream woody debris and long-term periodic large woody debris recruitment is a key component to stable streambanks. Several small fires are documented on District fire maps but no other large fires are recorded within the analysis area. Therefore the ongoing fire-free period within these stands is 72 years north of the St. Joe River and 96 years to the south (*Fire and Fuels* section).

Peak Flows

The mean annual precipitation throughout the Avery Fuels Reduction Project Area is 38 inches, producing two-year peak streamflow (Q2.33) for all named tributaries in the analysis area between 13 and 123 cubic feet per second (cfs) (average 49 cfs) (Berenbrock 2002) (SW-5b). The two-year recurring peak flow is approximately representative of the average bankfull or channel-forming flow (Hortness and Berenbrock 2004). Regional data shows that peak flows with return intervals of 50 to 100 years can be three times higher than normal bankfull flows in the vicinity of the project area (SW-5b). In 1996, the St. Joe River experienced the third highest discharge in nearly 100 years of streamflow records at the Calder gauge station with peak discharges more than double normal conditions (SW-10). It is highly likely that the tributaries within the project area also experienced the same high discharge conditions as the St. Joe River in 1996 (*Watershed Resources* section).

Many peak flows in northern Idaho are associated with mid-winter rain-on-snow events and rain-on-spring-snow events with peaks that are usually higher and of shorter duration than normal spring high flows (MacDonald and Hoffman 1995). These types of peak events can be difficult to predict because their frequencies are random, and they do not occur on an annual basis. They are dependent on certain climatic conditions such as air temperature, snowpack characteristics, rain-on-snow elevations, and intensity and duration of precipitation (Berris and Harr 1987; Kappesser 1991). Although the bankfull flow tends to be the main channel-forming flow, these higher peakflows can induce considerable channel changes, particularly if they are accompanied by mass failures. However, the channels in the analysis area are not likely to be affected by any potential changes in water yield (*Watershed Resources* section).

Road Density

The St. Joe River Basin has a long history of logging and road building. The total road density for the middle and upper portion of the St. Joe River is "High" based on the 0.5 – 3.2 (mi/mi2) the figure given in the Assessment for the St. Joe River (1996 p. 17).

Road construction within the Avery Fuels Reduction Project Area has not been extensive compared to other areas within the St. Joe River Basin. Access to the Avery Creek Subwatershed and the Setzer Creek Subwatershed was used for forest management activities such as fire suppression and regeneration projects. On average there are approximately 1.8 miles of road per square mile within the project area, with the highest road density in the Avery Creek Subwatershed. The following table displays the road density ratings for the individual subwatersheds as well as the total road density for the entire project area (F-2).

Table 15 - Road Densities and Road Density Ratings for Project Area Subwatersheds

Area	Drainage Area (acres)	Total Road Density[1] (mi/mi^2)	Total Road Density[1] Rating	RHCA Road Density[2] (mi/mi^2)	Total RHCA Road Density[2] Rating
Avery Fuels Reduction Project Area[3]	12,740	1.8	High	.11	Low
Avery Creek Subwatershed	710	3.6	High	1.2	Moderate
Setzer Creek Subwatershed	2490	2.1	High	.19	Low
Storm Creek Subwatershed	3034	.32	Low	.02	Very Low
Rock Creek Subwatershed	2022	.04	Very Low	.006	Very Low

1) Density of road within drainage
2) Density of road within RHCA (INFS Buffer)
3) Entire project area including that outside the fisheries analysis area.

Chemical Contaminants/Nutrients

The State of Idaho designated the following beneficial uses for this reach of the St. Joe River: (1) domestic water supply, (2) salmonid spawning, (3) cold-water biota, (4) primary contact recreation, and (5) special resource water (IDAPA 58.01.02.110.11). All tributaries in the project area are undesignated surface waters; therefore, they are assigned beneficial uses of cold water aquatic life and primary or secondary contact recreation (IDAPA 58.01.02.101.01). Wildlife habitat (IDAPA 58.01.02.100.04) and aesthetics (IDAPA 58.01.02.100.05) are designated as beneficial uses of all waters of the state of Idaho. Consumptive use of surface water within the project area is primarily by wildlife. There are no identified point sources pollutants within the project area. An old petroleum spill was discovered while replacing an underground culvert at the Avery Work Center in September, 2006. Lab test results revealed a high level for diesel, but the potential pollutant had degraded to a point where no PAHs (polycyclic aromatic hydrocarbons) were detected (ACT-3, SW-27); therefore, it is not an existing point source pollutant. Furthermore the contaminated soil was removed from the area and disposed of (ACT-3).

IDEQ's 2002 Integrated 303(d) and 305(b) Report (IDEQ 2005) lists the middle St. Joe River assessment unit (from North Fork St. Joe River to St. Maries River) as impaired or not supporting assigned beneficial use due to temperature. None of the streams in the project area are listed for non-support due to sediment or other pollutants. The only activity in the project area since IDEQ's subbasin analysis was the construction of 0.1 mile of road (June 2000) connecting Road 3318 to Road 1934. Because the new section of road, which is outside the analysis area for fisheries, is along a ridgetop with no stream crossings and is unlikely to have any measurable effects that would impair or change support of existing beneficial uses.

Sediment

None of the streams in the project area are listed for non-support due to sediment or other pollutants. The only activity in the project area since IDEQ's subbasin analysis was the construction of 0.1 mile of road (June 2000) connecting Road 3318 to Road 1934. Because the new section of road is located along a ridgetop with no stream crossings, it is unlikely to have any measurable effects that would impair or change support of existing beneficial uses.

Surface Erosion Potential (SEP) is a rating of the relative susceptibility of exposed soils to sheet and rill erosion. None of the proposed activity areas exhibit high potential for surface erosion, and 99.5% of the acres are rated as low potential (*Watershed* section).

No areas within the proposed activity stands are rated high for Sub-Surface Erosion Potential (SSEP), which can occur when the soil material is exposed below the surface volcanic ash layer (*Soils* section).

Sediment Delivery Potential (SDP) is a rating of the probability of eroded soil reaching a stream channel. By using slope gradient, slope shape, and distance to channel, a rating of low, moderate or high potential is determined. Sediment yields are generally the highest during the first year following a fire and decline in subsequent years; however, the peak sediment delivery may be delayed a year or two if precipitation is below normal (Neary 2005). Of the proposed activity stands, 1,062 acres (27%) are rated as having high sediment delivery potential (*Soils* section). However the proposed action would not occur in those acres rated as having high sediment delivery potential.

Mass Failure Potential (MFP) is a rating of the relative probability of downslope movement of masses of soil material. These ratings consider slope gradient, slope dissection density, soil drainage characteristics, water input, soil texture and presence of mica. Removal of forest canopy and cover from either clearcutting or wildland fire increases landslide occurrence (Megahan and others 1978; Gray and Megahan 1981). This is primarily due to root decay, soil disturbance, increased snow accumulation and altered melting rates, and soil water increases from reduced interception and transpiration. Megahan and others (1978) found that landslide occurrence increased only slightly when overstory canopy was reduced from 100% to 11%, but increased dramatically when canopy closure went below 11%. They also found that crown cover from shrubs affected landslide occurrence after 80% crown removal and indicated that landslide occurrence is more sensitive to shrub removal than tree crown removal. In the project area there are 317 acres (8% of proposed activity acres) identified with high potential for mass failure: 314 acres within shrubfield stands (9% shrubfield acres within 7 stands) and 3 acres within the off-site ponderosa pine stands (1% OSPP acres in 1 stand) (*Soils* section).

Most of the root systems of trees and shrubs would remain intact and effectively provide slope stability while the vegetation reestablishes itself (generally within one to three years) (USDA 2003). The root strength would also help maintain evapotranspirational processes that remove excess soil moisture, consequently reducing mass wasting risks on individual sites. Landslide risk would also be minimized by avoiding ignition within streamside RHCA buffers (*Watershed Resources* section).

Temperature

Timber harvest can have negative effects to stream temperatures by reducing canopy and thus exposing channels to solar radiation (Chamberlin and others 1991). Temperature data does not exist for any of the streams found within the analysis area. Criteria for qualitatively assessing water temperature was based on the amount of riparian vegetation (shade component) present within the RHCAs and thus based on the amount of past riparian harvest or canopy removal. There is no record of past riparian harvest or canopy removal within the analysis area other than the trees removed to build Roads FH 50, FH 50A, 1934, 19934A, 3318 and 3318A (see Alternative B Map). Historically very moist riparian stands likely burned less often and less severely, due to their topographic position and fuel moisture conditions during most fire seasons. This has led to the condition where stream bottoms have maintained a good supply of large woody debris and riparian vegetation. Therefore because past fires were natural events and there has been minimal management within the riparian areas, stream temperatures within the subwatersheds are likely near reference conditions and are within the natural range of variably. However the segment of the St. Joe River within the analysis area has been subjected to many variables including past management that has likely elevated stream temperatures well beyond reference conditions. IDEQ's 2002 Integrated 303(d) and 305(b) Report (IDEQ 2005) lists the middle St. Joe River assessment unit (from North Fork St. Joe River to St. Maries River), which lumps all the mapped tributaries in the project area, as impaired or not supporting assigned beneficial use due to temperature. However no current temperature data for streams within the analysis area was used to develop this listing.

Physical Barriers

Waterfalls, channel flow intermittency, and some debris jams are part of the reference conditions that naturally and continually fragment aquatic habitats for various periods of time. In the Avery Fuels Reduction Project Area high gradient stream reaches in headwater locations are the predominant form of natural barriers. There are human-caused fish barriers in the Avery Fuels Reduction Project Area. They are:

- A human-created migration barrier on Rock Creek at the crossing of Forest Highway 50 (there may be passage at some water levels). A natural fish migration barrier is located 1200 feet upstream of the mouth. No fish were found above this point (F-2)
- A human-created migration barrier on Storm Creek at the crossing of FH 50 (F-2). This is a partial barrier that does not pass fish at low flows. There are several natural migration barriers (cascading bedrock falls) throughout the lower portion of this creek. Fish were found above these falls; therefore, they are likely resident fish.
- A human-created migration barrier on Setzer Creek at the crossing of FH 50 (there may be passage at some water levels) (F-2).
- A physical barrier exists at a concrete dam on Avery Creek located about 20 feet upstream from where Road 1934 first crosses the stream. This is likely a complete barrier. Electrofishing surveys found no fish above this structure (F-2).

Large Woody Debris

Salmonids generally require cool, clear water; clean gravel substrates; well-vegetated banks for shading and bank stability; abundant instream cover such as boulders, logs, and undercut banks; and unobstructed migratory corridors (Bjornn and Rieser 1991). Stream habitats are influenced by woody debris constrictions and local confinement, which typically produce scour pools and riffles. Information derived from qualitative stream reviews (2003-2006), indicates that large woody debris abundance in the Avery Fuels Reduction Project Area subwatershed analysis areas are near reference conditions. This is likely due to the lack of riparian harvest and because very moist riparian stands likely burned less often and less severely, due to their topographic position and fuel moisture conditions during most fire seasons. This has led the condition where stream bottoms have maintained a good supply of large woody debris and excellent aquatic habitat. The cumulative effects segment of St. Joe River has likely seen a large reduction from reference conditions in large woody debris due to extensive road building along the river corridor.

Individual Subwatershed Discussion and Limiting Factor Assessment

<u>Avery Creek</u>

Some commercial timber harvest has occurred within the project area in the Avery Creek Subwatershed. Previous activities included fire suppression, tree planting, four miles of road construction and the construction of a stream crossing at FH 50 where Avery Creek flows into the St. Joe River from the north. The town of Avery was built near the bottom end of the drainage.

Avery Creek drainage is approximately 0.06% of the St. Joe River drainage. Avery Creek is not listed as a high-value stream in the Forest Plan, and it is not listed as providing spawning and rearing habitat. However, westslope cutthroat trout were found in the lower reach of Avery Creek. It is likely that these fish are isolated from the main stem due to the physical barrier that exists at a concrete dam located about 20 feet upstream from where Road 1934 first crosses the stream. Avery Creek is approximately 1.5 miles long with several small, high gradient, perennial and intermittent non-fish-bearing tributaries totaling to about 2.3 miles of perennial and non-perennial stream in the drainage. The main channel is characterized as a Rosgen A type, high-moderate gradient (5-15% and up to 30% in the head walls) cascading/step pool stream with average bankfull width of 6 feet (F-2).

Fish Populations: Westslope cutthroat trout were found in the lower portion of Avery Creek during a 2004 electrofishing survey. It is believed that fish are present only in the lower 0.25 miles of Avery Creek due to the concrete dam barrier previously mentioned. No fish have been documented above this point. Fish numbers for this subwatershed are likely to remain at depressed levels due to the physical barrier and overall lack of good habitat i.e. high gradient morphology (15-30%), lack of substrate suitable for spawning and lack of pools for rearing (F-2).

Streambank Conditions: The lower reach of Avery Creek, near its confluence with the St. Joe River, has been channelized into a culvert (~250 feet long) beneath a parking lot.

Peak Flows: Water yield is not currently an issue in the Avery Creek Subwatershed (*Watershed Resources* section).

Road Density: Total road density for this subwatershed is considered "High" and "Moderate" within the RHCA (Table 15). There are four miles of road within the subwatershed.

Chemical Contaminants / Nutrients: There are no identified point source pollutants within the project area. An old petroleum spill was discovered while replacing the underground culvert at the Avery Work Center in September 2006. Lab test results revealed a high level for diesel, but the potential pollutant had degraded to a point where no PAHs (polycyclic aromatic hydrocarbons) were detected (*Watershed* section, ACT-3, SW-27); therefore, it is not an existing point source pollutant. The contaminated soil was removed from the area and disposed of (ACT-3).

Sediment: None of the streams in the project area are listed for non-support due to sediment or other pollutants (*Watershed Resources* section).

Steam Temperature: IDEQ's 2002 Integrated 303(d) and 305(b) Report (IDEQ, 2005) lists the middle St. Joe River assessment unit (from North Fork St. Joe River to St. Maries River), which lumps all the mapped tributaries in the project area, as impaired or not supporting assigned beneficial use due to temperature. However, no shade-reducing riparian harvest has occurred in the Avery Creek Subwatersehd therefore stream temperatures have not been altered from the historic range of variability (*Watershed Resources* section).

Habitat Access: It is likely that the fish that are present are isolated from the main stem due to the physical barrier that exists at a concrete dam located about 20 feet upstream from where Road 1934 first crosses the stream. Migration of fish over the dam is not possible.

Large Woody Debris: Although this subwatershed has good amounts of large woody debris present in-stream and for recruitment, the high gradient morphology and substrate of the stream channel is not indicative of excellent fish habitat (F-2). Large woody debris for this subwatershed is within the natural range of variability because there has been limited past management within riparian areas.

Summary: Based on the above information the following are limiting factors: 1) concrete dam migration barrier and 2) high road densities. The overall condition of the fish habitat in Avery Creek is considered to be *Adequate* because no more than two limiting factors are identified.

<u>Setzer Creek</u>

Setzer Creek Drainage is approximately 0.22% of the St. Joe River Drainage. Setzer Creek is not listed as a high-value stream in the Forest Plan, and it is not listed as providing spawning and rearing habitat. Although westslope cutthroat trout were found in a 2004 survey of Setzer Creek, it is likely that at low flows these fish are isolated from the main stem of the St Joe River due to the physical barrier that exists at FH50 were Setzer Creek flows into St Joe River. The main stem of Setzer Creek is approximately 2.3 miles long with several small, high-gradient, perennial and intermittent non-fish-bearing tributaries totaling to about 5.0 miles of stream in the drainage. The main channel is characterized as a Rosgan A-B high-moderate gradient (5-15% and up to 30% in the upper reaches) cascading/step pool stream with average bankfull width of 15 feet (F-2).

Fish Populations: Westslope cutthroat trout were found in the lower portion of Setzer Creek during a 2004 electrofishing survey (relative abundance). It is likely that at low flows these fish are isolated from the main stem due to the physical barrier at low flows. Fish numbers for this subwatershed are relatively good as 21 westslope cutthroat trout were caught in a 100 meter reach (F-2).

Streambank Conditions: Other than the road crossing and man-made migration barrier at FH 50 which is at the mouth of this stream, Setzer Creek has not been altered beyond the historic range of variability (*Watershed Resources* section).

Peak Flows: The watershed report identifies that water yield is not currently an issue in the Setzer Creek Subwatershed (*Watershed Resources* section).

Road Density: Total road density for this subwatershed is considered "High" (Table 15) because there are eight miles of road within the subwatershed. However, the majority of this road is near the ridge tops and not near the streams. RHCA road density is rated as low.

Chemical Contaminants/Nutrients: Chemical contaminants/nutrients are not an issue in this subwatershed (*Watershed* section).

Sediment: None of the streams in the project area are listed for non-support due to sediment or other pollutants (*Watershed* section).

Steam Temperature: IDEQ's 2002 Integrated 303(d) and 305(b) Report (IDEQ, 2005) lists the middle St. Joe River assessment unit (from North Fork St. Joe River to St. Maries River), which lumps all the mapped tributaries in the project area, as impaired or not supporting assigned beneficial use due to temperature. However no riparian harvest has occurred in the Setzer Creek Subwatershed therefore it has not been altered from the historic range of variability (*Watershed Resources* section).

Habitat Access: A human-created migration barrier occurs on Setzer Creek at the crossing of FH 50, although there may be passage at some water levels. Natural temporal migration barriers exist thought the drainage (F-2).

Large Woody Debris: Although this subwatershed has good amounts of LWD present in-stream and for recruitment, the high gradient morphology and substrate of the stream channel is not indicative of excellent fish habitat (F-2). Large woody debris for this subwatershed is within the natural range of variability because there has been limited past management within riparian areas.

Summary: Setzer Creek Subwatershed habitat elements are within the natural range of variability and have been relatively unchanged due to limited management within the riparian areas. Based on the above information the following are limiting factors: 1) culvert migration barrier (FH50), 2) high total road density. The overall condition of the fish habitat in Setzer Creek is considered to be *Adequate* because no more than two limiting factors were identified.

<u>Storm Creek</u>

Storm Creek drainage is approximately 0.27% of the St. Joe River Drainage. Storm Creek is not listed as a high-value stream in the Forest Plan, and it is not listed as providing spawning and rearing habitat. However, westslope cutthroat trout were found in a 2004 survey of Storm Creek. It is likely that these fish are isolated from the main stem at low flows due to the physical barrier that exists at FH50 were Storm Creek flows into St Joe River. The main stem of Storm Creek is approximately 2.8 miles long with several small, high-gradient, perennial and intermittent non-fish-bearing tributaries totaling to about 5.5 miles of stream in the drainage. The main channel is characterized as a Rosgen A-B high-gradient (5- 15% and up to 30 % in the upper reaches) cascading/step pool stream with average bankfull width of 15 feet (F-2).

Fish Populations: Westslope cutthroat trout were found in the lower portion of Storm Creek during a 2004 electrofishing survey. It is likely that these fish are isolated from the main stem due to the man-made physical barrier at FH 50 at low flows and the natural barriers that exist upstream from the mouth. Fish numbers for this subwatershed are relatively good as 20 westslope cutthroat trout were caught in a 100 meter reach upstream of the mouth (F-2).

Streambank Conditions: Other than the road crossing and man-made migration barrier at FH 50 which is at the mouth of this stream, Storm Creek has not been altered from its historic range of variability (*Watershed* section).

Peak Flows: The watershed report identifies that water yield is not currently an issue in the Storm Creek Subwatershed (*Watershed Resources* section).

Road Density: Total road density for this subwatershed is considered "low" and RHCA road density is rated as "Very Low" (Table 15). There are 1.5 miles of road within this subwatershed, and most of that is along the ridges.

Chemical Contaminants/Nutrients: Chemical contaminants/nutrients are not an issue in this subwatershed (*Watershed Resources* section).

Sediment: None of the streams in the project area are listed for non-support due to sediment or other pollutants (*Watershed* section).

Steam Temperature: IDEQ's 2002 Integrated 303(d) and 305(b) Report (IDEQ, 2005) lists the middle St. Joe River assessment unit (from North Fork St. Joe River to St. Maries River), which lumps all the mapped tributaries in the project area, as impaired or not supporting assigned beneficial use due to temperature. However, no riparian harvest has occurred in the Storm Creek Subwatershed; therefore it has not been altered from the historic range of variability (*Watershed Resources* section).

Habitat Access: A human-created migration barrier occurs on Storm Creek at the crossing of Forest Highway 50, but there may be passage at some water levels. A short distance upstream of this crossing is a natural migration barrier (F-2).

Large Woody Debris: Although this subwatershed is near reference condition with good amounts of LWD present and some pools, the high gradient morphology and substrate of the stream channel is not indicative of excellent fish habitat.

Summary: Storm Creek habitat elements are within the natural range of variability and have been relatively unchanged due to limited management. Based on the above information the culvert migration barrier (FH50) is the limiting factors. The overall condition of the fish habitat in Storm Creek is considered to be *Adequate*.

<u>Rock Creek</u>

Rock Creek drainage is approximately 0.18 % of the St. Joe River Drainage. Rock Creek is not listed as a high-value stream and it is not listed as providing spawning and rearing habitat in the Forest Plan. However, westslope cutthroat trout were found in the lower portion of Rock Creek during a 2004 electrofishing survey. It is likely that these fish are isolated from the main stem due to the physical human-made barrier (perched culvert) that exists at FH50 were Rock Creek flows into St Joe River. There is a natural fish barrier (8-foot cascade/falls) approximately 1200 feet upstream from the mouth. Rock Creek main stem is approximately 1.8 miles long with several small, high gradient, perennial and intermittent non-fish-bearing tributaries totaling to about 3.7 miles of stream in the drainage. The main channel is characterized as a small, high-gradient (5-15% and up to 30 % at the head walls), cascading/step pool stream (F-2).

Fish Populations: Westslope cutthroat trout were found in the lower portion of Rock Creek during a 2004 electrofishing survey. It is likely that these fish are isolated from the main stem due to the physical barrier at FH 50 during low flows the natural fish barrier (8-foot cascade/falls) approximately 1200 feet upstream from the mouth (no fish were caught above this point). Fish numbers for this subwatershed are likely at low levels due to the physical barriers because otherwise there is good habitat throughout the lower reaches of this drainage. Fish numbers for this subwatershed are seem to be relatively low as only 1 cutthroat was caught in a 100 meter reach about 200 meters upstream from the mouth (F-2).

Streambank Conditions: Rock Creek has not been altered from the historic range of variability (*Watershed Resources* section).

Peak Flows: Water yield is not currently an issue in the Rock Creek Drainage (*Watershed Resources* section).

Road Density: Total road density and RHCA road density for this subwatershed are both considered "very low" (Table 15).

Chemical Contaminants/Nutrients: Chemical contaminants/nutrients are not an issue in this subwatershed (*Watershed* section).

Sediment: None of the streams in the project area are listed for non-support due to sediment or other pollutants (*Watershed* section).

Steam Temperature: IDEQ's 2002 Integrated 303(d) and 305(b) Report (IDEQ, 2005) lists the middle St. Joe River assessment unit (from North Fork St. Joe River to St. Maries River), which lumps all the mapped tributaries in the project area, as impaired or not supporting assigned beneficial use due to temperature. However no riparian harvest has occurred in the Rock Creek Subwatersehd, therefore it has not been altered from the historic range of variability (*Watershed Resources* section).

Habitat Access: A human-created migration barrier occurs on Rock Creek at the crossing of Forest Highway 50, but fish may be able to pass this point at some water levels. A short distance upstream (approximately 1,200 feet) of this crossing is a natural migration barrier (F-2).

Large Woody Debris: Although this subwatershed is near reference condition with good amounts of LWD present and some pools, the high gradient morphology and substrate of the stream channel is not indicative of excellent fish habitat.

Summary: Rock Creek Subwatershed elements are within the natural range of variability and have been relatively unchanged due to limited management. Based on the above information the following are limiting factors for fish production in the Rock Creek Drainage: 1) culvert migration barrier (FH50) and 2) low numbers of fish. The overall condition of the fish habitat in Rock Creek is considered to be *Adequate* and would be considered unaltered if not for the human-made barrier at FH50.

St. Joe River

Human activity in the St. Joe River Drainage dates back 5,000 years. However in the early 1900s most of the landscape-changing activity began. The St. Joe River Basin has since experienced management such as logging, mining, road building, brook trout planting, fire suppression and grazing activities.

The segment of the St. Joe River analyzed for this project (from Slate Creek to Hoyt) is approximately 8 miles long and is a very small segment relative to the entire St. Joe River Basin. The St. Joe River is listed as a high-value stream in the Forest Plan, and it is listed as providing spawning and rearing habitat. Existence of westslope cutthroat trout and bull trout populations are well documented for the St Joe River. There are no known physical migration barriers on the main stem of the St Joe River. The St. Joe River basin above Slate Creek drains more than 500 square miles of stream, which includes the southern slopes of the St. Joe Mountains, the western slope of the Bitterroot Range, and the northern slopes of the Clearwater Mountains. Its main stem is over 100 miles long. The channel is characterized as a wide, moderate gradient (1-6%), riffle/pool morphology stream.

Fish Populations: Existence of westslope cutthroat trout (sensitive species) and bull trout (threatened species) populations are well documented for the St Joe River. There are no known physical migration barriers on the main stem of the St Joe River. However, basin-wide these fish are at depressed levels due to a long history of environmental impacts. Therefore, these fish have been listed as either "Threatened" or "Sensitive" species.

Streambank Conditions: Road building (FH 50 and 50A) along the north and south side of the St Joe River within the 300-foot RHCA buffer caused the river channel to lose connection with its natural floodplain. Streambanks of the St Joe River have undergone extensive changes due to basin-wide management. In some reaches width/depth ratios have increased while sinuosity has decreased. Off-channel habitats (side channels and barriers to tributaries) have likely been reduced from its natural condition. The St. Joe River is less likely to retain inputs of woody debris due to the changes in stream morphology and due to the fact that large woody debris is periodically removed to facilitate boater safety. Several of the St Joe River Drainage tributary streams and main stem stream segments are no longer in "dynamic equilibrium" due to extensive past management as well past flood and wildfire events (St Joe River Basin GA).

Peak Flows: Water yield is not currently an issue in the St. Joe River (*Watershed Resources* section).

Road Density: The total road density for the middle and upper portion of the St. Joe River ranges between "Low" and "High" based on the 0.5 – 3.2 (mi/mi^2) figure given in the assessment for the St. Joe River (1996 p. 17).

Stream Temperature: IDEQ's 2002 Integrated 303(d) and 305(b) Report (IDEQ, 2005) lists the middle St. Joe River Assessment Unit (from North Fork St. Joe River to St. Maries River) as impaired or not supporting assigned beneficial use due to temperature.

Chemical Contaminants/Nutrients: Contaminants/nutrients are not an issue in this stream segment (*Watershed Resources* section).

Sediment: This section of the St Joe River is not listed for non-support due to sediment or other pollutants (*Watershed Resources* section).

Habitat Access: There are no physical barriers on the main stem of the St. Joe River.

Large Woody Debris: The St. Joe River is less likely to retain inputs of woody debris due to the changes in stream morphology and the fact that large woody debris is periodically removed to facilitate boater safety. In-stream LWD exists at depressed levels and recruitment is limited due to Highway 50, the old river road, loss of floodplain, and periodic removal of large woody debris.

Habitat Access: There are no known physical migration barriers on the main stem of the St Joe River; however, several smaller tributaries flowing into the St. Joe have human-made barriers at the crossing of Forest Highway 50.

Summary: In general the 7.5 mile segment of the St. Joe River within the project area provides good fish habitat for adult and juvenile salmonids at certain times of the year. Migrating and resident salmonids found in the St Joe River system tend to spawn and rear in smaller stream segments and tributaries associated with clean, cold water, lower gradients, pool/riffle morphology, smaller gravel sizes and off channel habitat found in the upper St. Joe River Drainage during the spring and summer months. The larger St. Joe River main stem is thus more readily used by resident, fluvial and adfluvial salmonids for feeding and refugia in the deep, slow-moving pools and for migration to and from smaller streams during particular life stages.

Based on the above information the following are limiting factors: 1) tributary migration barriers, 2) riparian roads 3) temperature regimes, 4) low to high road densities, 5) below average large woody debris densities 6) "Sensitive" and "Threatened" fish populations. The overall condition of the fish habitat in the St. Joe River is considered to be *Moderately Altered/Moderate Risk*; therefore, fish habitat is considered to be *Moderately Altered* from the historic range of variability and/or moderate risk of further undesirable change.

Environmental Consequences

Table 16 lists the current and reasonably foreseeable activities common to all alternatives and provides a summary of the effects from the individual activities. Some of these activities are authorized by the Forest Service; others are general uses which do not require specific authorization. These activities and their effects were taken into consideration during the cumulative effects analysis. Past activities have previously been discussed.

Table 16 - Summary of Effects of Current and Reasonable Foreseeable Actions

Activity	Type of Potential Effect	Direct/Indirect Effects	Reference
Dispersed Camping	Alteration of streambanks and increased nutrient loading	Minimal	St. Joe River/NF Clearwater Basins BA, July 1998
Outfitter and Guides	Primarily associated to camping related effects and effects of stock use	Minimal	Outfitter Guide Programmatic BA, 2004, (project file)
Fire Suppression	Reduction of shading due to felling of hazard trees in RHCA, Chemical contamination	Minimal based on implementation of INFS Guidelines.	St. Joe River/NF Clearwater Basins BA, July, 1998
Gathering of miscellaneous forest products	Primarily due to influence of roads	Minimal based on implementation of INFS guidelines	Programmatic Road Maintenance BA, 2004 Determination: May affect, not likely to adversely affect.
Control of Noxious Weeds		No Effect	St. Joe Noxious Weeds EIS, Oct 1999
Road Maintenance	Increase sedimentation, temperature and chemical contamination, decrease in large woody debris	No Effect	Programmatic Road Maintenance BA, 2004 Bull Trout Determination: May affect, not likely to adversely affect.
Data Gathering		No Effect	No ground-disturbing activity
Trail Maintenance	Increase sedimentation, temperature and chemical contamination, decrease in large woody debris	No Effect	Programmatic Road Maintenance BA, 2004 Bull Trout Determination: May affect, not likely to adversely affect.
Helispot maintenance		Minimal Effect	Best management practices would be utilized.
Firewood cutting	Potential for reduction in LWD recruitment	Minimal	Firewood permit specifies no firewood cutting within 300 feet of a stream.

No Action (Alternative A)

Direct/Indirect Effects

In the No-Action Alternative, no new management-induced detrimental effects (direct or indirect) would occur in the fisheries analysis area; therefore, there would be no change to the existing channel conditions, beneficial uses and water yields (*Watershed Resources* section), habitat access, stream temperatures, fish populations, large woody debris, road densities and chemical contaminants/nutrients.

However, without the proposed thinning near Avery, risk for higher severity crown fires would continue (see *Fire and Fuels* section). A severe crown fire could indirectly modify the existing hydrologic condition of the watershed with increased runoff, erosion and sediment delivery to stream channels. Similar conditions can be expected in the off-site ponderosa pine stands currently at high risk for mortality. If left untreated, the dead trees could increase the risk of residual stand loss due to wildfire (Goheen and Hansen 1993; see *Fire and Fuels* section) and consequently could produce increased runoff and erosion rates. Stream temperatures could possibly increase and large woody debris could decrease if a high-severity fire burned through the riparian areas killing riparian vegetation and subsequently reducing the amount of shade and future large woody debris recruitment.

Additionally, the continued accumulation of dead and down fuel loads throughout the shrubfields could contribute to an increased potential for locally severe wildfire effects on the watershed conditions, indirectly resulting in a potential increase in erosion rates and sediment delivery to streams (*Watershed Resources* section and SW-12). In the event of a wildfire, the effects could range from negligible to severe, depending on location, size, severity of burn, and subsequent administrative activities. Due to the numerous variable conditions, post-fire effects on watershed conditions, and therefore fisheries, are difficult to predict and quantify.

Cumulative Effects

Overall, the cumulative effects of the No-Action Alternative would be the possible detrimental impacts to the existing fisheries resource and watershed conditions because future fires would be more severe with continued fire suppression and no treatment. In the event of another severe wildfire, effects of the No-Action Alternative would likely exceed the effects predicted for the proposed action (*Watershed Resources* section).

Alternative (B)

The direct, indirect and cumulative effects of the three proposed treatments (commercial thinning, off-site ponderosa pine treatment, and shrubfield burning) are discussed with respect to the (1) fish populations, (2) stream channel condition, (3) peak flows/water yield, (4) road densities, (5) chemical contaminants, (6) stream temperature, (7) habitat access, and (8) large woody debris. For this discussion the individual subwatersheds and stream segment analysis area are discussed together.

Fish Populations

Direct and Indirect Effects

Implementation of RHCA buffers on project activities would ensure that riparian areas and stream channels are not subjected to any direct effects from harvest or fuels treatment activities. Indirect effects would also be substantially moderated by the presence of these buffers as large woody debris would be retained aiding in stabilizing stream banks, reducing sediment delivery potential to streams, maintaining riparian shade, maintaining habitat-forming large woody debris and protecting fish habitat.

> *Timber Harvest:* Would not occur within the fisheries analysis area or within a subwatershed that contains fish.
>
> *Off-Site Ponderosa Pine:* No changes in fish populations are anticipated due to the offsite ponderosa pine treatment. As previously stated, the non-OSPP would be retained and would continue to mature providing stream shading and in-stream woody debris recruitment, which would maintain fish habitat.
>
> The proposal calls for falling of approximately 25 OSPP trees within the RHCA buffers along Avery Creek and two unnamed tributaries directly west of Avery Creek. This would not measurably, detrimentally affect the soil or water resources because the trees would be left onsite to retain nutrients and provide habitat, and their placement would be directed by a fisheries specialist (Chapter 2 Design Feature). Such a minimal reduction in canopy is not likely to alter the stream temperature because the ~25 trees within the RHCA are spread over approximately 60 acres (less than 1 tree per two acres). Furthermore, the removal of these off-site ponderosa would be beneficial to the long-term condition of the watershed by improving the overall stand health. Although OSPP trees would be felled within the RHCA buffer, burn activities would not occur within the RHCA.
>
> *Shrubfield Burning:* Ignition of shrubfields would not occur within the RHCAs. The proposed shrubfield burning is expected to have a low to moderate intensity with low soil temperatures, in part due to the timing of implementation and proposed design features of the burn. Therefore, the proposed action would reduce the overall risk of potential detrimental effects to the stream channel conditions (fish habitat) when compared to the potential effects of wildfire in the untreated Alternative A (*Watershed* section).

Cumulative Effects

Proposed Forest Service activities would not result in cumulative effects on tributary channels within the project area. Furthermore, there would be no cumulative effects on the St. Joe River due to the negligible effects the proposed management activities would have on its subbasins (*Watershed Resources* section). Stream channels within the project area are unlikely to be adversely affected by minor, short-term predicted

water and/or sediment yield increases (*Watershed Resources* section). Therefore, cumulative effects on fish populations are not anticipated.

Stream Channel Condition

Direct and Indirect Effects

Implementation of RHCA buffers on project activities would ensure that riparian areas and stream channels are not subjected to any direct effects from harvest or fuels treatment activities. Indirect effects would also be substantially moderated by the presence of these buffers as large woody debris would be retained which would aid in stabilizing stream banks and reduce sediment delivery potential (*Watershed Resources* section).

Timber Harvest: No timber harvest is proposed within the fisheries analysis area. With regard to Roundhouse Gulch, it is unlikely that any potential short-term peak flow increase from harvest activities (see *Water Yield /Peak Flows* below) would be sufficient to increase in-channel erosion or decrease existing pool volumes because the sediment supply would not likely exceed transport capacity (Montgomery and Buffington 1997). In reality, spring and mid-winter floods due to climate fluctuations (temperature and precipitation) are more likely to cause channel changes than the proposed management activities (*Watershed Resources* section).

Off-Site Ponderosa Pine: No changes in channel conditions are anticipated due to the off-site ponderosa pine treatment. As previously stated, the non-OSPP canopy would be retained and would continue to mature providing stream shading and in-stream woody debris recruitment, which would likely help stabilize the stream banks.

The proposed burning associated with this treatment would occur in stands with similar vegetation, topography, aspect, and soil landtypes as the shrubfield burning stands; therefore the effects would be similar as discussed below. Although OSPP trees would be felled within the RHCA buffer, burn activities would be buffered from the stream channels.

Shrubfield Burning: The proposed shrubfield burning is expected to have a low to moderate intensity with relatively low soil temperatures, in part due to the timing of implementation and proposed design features for burning. Therefore, the proposed action would reduce the overall risk of potential detrimental effects to the stream channel conditions when compared to the potential effects of wildfire in the untreated Alternative A (*Watershed Resources* section).

Cumulative Effects

Stream channels within the project area are primarily transport-type and are unlikely to be adversely affected by minor, short-term predicted water and/or sediment yield increases. Therefore, there are no anticipated cumulative effects on tributary channels within the project area from proposed Forest Service activities. Furthermore, there would be no cumulative effects on the St. Joe River due to the negligible effects the proposed management activities would have on its subbasins. Overall, it is anticipated that there would be no measurable direct, indirect or cumulative effects on the watershed condition within the Avery Fuels Reduction Project Area. In fact, the fuels and vegetative treatments would reduce the risk of severe wildfire effects on the watershed allowing the watershed to move towards a more natural fire regime. Consequently, this would provide a long-term benefit of reducing the risk of degradation of the watershed from potential increases in runoff and sediment delivery and would also reduce potential beneficial use impairment that would result from a wildfire (*Watershed Resources* section).

Water Yield / Peak Flows & Sediment

Direct and Indirect Effects

Overall, little to no changes are expected from rain-on-snow events, which typically occur between 2,500 feet and 4,500 feet in elevation (majority of project area) (*Watershed Resources* section, Kappesser 1991).

> *Timber Harvest:* Reduced crown cover would decrease interception and transpiration and could increase snow pack levels, evaporation and sublimation of snow. This could potentially result in increases in soil water retention and/or slightly increased water yields and peak flows in Roundhouse Gulch over the short-term. However, these effects are not likely due to the retention of ground cover and the increased stream buffer width, which would slow delivery and protect snow layers near the stream.

Any effects of water or sediment delivery from this small subbasin would be diluted by the much larger St. Joe River and would have no detectable consequences on water yield. Predictions based on the WEPP model results are essentially no change in runoff, erosion, and sediment delivery to the stream due to proposed harvest activities (Table 35).

Off-Site Ponderosa Pine: No changes in water yield are anticipated with the offsite ponderosa pine treatment due to the minimal change in vegetation and ground cover. The proposed burning associated with this treatment would occur in stands similar to the shrubfield burning stands; therefore the effects would be similar as discussed below. Although OSPP trees would be felled within the RHCA buffer; burn activities would be buffered from the stream channels, other species would be left, and trees would be planted; therefore, there should be no detectable impact on the water yield.

Shrubfield Burning: No long-term detectable changes in water yield above current conditions is expected as a result of proposed burning activities. Proposed stands selected for burning are currently classified as openings, and no further canopy reduction would be created. The WEPP model shows a 73% chance of a small increase in runoff of 0.08 inches within the first eighteen months following a low-severity burn, which is the expected condition for the prescribed burn (Table 35) (SW-14). Erosion and sediment values are also predicted to increase due to the prescribed burn activities, but the increase for the low severity burn would be less than the increase following a high-severity wildfire (Table 35). However, these possible small increases may produce small areas of localized, mass movement but would not significantly alter channel conditions of tributaries within the project area or of the St. Joe River due to RHCA buffers and the stream channel types (Rosgen A & B (1996); Montgomery and Buffington Cc, Ca and SP (1998)).

A high-severity fire, which is more likely if the project area is left untreated (No-Action Alternative), would increase water yields with recovery likely back to existing conditions within 20 years (Legleiter and others 2003). Furthermore, high-severity fires have a higher loss of protective cover and fire-induced soil repellency that can induce flooding and erosion after rain events (DeBano and others 2000; Neary and others 2005; Lavine and others 2006). In severely burned areas, high-intensity, short-duration rain events have increased peakflows from 2 to 2000 times (DeBano and others 2000; Neary and others 2005). The WEPP model shows runoff, erosion and sediment values for wildfires and high-severity burns roughly double the values predicted for low-severity prescribed burns in the activity area (Table 35). No long-term detectable changes in water yield above current conditions is expected as a result of proposed burning activities within the analysis area (*Watershed Resources* section).

Cumulative Effects

Overall, the cumulative effects on water yield from the proposed fuels and vegetative treatments could be less than the effects of the No-Action Alternative (*Watershed* section) which could have an increased risk of negative effects on fish and water conditions from higher intensity wildfire if one were to occur (*see Fire and Fuels* section). The streams in the project area have resilient channel types and high transport capacities (*Watershed Resources* section); therefore, in-stream effects from the potential small increases in water yields and peak flows due to management activities are expected to be inconsequential. No cumulative water yield effects are expected in the St. Joe River downstream of the project area due to the negligible effects on its tributaries (*Watershed Resources* section).

Road Densities

Direct and Indirect Effects

No new road construction would occur. Therefore there would be no change from the existing road densities within the analysis area.

Cumulative Effects

Project activities would not change road densities within the fisheries analysis areas. No new point sources of discharge would be created. Furthermore, the characteristics that resulted in the determination of support of beneficial uses (IDEQ 2003) for the St. Joe River and its tributaries would continue to be protected.

Stream Temperature

Direct and Indirect Effects

The proposed action is designed to maintain water quality and protect beneficial uses through proposed design features. The use of BMPs (with overall effectiveness for all BMPs expected to be high (Burroughs and King 1989; Lynch and Corbett 1989 and 1991; Seyedbagheri 1996; USDA 2002)) would minimize the direct and indirect effects to the watershed.

Timber Harvest: Would not occur within the fisheries analysis area or within a subwatershed that contains fish. For Roundhouse Gulch, the implementation of RHCA buffers would prevent any harvest activities near streams. This would preserve the potential for future woody debris recruitment to streams, minimize the potential to increase stream temperatures, and reduce the likelihood of sediment from proposed activities from reaching the stream channels, thereby preserving water quality. Additionally, the enhanced buffer of 300 feet would allow Roundhouse Gulch to move toward its target canopy cover and support of beneficial uses (*Watershed Resources* section).

Offsite Ponderosa Pine: The minimal loss in canopy (≤20%) is not likely to alter the stream temperature because only ~25 trees within the stream buffers would be removed (<1 tree per 2 acres), and trees would be planted within the RHCA. Furthermore, the felled trees would likely provide habitat for aquatic life and provide additional sediment traps if they are felled along the contour of the land. This could reduce the amount of sediment entering the streams, which would likely maintain and/or slightly improve the existing water quality and beneficial uses.

Shrubfield Burning: Stream buffers would prevent an increase in stream temperature so that the riparian overstory remains.

Cumulative Effects

No measurable effects from project activities are anticipated on water quality (temperature) or beneficial uses for any of the tributary watersheds or for the St. Joe River (*Watershed Resources* section). Furthermore, the characteristics that resulted in the determination of support of beneficial uses (IDEQ 2003) for the St. Joe River and its tributaries would continue to be protected.

Chemical Contaminants / Nutrients

Direct and Indirect Effects

The proposed action is designed to maintain water quality and protect beneficial uses (fish) through proposed design features. The use of BMPs would minimize the direct and indirect effects to the watershed. The overall effectiveness for all BMPs is expected to be high (Burroughs and King 1989; Lynch and Corbett 1989 and 1991; Seyedbagheri 1996; USDA 2002).

Timber Harvest: Would not occur within the fisheries analysis area or within a subwatershed that contains fish. The helicopter fueling site for the timber harvest would utilize an existing landing site along the St. Joe River (Avery lower landing) within the RHCA buffer because there are no other reasonable landing sites near the project area (PD-49). Provisions have been established in accordance with INFS recommendations to prevent fuel contamination into the ground and adjacent St. Joe River. BMPs and design features should prevent any type of fuel contamination; therefore, this activity would have no effect on the water quality. These BMPs include:

- PRACTICE 11.07 - Oil and Hazardous Substance Contingency Planning
- PRACTICE 11.11 - Petroleum Storage and Delivery Facilities and Management
- PRACTICE 15.11 - Servicing and Refueling of Equipment

Helicopter log transfer sites would be located on and adjacent to Road 3465 (approximately 6 acres). Pile burning is proposed at these sites; however, the road is located on a hilltop so no detrimental effects on water quality or beneficial uses are expected.

Off-Site Ponderosa Pine: No detrimental effects on water quality and beneficial uses are anticipated with the off-site ponderosa pine treatment as all trees would be felled by hand and left on site to retain nutrients (*see Soils* section).

Shrubfield Burning: Possible effects to water quality and quantity depend upon the extent and severity of the prescribed fire. Stream buffers would prevent an increase in stream temperature because the riparian overstory would remain. Minimum soil moisture levels prior to burning would

help ensure a low-severity burn which would allow for retention of roots and soil shear strength; therefore, reducing the potential for mass failure and debris torrents (see *Soils* section).

Cumulative Effects

No measurable effects from project activities are anticipated on water quality or beneficial uses (fish) for any of the tributary watersheds or for the St. Joe River. No new point sources of discharge would be created. Furthermore, the characteristics that resulted in the determination of support of beneficial uses (IDEQ 2003) for the St. Joe River and its tributaries would continue to be protected.

Habitat Access

Direct and Indirect Effects

There would be no change in the existing condition of habitat access within the analysis area with any alternative.

Cumulative Effects

Project activities would not change habitat access within the fisheries analysis area.

Large Woody Debris

Direct and Indirect Effects

Implementation of RHCA buffers on project activities would ensure that riparian areas and stream channels are not subjected to any direct effects from harvest or fuels treatment activities. Indirect effects would also be substantially moderated by the presence of these buffers as large woody debris would be retained aiding in stabilizing stream banks, reducing sediment delivery potential to streams, maintaining riparian shade, maintaining habitat forming LWD and protecting fish habitat.

Timber Harvest: Timber harvest would not occur within the analysis area or within a subwatershed that contains fish.

Off-Site Ponderosa Pine: No detrimental effects are anticipated due to the offsite ponderosa pine treatments. As previously stated, the non-OSPP would be retained and would continue to mature providing stream shading and in-stream woody debris recruitment which would maintain fish habitat.

The proposal calls for falling approximately 25 OSPP trees within the RHCA buffers along Avery Creek and two unnamed tributaries directly west of Avery Creek. This would not measurably, detrimentally affect the soil or water resources because the trees would be left onsite to retain nutrients and provide habitat (Watershed Report). Such a minimal reduction in canopy is not likely to alter the stream temperature because the ~25 trees within the RHCA are spread over approximately 60 acres (less than 1 tree per two acres). Furthermore, the removal of these off-site trees would be beneficial to the long-term condition of the watershed by improving the overall stand health. Although OSPP trees would be felled within the RHCA buffer, they would not be removed and their placement would be directed by a fisheries specialist and burn activities would not occur within the RHCA.

Shrubfield Burning: Ignition of shrubfields would not occur within the RHCAs. The proposed shrubfield burning is expected to have a low to moderate intensity with low burn soil temperatures, in part due to the timing of implementation and proposed design features of the burn. Therefore, the proposed action would reduce the overall risk of potential detrimental effects to LWD when compared to the potential effects of wildfire in the untreated Alternative A.

Cumulative Effects

No cumulative effects on large woody debris are anticipated within the project area from proposed Forest Service activities. Furthermore, there would be no cumulative effects on the St. Joe River due to the negligible effects the proposed management activities would have on its subbasins (*Watershed Resources* section). The overall fuels reduction action would reduce the risk of negative effects from a “high-severity” fire that could reduce the amount of large woody debris with riparian the areas.

Alternative C

Proposed activities in Alternative C would have the same effects as Alternative B with the exception of the sensitive landtypes within the shrubfield burning units (see *Soils* section), which would indirectly affect

watershed conditions. Alternative C would not include 475 acres of shrubfield stands with high potential for mass failure (MFP) in Rock Creek and Storm Creek drainages (*note:* 3 acres of high MFP remain in Alternative C because they occur in the OSPP treatment, which would not have any noticeable detrimental effect on the watershed). The exclusion of high mass failure potential acres in Alternative C is in accordance with INFS. The removal of these acres would reduce the total shrubfield acres to be burned to 3,022 and reduce the percent of activity within the individual drainage basins of Rock Creek from 31% to 25% and of Storm Creek from 49% to 39% (SW-5b) as compared to Alternative B.

Although the proposed treatment (Alternative B) is not expected to detrimentally reduce soil strength, Alternative C would not treat the shrubfield acres with high potential for mass failure. Therefore, Alternative C would have less potential for erosion and sediment delivery into the stream channels of Rock and Storm Creeks and could have reduced risk for detrimental effects on the water quality, stream channel conditions (*Watershed Resources* section), and fish habitat as compared to Alternative B. Overall, Alternative C has fewer risks to the watershed condition than Alternative B, although both alternatives have minimal potential for detrimental effects due to the proposed design features (*Watershed Resources* section).

Alternative C prescriptions for the off-site ponderosa pine treatment and the commercial thinning are the same as Alternative B and therefore, would have the same effects on the watershed condition, stream channel condition, water quality, beneficial uses, water yield (*Watershed Resources* section), large woody debris, fish populations, road density and chemical contaminants and nutrients.

Sensitive Species Biological Evaluation

Table 17 - Sensitive Wildlife Species Conclusion of Effects

Species	No Action (Alternative A)	Proposed Action (Alternative B)	Action Alternative (Alternative C)
Westslope Cutthroat Trout	No Impact	No Impact	No Impact

Regulatory Consistency

IPNF Forest Plan and INFS Guidelines

Fish Standards 1 and 2 (fry emergence) do not apply because the Forest Plan was amended to remove these standards.

Standard 3 lists streams to be managed as low access fishing streams. No streams in this project area are listed (Forest Plan II-30).

Standard 4 requires fish passage to suitable habitat areas by designing road crossings of streams to allow fish passage or removing in-stream migration barriers. Standard 4 would be met. No new road construction is proposed. The existing fish migration barriers are located where FH 50 crosses the stream. It is outside the scope of this proposal (not part of the purpose and need) to reconstruct FH 50. If funds become available for highway improvement projects culverts would be replaced based on District and Forest priorities.

Standard 5 states, “Utilize data from stream, river, and lake inventories to prepare fishery prescriptions that coordinate fishery resource needs with other resource activities. Pursue fish habitat improvement project to improve habitat carrying capacities on selected streams.” Standard 5 was met. The information contained in this report uses fisheries surveys to coordinate activities with other resources.

Standard 6 requires coordination of management activities with water resource concerns as described in MA 16, Appendix I, and Appendix O. Standard 6 was met with the review of the stream systems and the implementation of standards described in INFS.

Inland Native Fish Standards

INFS requires landslide-prone areas to be buffered. Alternative B includes prescribed burning on areas with high potential for mass failure (landslide-prone areas), so it would not comply with INFS standards for riparian habitat conservation areas (INFS A-5, A-6).

Alternative C does not include shrubfield burning on landslide-prone areas. The implementation of the Alternative C would comply with INFS standards (F-3).

NFMA Regulations

Alternatives A, B and C would meet NFMA requirements by maintaining and improving habitat of management indicator species (MIS): bull trout and westslope cutthroat trout. The alternatives would comply with NFMA by complying with the Forest Plan (see above and F-3). Viability of MIS would be maintained under all alternatives (F-3).

ESA Regulations

Alternatives A, B and C would not jeopardize the continued existence of bull trout, the listed species that historically was found in the project area. A biological assessment will be completed when an alternative is selected for implementation.

Executive Orders 11988 and 11990

Alternative B would not comply because shrubfield burning would occur on areas with high potential for mass failure. Alternative C would not damage wetlands, and riparian dependent resources such as the fishery would be protected through the implementation of INFS buffers. It does not include shrubfield burning on areas with high potential for mass failure.

Executive Order 12962

Alternatives A, B and C would maintain habitat and thus would not affect the fishery potential, which in turn would not reduce the potential for recreational fishing opportunities.

HERITAGE RESOURCES

(Project File Volume III, Section H)

Regulatory Framework

The Idaho Panhandle National Forests (IPNF) Forest Plan requires systematic heritage resource inventory prior to ground disturbing activities and the preservation of significant heritage resources in place whenever possible. The IPNF Forest Plan also requires consultation with the State Historic Preservation Officer to determine significance of historic properties. This site evaluation process is outlined in the Programmatic Agreement among the United States Department of Agriculture, Forest Service, Northern Region, The Advisory Council on Historic Preservation and, the Idaho State Historic Preservation Officer regarding Cultural Resources Management on Region 1 National Forests in the State of Idaho. This includes consultation with Native American groups to determine if sites of religious or cultural significance are in the area.

Affected Environment

A heritage resource investigation was conducted for this project, and three cultural properties were identified within the area of potential effect. A flyer announcing the February 12, 2005 public meeting was mailed to the Coeur d'Alene Tribe on January 18, 2005 (PI-5). The project was discussed with representatives of the Coeur d'Alene Tribe during meetings in March 2005 and March 2006 (PI-22, PI-25). A letter with updates about the project was mailed to the Coeur d'Alene Tribe on November 20, 2006 (PI-29). The Coeur d'Alene Tribe did not express concerns with the project.

Environmental Consequences

No Action

No direct, indirect or cumulative effects are expected with the No-Action Alternative.

Alternatives B and C

Implementing Alternative B or Alternative C would have no adverse effect on cultural properties because the project was designed to avoid significant effects to heritage resources (project file: H-1). No direct, indirect, or cumulative effects are expected to the heritage resources with implementation of Alternative B or Alternative C. No potentially significant effects were identified. The proposed activities complies with the National Historic Preservation Act. A timber sale contract provision for protection of heritage resources would be included in the timber sale contract to ensure protection of heritage sites should any be located during project implementation. Future federal activities would be surveyed and would comply with the National Historic Preservation Act.

INVENTORIED ROADLESS AREA

(Project File Volume III, Section RRT)

Analysis Area

The analysis area is the Avery Fuels Reduction Project Area. The project area south of the St. Joe River is not within an inventoried roadless area. The project area north of Highway 50 encompasses the Storm Creek Inventoried Roadless Area #I-144.

Affected Environment

The Storm Creek Inventoried Roadless Area #I-144 is the “backyard” for the rural town of Avery, Idaho. Open, maintained roads encircle the area with an additional road, the Trego Point Road, intruding three miles into the roadless area which falls within a year-long area restriction that prohibits the use of motorized vehicles off designated routes. The Forest Plan (Draft EIS, CC-233) describes this 8,200-acre roadless area as follows:

> Steep rugged slopes transected by several small drainages characterize the topography of this area. Elevation ranges from 2,400 to 5,700 feet with Dunn Peak, Storm Mountain and Flash Peak being the most prominent features. The entire area burned in 1910, creating a mosaic of brush fields and scattered timber. Reforestation efforts included planting what was considered to be “off-site” ponderosa pine. Natural stands of lodgepole and Douglas-fir also are present throughout the area. A major portion of the unit is brush field.

The recreational use is primarily dispersed in nature with hunting, berry picking, driving for pleasure and viewing scenery being popular. The access road provides a panoramic view of the entire roadless area There are several trails on the perimeter or within the area that receive moderate motorcycle use and light stock and hiker use.

Roadless attributes of natural integrity and apparent naturalness, solitude, semi-primitive recreation opportunities, unique features, manageability and special places were reviewed for this analysis.

Natural Integrity and Apparent Naturalness: Most people visiting the area feel that they are within a natural area. The steep topography of its three major drainages (Setzer, Rock and Storm Creeks) contributes to this feeling by isolating people from activity and development. Extensive shrubfields from the 1910 fire cover such large areas that periodic burning of some of these fields to maintain big game habitat appear to most people as a natural situation.

Recreational Opportunities: With the access so close to the town of Avery, this part of the National Forest is a very popular day-use area for picnicking, huckleberry picking, hunting and driving for pleasure. The perimeter roads and the Trego Road are used in this way. Forest Service system trails are mostly along the perimeter of the area (Dunn Peak, Cedar Creek & Cedar Mountain). These trails allow motorized use, and the primary user is likely the motorcyclist. There is also hiking and some stock use. There are other non-system trails that are used by the public within the area. Because of the dense brush, human use is concentrated on the roads and trails. Only the antler and big game hunters make many forays into the heart of this roadless area. Late summer and autumn are the highest use seasons for this area.

Solitude: The area offers limited opportunities for solitude. The deeply dissected topography, while providing screening between people, also tends to concentrate their use of the area to ridgetop trails or along the encircling roads. The access road provides a panoramic view of the entire roadless area. At no

place within this area is a person more that two miles from a road; even though topography may dictate a longer walk than that. Expanses of dense brush gives an appearance of openness from above while actually concealing many of the area's features.

Unique Features: The entire area was burned during the 1910 fire. The greatest number of casualties occurred in the 1910 fire when 28 people perished in the fire at the head of Storm Creek (Section 29, T46N, R5E). Cultural sites related to that event are known to exist within this roadless area.

Special places: Storm and Setzer Creeks are beautiful streams with waterfalls. Local people occasionally hike these streams from Forest Highway 50 up into the roadless area.

Manageability: Most of the area is on National Forest land and most of the boundary is readily definable with a road as boundary.

Environmental Consequences

No Action

There would be no effect to any inventoried roadless areas.

Alternatives B and C

The proposed alternatives include burning from 3,022 to 3,497 roadless acres of shrubfields with some scattered lodgepole pine, Douglas-fir and off-site ponderosa pine within the Storm Creek Roadless Area. Disturbance of soils and vegetation have a direct effect on the physical and biological attributes of an area. Burning the shrubfields would not comprise ground disturbance but the large burn acreage would have a noticeable visual effect for the first one to two years after burning.

Natural Integrity & Apparent Naturalness: The proposed shrubfield burning may be viewed by visitors in two ways: some may view it as completely natural and others may not. At any rate, the proposed burning would affect the natural appearance only while the foliage is in its burned or blackened state. This effect would be temporary and after the flush of brush the following spring, this management would be unnoticed.

Semi-Primitive Recreation Opportunities & Solitude: Recreation opportunities would remain unchanged except when burn operations are actually in progress. There may be restricted access and there would be noise from helicopters, trucks and other management operations. There would also be smoke from the burning. The sounds and smoke would be temporary. Access limitations could be ameliorated by using local notices and press releases. Most of the recreation use occurs during the fall so if burning was done during spring, the operations would affect fewer people. Any sense of solitude would be lost during the burn operations and could also change after the burn depending on how "open" the terrain looks afterwards. The brush will come back quickly but any forested area will take years to return.

Unique Features: The prescribed burning would not affect unique features in this area.

Special Places: Protection of riparian zones and the fish habitat in stream channels would ensure the maintenance of these special places in Setzer and Storm Creeks.

Manageability: The ability to manage the roadless boundaries of the area will remain the same.

NOXIOUS WEEDS

(Project File Volume I, Section B)

Regulatory Framework

Executive Order #13112 (February, 1999) directs federal agencies to "…prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause…" The National Forest Management Act (1976) has a goal of providing a diversity of plant and animal communities. The Idaho Panhandle National Forests, Forest Plan (USDA 1987) and Forest Service Manual (Chapter 2080, as amended, 1995) prioritize weed treatments and state that noxious weeds will be controlled with an integrated pest management approach. The State of Idaho also requires landowners to control weeds on their property under the Noxious Weed Act, Title 22, Chapter 24 Idaho Code.

Analysis Area

The geographic scope of analysis of direct, indirect, and cumulative effects for noxious weeds in this project is the Avery Fuels Reduction Project Area (approximately 12,800 acres). This is the largest area upon which a meaningful analysis can be done. Weed populations may expand beyond the project area boundary, but the extent to which this would occur within the time scale of the project is unknown. Many areas outside of the project area that would be suitable for weed colonization already have weeds.

Analysis Methods

The St. Joe Noxious Weed Project FEIS (USDA 1999) lists 34 undesirable species that can be targeted for treatment and their level of infestation on the St. Joe Ranger District (B-1). Disturbed areas often translate into potential weed habitat. Weed species are adept at colonizing recently disturbed areas particularly if light levels increase. Once established, species can grow and spread quickly and effectively exclude native vegetation from the site. Project activities vary in the extent to which they would result in disturbance. Both roads and trails may serve as corridors for weed travel. Activities on potential weed establishment and spread, the amount, duration and severity of ground disturbance, and the risk of weed colonization (includes proximity to existing weed populations, spread vectors, and susceptibility of the habitat) are examined to assess effects of project.

Affected Environment

Noxious weeds are plant species that have been officially designated by federal, state or county officials. The Federal Noxious Weed Act of 1974 defines a noxious weed as "a plant which is of foreign origin, is new to, or is not widely prevalent in the United States, and can directly or indirectly injure crops or other useful plants, livestock or the fish and wildlife resources of the United States, or the public health" (P.L. 93-629). The Idaho Noxious Weed Law definition is any exotic plant species that is established or that may be introduced in the State, which may render land unsuitable for agriculture, forestry, livestock, wildlife, or other beneficial uses and is further designated as either a State wide or County wide noxious weed (Idaho Code 24 Chapter 22). Both federal and state definitions pertain primarily to competition with commodity land uses, although, weeds also impact non-commodity resources such as water quality (Lacey and others 1989), wildlife (Rice and others 1997; Harris and Cranston 1979), rare species (Pimental and others 2005) and natural diversity (Forcella and Harvey 1983; Tyser and Key 1988; Williams 1997).

Historic Condition

Historically, it can be assumed that there were no noxious weeds within the project area. The weeds included in the St. Joe Noxious Weed Project FEIS (USDA 1999) for treatment on the St. Joe Ranger District originate in Europe and Asia. Before widespread human disturbance, travel and commerce, seed sources were not available for these plants. The first recorded sightings in Shoshone County of several currently established weed species on the St. Joe Ranger District Noxious Weed List (yellow toadflax and curly dock) date from the late 1890s (Noxious Weed List for the St. Joe Ranger District and the First Recorded Occurrence in Shoshone County:B-1). However, it is unknown when weeds first appeared in the project area. Prior to the 1900s, European settler activity was limited in the watershed. Within the analysis area, significant changes to the character of the watershed have occurred within the past century. These were primarily due to large-scale fires around the turn of the century, but also included timber harvest, road

building, and the introduction of exotic species. The fires of 1910 and 1934 radically changed the character of the area with regards to species and habitat composition, seral stage and soil condition.

Existing Condition

The St. Joe Geographic Assessment (USDA 1997) indicates that weeds within the project area are likely present in recently disturbed areas and roads. The full extent of weed infestations within the project area is unknown. Inventories within the area found spotted knapweed (*Centaurea biebersteinii*) and St. John's wort (*Hypericum perforatum)* to be the predominant weed species present. Other species present include meadow hawkweed (*Hieracium caespitosum*), Canada thistle (*Cirsium arvense*), houndstongue (*Cynoglossum officinale*), sulphur cinquefoil (*Potentilla recta*), and dalmation toadflax (*Linaria dalmatica*) (Noxious Weeds Surveys 2006: B-2). Weeds were most prolific along roadways in the lower elevations. However, surveys conducted for rare plants indicate that many of the shrubfields had weeds in openings, most frequently St. Johnswort. These sightings of weeds within stands were usually scattered. However, those stands adjacent to roads with dense concentrations of noxious weeds often had those same weeds as their predominant forb species for some distance into the stand (Rare Plant Survey Forms: B-3).

Weeds were treated in the project area manually and through herbicide spraying along roadsides in 2001-2006 (B-14). Biological control agents for spotted knapweed were released in 2003 and 2005 (B-15). Future weed treatments would be conducted in accordance with the St. Joe Noxious Weed Control FEIS (USDA 1999).

The St. Joe Geographic Assessment (GA) shows the project to be within the North Fork of the St. Joe-Loop Creek, Slate Creek, and Siwash-Fishhook Landscape Analysis Areas. The priority matrix in Appendix A (USDA 1997 p. 106E) identifies all three landscape analysis areas as being moderately altered from the historic reference value and having weeds present in recently disturbed areas, roads, and the river face. These areas are considered to have a moderate to low risk of further undesirable change without management. Management of existing weeds would focus on maintaining the current condition and limiting spread after disturbances.

Environmental Consequences

Alternative A (No-Action)

Direct and Indirect Effects

Under this alternative, no fuel reduction activities would take place. Potential exists for some weed colonization due to traffic in and out of the area, small scale disturbance from natural processes and established weeds in disturbed areas. Existing populations of weeds within the project area are expected to persist along roads and in open, disturbed areas due to more frequent disturbances and higher light levels than in forested stands. Here they would provide a seed bank for future weed infestations. Overall, weed populations are expected to remain static or may increase slightly.

Cumulative Effects

Cumulative effects are the result of past, present and future activities within the project area. Past activities including fire, road construction, trail construction, and timber harvest have likely contributed to the presence of noxious weeds in the area. Current and reasonably foreseeable activities within the project area consist primarily of public access and recreation, along with trail and road maintenance. While such actions may result in some ground disturbance, the scale is expected to be small and of short duration. In addition, any actions undertaken by the Forest Service have design features to minimize expansion of weed populations. It is expected that the small scale of activities, built in design features and the possibility of weed treatments would help to control the spread of noxious weeds. Cumulatively, the effect of all activities is expected to result in either static levels (because of the small scale and uncertainty of disturbance) or a slight increase in weed abundance within the area over time, especially if control methods are not employed.

Alternatives B and C

Direct and Indirect Effects

The direct effect of ground-disturbing activities on noxious weeds is to increase the area available for weed colonization. Indirect effects of project activities could be the possible establishment of new weed populations or the expansion of existing populations into newly disturbed areas. Effects associated with

weed population enlargement may include: declines in the palatability or abundance of wildlife and livestock forage (Rice and others 1997), declines in native plant diversity (Forcella and Harvey 1983; Tyser and Key 1988), reductions in the aesthetic value of the landscape, encroachment upon rare plant populations and their habitats, potential reductions in soil stability and subsequent increases in erosion (Lacey and others 1989), and an overall decline of ecosystem health.

The potential for the spread of existing noxious weeds and the introduction of new species exists for all alternatives. Established weed populations along right-of-ways and water courses on National Forest lands may provide a source of seeds for infestation. Existing populations of weeds may continue to spread due to seed transport by vehicular traffic, wildlife and other natural dispersal methods if available colonization sites are available. Design features would help to decrease this threat. Weed control activities within these areas would be scheduled as funding and other priorities allow. Weed control efforts are likely to occur along roads in the project area, but in all likelihood would not occur within stands due to access difficulties. Roadside populations contain the greatest density and greatest variety of weed species, while interior shrubfield stands generally have light or scattered population of predominantly St. Johnswort. Some stands adjacent to very weedy roads had abundant St. Johnswort and spotted knapweed. Without associated weed control methods, weed species may colonize post-disturbance areas.

Predicting the responses of weed populations following disturbance is difficult as it depends on a host of factors. Stands would be commercially thinned with helicopter logging. While helicopter harvest is expected to minimize ground-disturbance, the remaining canopy would be substantially reduced. The stands to be thinned are not weedy, and there would be a 300-500 foot buffer to the north of the units between the weeds along the old river road and the proposed thinning. The northern portions of the unit do abut areas that have abundant meadow hawkweed. Thinning would result in some ground disturbance and increased light levels which would provide opportunities for weed colonization.

Alternatives B and C differ in that 475 fewer acres of shrubfields would be burned in Alternative C. Shrubfield burning ideally results in the burning of the decadent above-ground shrub growth, leading to an increase in light levels reaching the ground. This effect is generally short-lived as by the next year shrubs regenerate and often have thicker growth than was present pre-burn. Portions of the off-site ponderosa pine treatments would be similar to the shrubfield treatments in that it would involve broadcast burning. However the majority of this treatment would result in small and localized decreases in canopy cover through partial slashing and/or jackpot burning.

The following discussion centers on spotted knapweed and St. Johnswort because these two species are by far the most abundant and widespread in the project area. Research has shown varying responses of St. Johnswort and spotted knapweed to fire (Zouhar 2001 and Zouhar 2004). A study done by Rice and Harrington (2005) on low severity spring burns in grassland habitats did not show an effect on weed abundances over three years. Weed species examined included spotted knapweed and St. Johnswort. A shorter term study found that St. Johnswort did increase following low-intensity burning of a seral brush community (Zouhar 2004). Other research has suggested fire stimulates germination and encourages the spread and establishment of St. Johnswort. However, St. Johnswort seedlings grow slowly and thus have low survival to maturity unless they have little competition from other species (Zouhar 2004). The native plant communities studied by Rice and Harrington did not show lasting effects to community composition following a spring burn. Initially bunchgrass did have suppressed growth following a prescribed burn at one site out of four, but this suppression was not observed in subsequent growing seasons or at other sites. Spotted knapweed population may increase after fire for the same reasons as St. Johnswort: increased light, decreased competition, and creation of bare soil patches. In one study, fall burning in a Douglas-fir/ninebark habitat resulted in a doubling of spotted knapweed volume after two years. At an adjacent site with no spotted knapweed initially, a spring burn of lesser intensity did not promote weed establishment. It was also found that shrubs recovered faster and grasses increased on the spring burn, whereas with the fall burn, the forbs recovered faster (Zouhar 2001).

Although it is impossible to say with certainty what effects these activities would have on weed populations, all activities do create conditions that favor weed expansion. Design features (Chapter 2, Design Feature 7) are expected to aid in the reduction of opportunities for weed colonization. In addition, while burning does initially reduce canopy cover, shrubs are not killed and their extensive root systems would continue to compete with weed species. St. Johnswort in particular is known to be a poor competitor against established vegetation. In those stands where weeds are currently the main forb, shrubfield burning activities are not expected to increase weed densities as weeds are currently occupying all available space.

Canopy would also be reduced in the off-site ponderosa pine treatment through the slashing of trees, but the density of the ponderosa pine within stands to be cut is low.

Cumulative Effects

Cumulative effects are the result of past, present and future activities within the project area. Past activities including fire, road construction, trail construction, and timber harvest have likely contributed to the presence of noxious weeds in the area. In addition to proposed project activities, other current and reasonably foreseeable activities within the project area consist primarily of public access and recreation, along with trail and road maintenance. Any ground disturbance to result from these additional actions is expected to be small in scale and short in duration. Design features are proposed (Chapter 2, Design Feature 7) to limit the spread of weed seed and establishment of new populations, but they cannot fully prevent expansion of weed populations. Weed control, as outlined in the St. Joe Noxious Weed Control EIS, may potentially occur and could reduce the extent of existing weed populations along roads and trails. It is highly unlikely that any populations within inaccessible stands would be treated, except through the expansion of biocontrol populations. Activities associated with this project may contribute to a net increase in weed populations within the project area. Alternative C would result in less ground disturbance than Alternative B and so provide less opportunity for increases in weeds.

Regulatory Consistency

National Forest Management Act and Forest Plan

According to the Idaho Panhandle Forest Plan (1987) direction, infestations of many noxious weed species, including spotted knapweed, meadow hawkweed, and goatweed are so widespread that control would require major programs that are not possible within expected budget levels (Forest Plan, p. II-7). Forest Plan direction is to "provide moderate control actions to prevent new weed species from becoming established. The provisions for minimizing weed spread in Chapter 2 would meet this goal. The No- Action Alternative would also meet the intent of the Forest Plan.

Executive Order #13112

Design features combined with past weed treatment and future weed control according to the St. Joe Noxious Weed Project EIS would work towards preventing the introduction of invasive species, providing for their control, and minimizing the economic, ecological, and human health impacts that invasive species cause.

State of Idaho Noxious Weed Act

The State of Idaho also requires landowners to control weeds on their property under the Noxious Weed Act, Title 22, Chapter 24 Idaho Code. Weed have been treated within the project area (B-4), and future weed control would be examined and implemented according to the St. Joe Noxious Weed Project EIS (Chapter 2 Design Feature 7).

OLD GROWTH

(Project File Volume III, Section OG)

Forest Plan Direction

Direction in the Forest Plan (page II-5) states that "Approximately 10 percent of the Forest will be maintained in old growth as needed to provide for viable populations of old growth dependent and management indicator species. To obtain the desired distribution, the IPNF will be managed to maintain approximately 5 percent of each old-growth unit as old growth where it exists." As part of a Forest-wide process the District(s) identified stands meeting old growth criteria. Stands were then allocated to old growth management to comply with Forest Plan standards.

The Forest Plan standards related to old growth are found in the Forest Plan (page II-29). Forest Plan standard *10a* incorporates the definitions of old growth developed by the Regional Old Growth Task Force, documented in *Old-Growth Forest Types of the Northern Region* (Green and others 2005). In compliance

with Forest Plan old growth standard *10a,* the validation process for the Avery Fuel Reduction Project used the definitions as outlined in this Regional old growth guide (OG-1).

Analysis Methods

The Avery Fuels Reduction Project Area includes four old growth management units (OGMU). Analysis of old growth was done on all of the OGMUs that are totally or partially within the project area (OG-2, OG-8). The old growth analysis area for the Avery Fuels Reduction Project partially includes the following OGMUs on the Avery Ranger District (02): OGMU 2; OGMU 3; OGMU 5; and OGMU 15.

The old growth validation process for the Avery Fuels Reduction Project is documented in the project file (OG-2). This validation process used the minimum criteria for each old growth type by appropriate habitat type group to validate whether stands meet the old growth criteria. The three stand characteristics used to display the minimum criteria are: (1) minimum age of large trees, (2) number of trees per acre equal to or greater than a given DBH level and age, and (3) minimum basal area of trees ≥5 inches d.b.h. (Green and others 2005: OG-1).

Stands are allocated for old growth if they meet the minimum criteria for old growth (Green and others 2005) or have the potential to meet minimum criteria some time in the future. The stands that currently meet the minimum criteria for old growth are tracked with a special use code of "9". Those that do not meet the minimum criteria but are expected to in the future and would create larger blocks, corridors, or logical old growth landscape management units are tracked with a special use code of "11". The stands proposed to be treated do not meet the minimum criteria for old growth and are not allocated for old growth management (OG-9).

Affected Environment

The proposed Avery Fuels Reduction Project is located partially within four OGMUs (2, 3, 5, 15). The current old growth allocation within the four OGMUs that make up the Avery Fuels Reduction Project Area are shown in the following table. No treatment is proposed in stands that are known to meet the minimum criteria for old growth or are allocated for old growth management.

Table 18 - Old Growth Management Unit Analysis Information

OGMU	Total size of OGMU (acres)	Acres Allocated for Old Growth Management in OGMU		% of OGMU Allocated for Old Growth Management
		Code 9	Code 11	
2	21,692	130	30	0.7%
3	9,284	0	0	0%
5	14,526	529	197	5.0%
15	18,100	738	703	8.0%

Forest Plan Consistency

Old growth standard 10a in the Forest Plan states: "A definition for old growth is being developed by the Regional Task Force and will be used by the Forest when completed." In compliance with Forest Plan old growth standard 10a, the definitions of old growth developed by the Regional Old Growth Task Force, documented in Old-Growth Forest Types of the Northern Region (Green and others 2005) have been incorporated into Forest Plan standard 10a and were used in the validation and analysis process of old growth in this project.

Old growth standard 10b in the Forest Plan directs that we "Maintain at least 10 percent of the forested portion of the IPNF as old growth." The Idaho Panhandle National Forest is meeting Forest Plan standards for old growth with 12.1% of forested acres to be retained as old growth, as disclosed on page 6 in the draft Old Growth chapter for the 2004 IPNF Forest Plan Monitoring Report (project file: OG-6).

Old growth standard 10c in the Forest Plan states: "Select and maintain at least five percent of the forested portion of those old-growth units that have five percent or more existing old growth." The proposed Avery Fuels Reduction Project is located partially within OGMU 2, 3, 5, and 15 (Avery, 02). See Table 18 above.

OGMU 5 and 15 both meet this Forest Plan standard, while OGMU 2 and OGMU 3 do not meet this standard, primarily due to the amount of shrubfields present in each of these OGMUs

Old growth standard 10d states: "Existing old-growth stands may be harvested when there is more than 5 percent in an old-growth unit, and the Forest total is more than 10 percent." Timber harvest is not proposed in either allocated old growth or in stands identified as meeting old growth criteria. All alternatives comply with old growth standard 10d.

Old growth standard 10e states: "Old growth stands should reflect approximately the same habitat type series distribution as found on the IPNF." Compliance with this Forest Plan standard is disclosed on pages 7-8 in the draft Old Growth chapter for the 2004 IPNF Forest Plan Monitoring Report (OG-6).

Old growth standard 10f describes desirable patch size stating: "One or more old-growth stands per old-growth unit should be 300 acres or larger…..The remaining old-growth management stands should be at least 25 acres in size. Preferred size is 80 plus acres." A map identifying old growth patches and a list of stands that make up each patch is included in the project file (OG-7). The table below shows patch sizes by OGMU.

Table 19 - Old Growth Patch Size

OGMU	# of Patches	Patch Size Range (acres)	# of Patches > or = 25 Acres	# of Patches > or = 80 Acres	# of Patches > or = 300 Acres
2	4	6-121	1	1	0
3	0	0	0	0	0
5	4	22-428	3	2	1
15	11	20-600	10	5	1

In OGMU 2 the allocated old growth occurs in four patches. These patches range in size from six to 121 acres. Within this OGMU there is one patch greater than 25 acres, and that patch is 121 acres. There are no patches greater than 300 acres. OGMU 2 is not in compliance with old growth standard 10f. No old growth is allocated in OGMU 3. OGMU 3 is not in compliance with old growth standard 10f. In OGMU 5 the allocated old growth occurs in four patches. These patches range in size from 22 to 428 acres. Three patches are greater than 25 acres, with two of those being greater than 80 acres in size. Of the patches greater than 80 acres, there is one patch greater than 300 acres. OGMU 5 complies with old growth standard 10f. In OGMU 15 the allocated old growth occurs in eleven patches. These patches range in size from 20 to 600 acres. Within this OGMU ten patches are greater than 25 acres, with five of those being greater than 80 acres in size. Of the patches greater than 80 acres, one patch is greater than 300 acres. OGMU 15 is in compliance with old growth standard 10f as discussed above.

Old growth standard 10g states: "Roads should be planned to avoid old-growth management stands to maintain unit size criteria." No system road or temp road construction is proposed with this proposal. All alternatives comply with old growth standard 10g.

Old growth standard 10h states: "Existing grazing allotments will be honored;…New allotments in old-growth will not be issued." There are no grazing allotments within this project area or within OGMU 2, 3, 5, or 15, and no new allotments are proposed. All alternatives comply with old growth standard 10h.

Old growth standard 10i states: "goals for lands to be managed as old-growth within those lands suitable for timber production are identified in the management area prescriptions." The Idaho Panhandle National Forest is meeting Forest Plan old growth standards for management area designation as disclosed on page 7 in the draft Old Growth chapter for the 2004 IPNF Forest Plan Monitoring Report (OG-6).

Environmental Consequences

No Action

Direct, Indirect and Cumulative Effects

There would be no direct/indirect and cumulative effects resulting from the No-Action Alternative on either existing allocated old growth or stands meeting old criteria. Forest Plan standards for old growth retention would continue to be met. Although OGMUs 2 and 3 do not currently have 5% allocated for old growth

management per OGMU, there would be no change to stands allocated for old growth and no change to stands meeting minimum criteria for old growth.

There would be no direct or indirect effects from current and reasonably foreseeable activities including weed control, road and trail maintenance, and public recreation (i.e. berry picking, hiking, hunting, wood gathering and similar activities). No cumulative effects on allocated old growth are expected as a result of these other activities.

Action Alternatives (B & C)

Direct, Indirect and Cumulative Effects

No road construction, timber harvest or other activities are proposed within allocated old growth or within stands meeting the minimum criteria for old growth (OG-9). There would be no direct/indirect or cumulative effects resulting from the action alternatives on either existing allocated old growth or stands meeting old growth criteria. Forest Plan standards for old growth retention would continue to be met. Although OGMUs 2 and 3 do not currently have 5% old growth per OGMU, there would be no change to stands allocated for old growth and no change to stands meeting minimum criteria for old growth.

There would be no direct or indirect effects from current and reasonably foreseeable activities including weed control, road and trail maintenance, and public recreation (i.e. berry picking, hiking, hunting, wood gathering and similar activities. No cumulative effects on allocated old growth are expected as a result of these other activities.

Forest Plan Consistency

As described above, the current conditions do not meet all specific goals, objectives and standards for old growth management as described in the Forest Plan on pages II-5 and II-29. However, the proposed actions would not affect any allocated old growth or any stands meeting the minimum criteria for old growth.

RARE PLANTS

(Project File Volume I, Section B)

Introduction

Ground-disturbing activities have the potential to impact Endangered, Threatened, Proposed, and Sensitive (TES) plants. Effects on population viability from disturbance events (natural or human-caused) are hard to quantify with certainty for all TES plant species and species of concern. Specific knowledge of population biology and species ecology is not yet known for several species, particularly the sensitive moonworts and certain orchids. Much of the current knowledge regarding TES plant species is based on observational and even anecdotal information. Literature and monitoring reports for several species, including deerfern (Blake and Ebrahimi 1992), Henderson's sedge and Constance's bittercress (Lichthardt 1998, Lichthardt 2000), clustered ladies slipper (Greenlee 1997), and Idaho barren strawberry (Crawford 1980) provide a greater understanding of the relationship of habitat disturbance to the integrity of species populations.

The risk of adverse effects on TES plants from activities varies with activity type, timing of activity, extent of activity, habitat suitability, and the species at risk. Plant surveys and mitigation measures are designed to protect populations and suitable habitat. Activities with effects that could lead to loss of population viability or trend toward federal listing would have the highest risks associated with them. Other activities may impact individual plants but are not likely to adversely affect population viability and as such are low to moderate risk activities. Small changes in the light regime, moisture levels, or moderate soil disturbance can impact individuals or populations of species dependent on specific successional habitats, soil fungi (mycorrhizae) associations, or canopy closure. Observations and monitoring information indicate that some activities may have little, or even positive, effect on some species such as deerfern (Blake and Ebrahimi 1992) and Constance's bittercress (Crawford 1980).

The purpose of this analysis is to determine if alternatives would adversely impact TES plants that may occur in the Avery Fuels Reduction Project Area, to insure that the alternatives do not contribute to loss of rare plant population viability, and to insure compliance with Forest Service and other federal policies. This

analysis discusses the current status and distribution of known rare plant populations and habitat within the analysis area and how planned activities can be expected to impact them.

Regulatory Framework

Protection of plant species deemed Threatened, Endangered, or Rare (Forest Service "sensitive") and protection for population viability is determined by federal legislation, regulations, policy, and direction. This regulatory framework includes the National Environmental Policy Act (1969); the Endangered Species Act (1973), as amended; the National Forest Management Act (1976); Forest Service Manual 2672.1 - 2672.43; Idaho Panhandle National Forests, Forest Plan (USDA 1987); and direction from the Washington Office and Regional Watershed, Wildlife, Fisheries, and Rare Plant program.

Analysis Area

The geographic scope of analysis for rare plant species in this project is the Avery Fuels Reduction Project proposed treatment areas (approximately 3,862 acres, all National Forest System lands). The geographic scope of potential effects (direct, indirect, and cumulative) is determined by a combination of factors including: activity areas, geographic location, the scope of the proposed action, resources and species which may be present, consequences and scope of effects, and the ability to measure effects. The scope of action and potential for adverse effects determine the extent of analysis necessary. This analysis considers short and long-term management as it may affect known or suspected populations of TES plant species as well as their potential habitat.

Temporally, the effects of proposed activities on rare plants or their habitat vary with activity. Small-scale activities with limited ground disturbance may result in brief effects. Large-scale activities may alter habitat characteristics: these effects may extend beyond the anticipated timing of activities.

Analysis Methods

Plant species can be assigned to one or more rare plant guilds, which are artificial groups based on similar habitat requirements and useful for the purpose of analysis (Mousseaux 1995). The St. Joe District's rare plant guilds are: Aquatic, Deciduous Riparian, Peatlands, Wet Forest, Moist Forest, Dry Forest, and Subalpine. Rock seeps and springs are another habitat that can support certain TES species, but they can occur across all guilds and are not identifiable at a coarse scale. A complete description of all guilds is located in the project file (B-5).

Based on current information regarding preferred habitat and successional state for species within the different guilds, the District Timber Stand Management Record System indicates the amount of highly suitable rare plant habitat that may be present in the project area. Potential habitat for *Silene spaldingii* is delineated using a GIS layer created from satellite imagery of reflectance patterns. This method reasonably identifies areas with grassland/forb communities. On the ground visits are used to verify habitat suitability should this method disclose the presence of potential *S. spaldingii* habitat. In addition, site specific information from timber stand examination records, aerial photographs, topographic position, existing habitat and survey information, personal knowledge and professional judgment were used in analysis. Evaluation of known sites for TES and species of concern (SOC) plants was accomplished using District Sensitive Plant Records and Idaho Department of Fish and Game Conservation Data Center (ICDC) Element Occurrence Records.

Regional direction (Leonard 1992) states that the need for and extent of field reconnaissance should be commensurate with the risk associated with the project and species involved, and the level of knowledge already in hand. Species presence is assumed for all highly suitable habitats and field surveys either validate or negate presence. Any occurrences that are deemed necessary to ensure species and population viability against a potential trend towards federal listing would be protected. The importance of a population is based on a variety of factors such as size of population, number of known sites, ranking, and sensitivity to disturbance. These practices are assumed to be an effective conservation strategy. Some isolated individuals or occurrences, not deemed critical to population viability, may be impacted by activities.

Affected Environment

Little is known regarding the historical occurrence, abundance, and distribution of rare plants and their habitats across the analysis area. An assessment of the forest ecosystem for the St. Joe Ranger District

estimated that over 20% of the geographic area had the potential to support plant species that are now of special concern (USDA 1997 Integration of Forest Planning into Ecosystem Management: Toward a Forest Ecosystem Approach: An Assessment for the St. Joe Area).

Historically, stand-replacing disturbance patterns in the St. Joe Sub-basin were large and dominated by wildfire (St. Joe Geographic Assessment pages 41-55, project file B-6). Severe fires occurred over the whole project area in 1910 and 1934. As a result, much of the area has been converted to shrubfields.

Existing Condition

The sub-basins of northern Idaho contain varied and diverse habitats and plant communities. Of the estimated 1,200 to 1,500 plant species known or thought to occur here, about ten percent are considered rare or uncommon. Approximately 3,400 acres of potential *Silene spaldingii* habitat were identified by a coarse filter within the project area (approximately 27% of the project area). Table 20 displays the amount of *S. spaldingii* habitat by alternative. Coarse filter queries (Project Area Rare Plant Habitat, project file B-7) of the TSMRS database indicate a total of approximately 2789 acres of high potential habitat within the project area boundary; 1741 acres of moist forest guild and 1048 acres of dry forest guild. This equates to about 22% of the project area. High potential wet forest, subalpine, deciduous riparian, aquatic, and peatland habitats do not occur within proposed activity areas (Maps of High Potential Habitat, B-8). The Avery Fuels Reduction Project Area is generally steep with incised drainages which limit the amount of wet forest habitat. Likewise, deciduous riparian communities, which are typically found at low elevations with broad riparian zones, are uncommon to non-existent within the project area. The general paucity of areas with mild topographic relief indicates that there are unlikely to be areas with the proper hydrologic conditions to support peatlands. A list of dry and moist forest species and their habitats (Habitat Information for Species in the Moist and Dry Forest Guilds, project file B-9) and a complete list of sensitive species and species of concern are included in the project file (B-10). Table 20 identifies acres of high potential habitat located in activity areas for all action alternatives.

The thinning units are comprised entirely of moist forest high potential habitat. The proposed off-site ponderosa pine treatment units contain moist forest, dry forest and *S. spaldingii* potential habitat. The proposed shrubfield treatments contain only *S. spaldingii* potential habitat (All Treatment Units and High Potential Rare Plant Habitat: B-11).

Table 20 - Total Acres of High Potential Habitat Affected in Each Action Alternative

Habitat	Alternative B			Alternative C		
	Thinning	Off-Site Ponderosa Pine	Shrubfield	Thinning	Off-Site Ponderosa Pine	Shrubfield
Moist Forest	112	70	-	112	70	-
Dry Forest	-	30	-	-	30	-
Silene spaldingii	-	115	1670	-	115	1437

One known site of the species of concern (*Mimulus clivicola*) is located within the project area; however, the population is not located within a proposed activity area. There are three other rare species (*Blechnum spicant*, *Cardamine constancei*, and *Dodecatheon dentatum*) located within one mile of the project boundary.

Surveys were conducted in high-potential habitat in 2005 and 2006 (B-3). One site of *Buxbaumia viridis* and one site of *Blechnum spicant* were discovered in portions of the thinning areas. These sites were subsequently dropped from the Avery Fuels Reduction proposal. Surveys of potential *Silene spaldingii* habitat showed that much of it was marginal, poor or non-existent. Although indicator bunchgrass species were found in some openings, the shrub and/or soil component, along with gradient served to make these areas unsuitable habitat for *S. spaldingii*.

Currently, vegetative conditions across the St. Joe Sub-basin are characterized by smaller patch sizes created by more uniform disturbances than would be found historically due to the predominance of human-caused disturbance regimes (USDA 1997, Integration of Forest Planning into Ecosystem Management: Toward a Forest Ecosystem Approach: An Assessment for the St. Joe Area). As a result, vegetative diversity and specialized habitats have declined over historic conditions. Riparian areas also suffer more severe and common disturbances resulting in major declines in natural plant communities and habitat complexity (USDA 1997). In the St. Joe Sub-basin, nearly 60% of riparian communities have experienced intensive habitat modification. Riparian communities that contained habitat for rare plant elements are

estimated to have declined by approximately 68% across the sub-basin, resulting in decreased geographic connectivity and isolation of rare plants.

Within the analysis area, significant changes to the character of the watershed have occurred within the past century. These were primarily due to large-scale fires around the turn of the century, but also included timber harvest, road building, and the introduction of exotic species. The fires of 1910 and 1934 changed the character of the area with regards to species and habitat composition, seral stage, and soil condition (see Vegetation Section). It can probably be safely assumed that the large-scale fires, resulted in a decrease in the amount of dry and moist forest habitat within the project area as timbered stands were converted to shrubfields.

Currently habitat types on the St. Joe Ranger District that have been heavily modified and/or are in short supply (dry forest w/ large trees, riparian and wet and moist forest habitats) compared to historical conditions are the same habitats where most rare plant species can be found. However, the majority of the remaining riparian and cedar wet and moist forest habitats to be found across the district are expected to remain stable due to protection requirements (St. Joe Geographic Assessment: B-6 p. 54). Stable trends are also predicted for subalpine habitats which have remained nearly intact. Although xeric sites are also predicted to remain stable, they are often highly vulnerable to noxious weed invasion.

Federally Listed Species

There are no known sites of federally listed plants on the IPNF. The USDI Fish and Wildlife Service indicates that two species listed as threatened might possibly occur within Shoshone County on the St. Joe Ranger District (USDI 2007). A threatened species is any that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Water howellia (*Howellia aquatilis*) and Spalding's catchfly (*Silene spaldingii*) could potentially occur on the St. Joe Ranger District. Suitable habitat is suspected, but to date, there are no documented citations of these species on the IPNF.

Water howellia (*Howellia aquatilis*) occurred historically on private land in the Idaho Panhandle but is believed to have been extirpated. It is an annual aquatic species restricted to small, seasonal, pothole ponds or the quiet water of abandoned river oxbows that dry up each season. Because of this restrictive habitat requirement, population numbers in a given year are directly influenced by the extent of pond drawdown at the end of the previous growing season (USDA 1994) and are susceptible to changes in hydrology and annual weather conditions.

Spalding's catchfly (*Silene spaldingii*) is suspected to occur in the IPNF. Its habitat is in dry grassland habitats and grassland inclusions in ponderosa pine and Douglas-fir forest.

More complete descriptions of these two species can be found in the project file (Species Descriptions for Federally Listed Threatened Species with Potential to be Found on the St. Joe Ranger District, B-13).

Sensitive Plant Species

Sensitive species, as determined by the Regional Forester (USDA 2004), are those for which population viability is a concern. This can be indicated by a current or predicted downward trend in population numbers or suitable habitat, which would reduce the species' existing distribution. Twenty-four of these species are known or thought to occur on the St. Joe Ranger District (St. Joe Threatened, Endangered and Sensitive Plants, project file B-10). There are no known sensitive species within the project area. Outside of the project area, but within one mile of the project boundary, there are occurrences of deer fern (*Blechnum spicant*) and Constance's cardamine (*Cardamine constancei*) (ICDC 2006). Additional information on these species is located in the project file (Habitat Information for Species in the Moist and Dry Forest Guilds, project file B-9).

Species of Concern

Along with threatened, endangered, and sensitive plants, the IPNF also tracks 23 Forest Species of Concern. Those species in the Moist Forest and Wet Forest Guilds have the potential to be within the project area (B-10). These species are considered to be secure at the global, regional, and state levels, but may be at risk at the Forest level. While biological evaluations are not required to address species of concern, they are addressed in effects analysis. There is one site of bank monkeyflower *(Mimulus clivicola*) within the project area boundary. White-flowered shooting star (*Dodecatheon dentatum*) occurs outside of the project area, but within one mile of the project boundary (ICDC 2006).

Environmental Consequences

Alternative A

Direct, Indirect and Cumulative Effects

There would be no known direct effects of the No-Action Alternative to rare plants.

There would be no impact to species of the Aquatic, Deciduous Riparian, Peatland, Wet Forest and Subalpine Rare Plant Guilds because they are not present in the project area. Indirect effects of Alternative A could result from an increased risk to rare plants and habitat due to an increase in fuel loads over time. The increase in ignition risk and resulting fires would have an array of effects on rare plant species, ranging from beneficial to detrimental, depending on factors like fire intensity, the ability of the species to survive the event, and competition in early successional habitat. The ability to analyze these effects for all sensitive plant species is limited given our current knowledge.

A few rare plant species inhabit earlier seral habitats established by fire within the last 50 years, or in habitats that likely had frequent historical fires. It appears that these species are at least tolerant of more open forest conditions, and natural disturbance events such as fire. Species like Idaho barren strawberry, western star flower, and Constance's bittercress are known to be in more open, mesic forest habitats that may have experienced recent disturbance (Crawford 1980). Indications are that survival of Constance's bittercress after fire may be dependent on the availability of moist microsites.

Dry, open forest habitats historically have had a higher fire frequency of non-stand replacing fires, than the moist and wet habitats. Species found within these habitats may therefore have higher survival rates following fire activity.

Clustered lady's slipper can be found in drier habitats that historically experience a more frequent fire regime. This species is, however, threatened from high intensity wildfire that removes the duff layer. Such fire activity has been documented to extirpate populations of clustered lady's slipper, however, individual plants survived areas that experienced low to moderate intensity fire (Greenlee 1997). It was noted that reproduction for this orchid following these events was reduced.

All the other moist forest and dry forest guild species have populations in mid and later successional habitats, preferring more closed canopy conditions. Some of these species such as moonworts and clustered lady's slipper orchid have factors like obligate soil mycorrhizae relationships that are likely to be affected by increased light (canopy reduction) and moderate to intense (duff replacing) fires. Stand-replacing fires were an important part of ecosystem processes in northern Idaho prior to the beginning of suppression efforts in the 1930s. While not much is known about the historic condition of rare plant communities, it is evident that with the decrease in the quality and amount of highly suitable habitats and the increase in fragmentation due to human activities, the ability of rare plants to re-colonize following disturbance has been reduced.

Species like maidenhair spleenwort and chickweed monkeyflower, which are found in seasonally moist moss mats and rock seeps are not likely to be affected by stand-replacing fires as their habitat is generally devoid of fuels that can carry a fire.

Under Alternative A, susceptibility of the landscape to high-intensity, stand-replacing wildfire may increase due to increased fuel loading. Such fires would have a detrimental effect on most Threatened, Endangered and Sensitive species in the moist forest guilds as few species are adapted to these types of events. However, the time scale of such events is unpredictable. Therefore, for listed species, this alternative would have no effect, and for sensitive plant species this alternative would have no impact.

Cumulative Effects

The cumulative effects area for TES plants and highly suitable habitat was determined to be the project area. Past activities including fire, road construction, trail construction, and timber harvest have likely affected rare plant habitat. Cumulatively, the effects resulting from all activities within the project area would not have a negative effect on rare plants or their habitats. Reasonably foreseeable activities within the project area consist primarily of public access and recreation, along with trail and road maintenance. None of these activities is expected to result in the degree of ground disturbance that would imperil rare plant populations.

Alternatives B and C

Direct and Indirect Effects

Alternatives B and C differ only in that 475 fewer acres of shrubfields would be burned in Alternative C. Of the 475 acres, just under half were deemed potential habitat by pre-field surveys. Project activity areas with high potential moist forest, dry forest, and *S. spaldingii* habitat were surveyed in 2005 and 2006. Potential habitat for *S. spaldingii* was generally found to be poor or marginal at best and no *S. spaldingii* plants were found.

Indirect effects to rare plants from Alternatives B and C could result from encroachment of noxious weeds into rare plant habitat. This potential is lesser in Alternative C because fewer acres would be burned. Much of the project area is inaccessible and would not likely receive weed treatments. However, ground disturbance would not occur in the immediate vicinity of any known rare plant site.

There would be no impact to species of the Aquatic, Deciduous Riparian, Peatland, and Subalpine Rare Plant Guilds because they are not present in the project area. Surveys revealed no species of the moist or dry forest guilds within proposed activity areas (B-3). Therefore there would be no impact to the species of those guilds.

Alternatives B and C would have no effect on *Silene spaldingii* or *Howellia aquatilis*. Surveys conducted in the summer of 2005 and 2006 revealed no habitat or presence of plants within proposed activity areas (B-3).

Cumulative Effects

The cumulative effects area for TES plants and highly suitable habitat was determined to be the project area. Past activities including fire, road construction, trail construction, and timber harvest have likely affected rare plant habitat. Cumulatively, the effects resulting from all activities within the project area would not have a negative effect on rare plants or their habitats. Project activities would not occur in areas with rare plants. In addition, surveys have shown that most of the potential habitat within proposed activity areas is poor to marginal at best. Reasonably foreseeable activities within the project area consist primarily of

public access and recreation, along with trail and road maintenance. None of these activities is expected to result in the degree of ground disturbance that would imperil rare plant populations.

The cumulative effects to TES plants would be very similar in Alternatives B and C. Because of the poor quality of *S. spaldingii* habitat within the shrubfield units and the absence of rare plants, the 475 fewer acres that would be burned in Alternative C should have no significant impacts on *S. spaldingii*.

Regulatory Consistency

Forest Plan

The Forest Plan states one management goal as "manage habitat to maintain populations of identified sensitive species of animals and plants" (Forest Plan, II-1). A Forest Plan standard for sensitive species is to "manage the habitat of species listed on the Regional Sensitive Species List to prevent further declines in populations which could lead to Federal listing under the Endangered Species Act" (Forest Plan, II-28). The Forest Plan also identifies the need to "Determine the status and distribution of Threatened, Endangered, and Rare (sensitive) plants on the IPNF" (Forest Plan, II-18). All of the proposed alternatives would meet the intent of the Forest Plan.

Other Laws

All alternatives would also meet the intent of the Endangered Species Act and the National Forest Management Act.

RECREATION

(Project File Volume III, Section RRT)

Analysis Area

The geographic scope for analysis of the recreation resources is the project area.

Analysis Methods

The Recreation Opportunity Spectrum was reviewed to determine the classification of the analysis area. The ROS setting indicators are access, remoteness, size, visual characteristics, site management, visitor management, social encounters and visitor impacts (Project Planning ROS Users Guide Chapter 60, USFS, 1987). Because proposed activities would not change any of current ROS setting indicators, this tool was not used for effects analysis.

An overview of recreational use was developed through first-hand knowledge from recreation personnel, on-site visits by the interdisciplinary team (IDT), and public input. This recreation analysis is subjective and evaluates the recreational experience using roadless attributes to evaluate the dispersed use and use of trails within or bordering the project area. The analysis period for the project is 10 years.

Forest Plan

Recreation Goals as identified in the Forest Plan pages II-I & 2 include:

1. Provide for the projected use of developed recreation areas. Complete the development of new sites as budget becomes available.
2. Provide for a variety of dispersed recreation opportunities.
3. Provide opportunities for people to be involved in Forest management activities and supply information enabling visitors to better enjoy National Forest lands.
4. Manage special areas for the unique qualities that precipitated their designation: i.e., Wild and Scenic Rivers, Scenic Areas, Botanical Areas, etc.

Recreation Objectives and Standards identified in the Forest Plan pages II-3 and 24 indicate, in part, that the Forest will continue to provide a share of outdoor recreation needs in relation to other public and private entities, provide for the projected use of developed recreation areas with development of new sites as budget becomes available, to provide for a variety of dispersed recreation opportunities, to pursue opportunities to increase and improve the recreation trail system, and to continue and increase cooperative trail programs with organizations, clubs, and other public agencies. Forest Service recreation programs will strive to be complementary with other public and private programs. Off-site interpretation and environmental education will be encouraged. Recreation planning and operations will be coordinated with other federal, state, local, and private recreation managers.

The project area is also designated in the IPNF Forest Plan as primarily Management Areas 1, 4 and 5 (MA1, MA4, MA5). This management area direction for recreation is as follows:

> MA1 and MA4: Manage primarily for roaded modified and roaded natural ROS classes. Maintain a diversity of recreation opportunities.
>
> MA4 and MA5: Manage toward roaded natural and semi-primitive ROS experience. Motorized use is generally restricted to designated routes. Within critical habitat components motorized recreation use may be restricted to provide needed wildlife security.

Affected Environment

Please see Inventoried Roadless Area above for discussion on solitude and special places for the project area on the north side of the St. Joe River. The project area also includes some National Forest System land on the south side of the St. Joe River. This is very steep forested ground dissected by Kelly Creek, Theriault Creek, Roundhouse Gulch and Fishhook Creek drainages. This area is primarily used during the fall hunting seasons. Hunters and local people are the primary users of the Roundhouse Gulch hiking trail (see below).

A number of Forest Service system trails are on the perimeter of this project area north of the St. Joe River: Dunn Peak Trail 58, Cedar Mountain Trail 9 and Cedar Creek Trail 4. The system trails allow single-track motorized use and motorcyclists are the primary users.

There are also a number of non-system trails within the project area. These are often remnants of historic trails and are used for local access by hunters, berry pickers and other visitors.

Roundhouse Gulch Trail 520 is the only Forest Service system trail in the project area on the south side of the St. Joe River. It is a short, 1.5-mile trail along Roundhouse Gulch that accommodates hikers. Hunters and local people are the primary users of this trail.

Environmental Consequences

Direct and Indirect Effects

On the north side of the river, the proposed activities include from 3022 to 3497 acres of broadcast burning. On the south side of the river, the proposed activities include approximately 112 acres of tree thinning and landing slash piling and burning.

The Dunn Peak trail will likely be used as a fire line. The fire crew may do some brushing along this trail but otherwise the trail is adequate for this purpose. Brushing the trail would be beneficial. Trails 4 and 9 will not be directly affected. There may be debris and trees that fall across the Dunn Peak trail and the non-system trails north of the river. Design features require that Dunn Peak trail is cleared after burning. The non-system trails may be impacted by falling debris and trees. Currently, people using these trees either detour around debris or cut out the trail themselves. There would likely be more debris than on a normal year on these trails.

There may be limited access to all of the trails during burning activities. There would be noise from helicopters, trucks etc. and smoke from the burning.

Summary for brush field burning: There would be no effect to system trails on the perimeter of the area provided that the trails themselves are protected and cleared after burning if there is falling debris. The non-system local access trails will likely have more debris than is normal for people to negotiate.

Summary for timber harvest and clearing: The proposed activities on the south side of the river include tree harvesting in Roundhouse Gulch near the town of Avery. Trees would be thinned and pruned, shrubs

removed and slash piled and burned. The trees would be thinned using helicopters. This area is in the town of Avery's back yard. There will be noise, smoke and related activities. Because the Roundhouse Gulch trail follows Roundhouse Gulch, riparian buffers will protect the trail way and tread and the timber sale contract normally includes a provision requiring protection of facilities in the area. There would be some restricted access to the trail while management activities are ongoing. If mitigation measures (clearing the trail after activities) are followed, effects to this trail would be minimal.

Cumulative Effects

There would be no cumulative effects to the recreation opportunities or trails from the proposed activities.

Forest Plan Consistency

Proposed activities would not affect the ROS setting and the predominating dispersed use would remain the same. These standards would be met for recreation and trails resources.

SOILS

(Project File Volume III, Section SW)

Introduction

A productive soil can sustain biological productivity, maintain environmental quality, and promote plant and animal health. The Healthy Forest Restoration Act (HFRA) was enacted to restore healthy forests and reduce wildfire risk. While wildfire has the potential to severely damage forest resources including soils, activities pursued under the auspice of HFRA also have the potential to negatively affect soil productivity. The purpose of this report is to investigate and disclose the potential effects of the proposed actions on soil resources.

Regulatory Framework

The Multiple Use-Sustained Yield Act of 1960

The Multiple Use-Sustained Yield Act of 1960 directs the Forest Service to achieve and maintain outputs of various renewable resources in perpetuity without permanent impairment of the land's productivity.

The National Forest Management Act of 1976 (NFMA)

Section 6 of the National Forest Management Act of 1976 (NFMA) charges the Secretary of Agriculture with ensuring research and continuous monitoring of each management system to safeguard the land's productivity.

The Code of Federal Regulations for Forest Planning (36 CFR 219.6)

The Code of Federal Regulations for Forest Planning that followed NFMA requires the Forest Service to measure effects of prescriptions, including “significant changes in land productivity” (Code of Federal Regulations 36, CFR Part 219.6, 2005).

IPNF Forest Plan & Regional Soil Quality Standards

In an effort to imply the most stringent standard, both Forest Plan and Regional Standards were incorporated into the analysis of this project. Management activities on Idaho Panhandle National Forests (IPNF) lands would not significantly impair the long-term productivity of the soil or produce unacceptable levels of sedimentation resulting from soil erosion. This would be accomplished using technical guidelines developed in conjunction with the soil survey and Best Management Practices (BMPs) necessary to protect soil productivity and minimize sedimentation. Specific standards and guidelines for Management Areas 1, 4, 5, 6 and 9 are presented in the IPNF Forest Plan (USDA, 1987). The Forest Plan (p. II-32-II-33) directs the following standards for the soil resources on National Forest System lands:

(i) Soil disturbing management practices would strive to maintain at least 80% of the activity area in a condition of acceptable productivity potential for trees and other managed vegetation. Unacceptable productivity potential exists when the soil has been detrimentally compacted, displaced, or severely burned, as determined in the project analysis.

Note: The Region 1 manual direction (2554.03 – R1 Suppl. 2500-99-1) for Soil Detrimental Impacts recommends maintaining 85% of an activity area’s soils at an acceptable productivity potential with respect to detrimental impacts (SW-16). This recommendation is based on research indicating that a decline in productivity would have to be at least 15% to be detectable (Powers 1990a). In areas where more than 15% detrimental soil conditions exists from prior activities, the cumulative detrimental effects from project implementation and restoration should not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality. These standards do not apply to intensively developed sites such as permanent (system) roads/landings, mines, developed recreation and administrative sites.

(ii) Projects should strive to maintain sufficient large woody debris to maintain site productivity. Large woody debris is essential for maintenance of sufficient microorganism populations.

Note: The Region 1 manual direction for organic matter recommends that management of coarse woody debris (CWD) follow guidelines such as those contained in Graham et al. (1994) to maintain healthy soil physical and biological conditions (SW-16).

(iii) In the event of whole tree logging, provisions for maintenance of sufficient nutrient capital should be made in the project analysis.

Analysis Area

The Avery Watershed Fuels (AWF) Reduction project is located on the St. Joe Ranger District of the Idaho Panhandle National Forests (IPNF). The project area is between Hoyt Flat and Avery, Idaho along a portion of the St. Joe River, just downstream of the North Fork St. Joe confluence (hydrologic unit code (HUC) 1701030414). The St. Joe River drains into Coeur d'Alene Lake near St. Maries, Idaho, approximately 50 miles downriver from the project area.

The project area encompasses approximately 12,740 acres (20 mi^2) of mostly National Forest managed land (~1250 acres privately managed) surrounding many first and second-order streams (sixth-level HUCs) including Hoyt Cr., Hamilton Cr., Rock Cr., Storm Cr., Trego Gulch, Setzer Cr., Avery Cr., Kelly Cr., Roundhouse Gulch and several smaller (less than 400 acres) unnamed drainages (SW-2). The project area includes approximately 7.5 miles of the St. Joe River in addition to the complete drainages of all previously named tributaries except Kelly Creek and Roundhouse Gulch. The proposed activity areas include approximately 3,862 acres of land with mostly south aspects and an average slope of 57% with some slopes nearing 90% (Table 21). The landscape of the project area is rugged terrain with moderately high relief (elevations ranging from 2390 to 5685 ft).

The cumulative effect analysis areas vary by resource. Soil productivity is assessed at the activity area and project area levels as defined in the updated soil guidelines (SW-17). To address Regional manual direction for soil impacts, the activity area is each timber harvest or fuels treatment unit and associated temporary roads and landings. The Regional standards are to maintain 85% of the activity area in acceptable soil productivity. Using the Regional standards, existing classified National Forest system roads and landings are designated lands and, as such, detrimental impacts and the loss of soil productivity due to their construction are irretrievable effects that are not considered in the cumulative effects analysis. To address the Forest Plan Standard to maintain 80% of the activity area in acceptable productivity, a separate cumulative effects analysis includes both the activity area as defined by the Regional manual supplement (SW-16) in addition to the existing forest roads and landings in the project area that would be used to accomplish project activities (SW-17). Soils outside the unit boundaries are not expected to be directly or indirectly affected by this proposal because no mechanical equipment would operate off system roads.

Table 21 - Slope and Aspect Summary for Stands within Proposed Treatment Areas

	Shrubfields (3,524 acres)		Commercial Thinning (112 acres)		Off-Site Ponderosa Pine (253 acres)	
Aspect	acres (%)	average slope (%)	acres (%)	average slope (%)	acres (%)	average slope (%)
NW	0.0	0	7.1	70	3.5	60
N	0.0	0	0.0	0	0.0	0
NE	0.0	0	80.4	68	0.0	0
E	11.8	61	12.5	55	2.5	60
SE	35.8	55	0.0	0	39.0	58
S	25.4	55	0.0	0	17.9	35
SW	17.1	59	0.0	0	15.4	60
W	10.0	50	0.0	0	21.7	60

Analysis Methods

The assessment of environmental effects focuses on three factors for soil resources: (1) detrimental soil impacts, (2) soil productivity and nutrients, and (3) sensitive landtypes. The following tools were used in assessing these three factors.

- Soil Disturbance Spreadsheet:

  The direct and cumulative affects of proposed timber harvest activities on soil were predicted using the Soil Disturbance Spreadsheet Model (Niehoff 2002) (SW-24) and the IPNF Updated Soil Guidelines (SW-17). These guidelines emphasize soil management standards and issues, long-term productivity, erosion and sediment production. Natural erosion and sediment production hazard ratings were gathered from landtype descriptions in the IPNF Land Systems Inventory (USDA, 1999). Effects on long-term soil productivity are calculated by totaling average soil disturbance values from logging methods and equipment and from slash treatment.

  The spreadsheet model evaluates the impacts of proposed activities on harvest units for each harvest method based on empirically derived coefficients that were obtained and averaged from numerous monitored sites throughout the Forest (Niehoff 2002). The model is limited to the harvest and slash disposal methods for which coefficients have been determined, and its coefficients assume that the appropriate best management practices (BMPs) would be implemented. The model does not account for changes in soil type or the recovery of soils over time. The protocol for applying the Soil Disturbance Model is included in the "Soil NEPA Analysis Process and Source of Soil Disturbance Model Coefficients" (Niehoff 2002).

- Water Erosion Prediction Project (WEPP):

  The WEPP model (Flanagan and Livingston 1995) is a physically-based soil erosion model that can provide estimates of soil erosion and sediment yield considering the specific soil, climate, ground cover, and topographic conditions. Model outputs are primarily intended to indicate trends and to compare management Alternatives, and secondarily to provide quantified estimates of sediment yield. For further information on WEPP, see project file document SW-4.

- Field Review:

  Field data was collected in 2001 through 2006 (SW-6). This data was used to confirm information in the stand management database concerning previous management activities in proposed action stands.

- Additional Information:

  Soil conditions were further evaluated based on maps, computer modeling, aerial photograph interpretation, and GIS data. Additional reference information was collected from previous NEPA projects including the Broadaxe EA (USDA 2005), Weitas Fuels Reduction project (USDA 2003), North Fork St. Joe River EIS (USDA 1998), and other scientific literature.

Affected Environment

Reference Condition

The reference conditions are based on natural, physical events and processes that historically shaped environmental conditions across the St. Joe River basin prior to human activities. Effects from natural disturbances such as volcanic eruptions (*e.g.* Mt. Mazama: ~7600 years ago and Mt. St. Helens: May 1980), alpine glaciations, fires, landslides, and flooding interacted with other land-shaping processes like geologic uplift and stream channel incision to form the basic character of soil resources and watersheds.

- Detrimental Soil Impacts:

  Detrimental soil impacts are defined as compaction, displacement, puddling, rutting, surface erosion, soil mass movement, or severe burning of the soil due to management activities (R1 Suppl. 2500-99-1). Detrimental impacts can have negative effects on both soil productivity and erosion potential, as discussed below (Harvey and others 1994). Since there is no known management of the middle St. Joe River basin prior to European settlement, detrimental impacts by definition could not have occurred. The impacts that could be attributed to natural causes would be erosion and displacement due to mass failures or severe burning due to high-intensity wildfires.

Throughout history, wildfires have been a natural component in forest watersheds and have influenced forest soils and watershed processes. The most recent wildfire activity within the Avery Fuels Reduction Project Area was in 1910 and 1934 (*see Fire/Fuels section*). However, as a result of fire suppression during the last century, natural fire regimes do not exist anywhere in north Idaho today (Smith and Fisher 1997). Depending on the intensity of the fire and the severity of its effects, wildfire can alter watershed soils by consuming the erosion-limiting litter layer at the top of soils and binding organics within the soil (Ice 2003). Condensation of volatized organics on soil surfaces often result in water-repellant (hydrophobic) soil conditions (Dyrness 1976; DeBano 1981; Doerr and others 2000) that can contribute to overland flow and increased in-channel failures (Ice 2003).

- Soil Productivity and Nutrients:

  Soil productivity refers to the soils capacity for growing trees given the site's parent material, topography, climate, vegetation and management history (Powers 1990b). The most productive part of the soil occurs near the surface at the contact between the forest litter and the mineral soil. This organic-matter-rich layer contains most of the soil nitrogen (N), potassium (K), sulfur (S) and mycorrhizae, which must be present for a site to be productive.

  Nutrients, especially the role of potassium, are of increasing concern to forest health, especially in regards to the forests susceptibility to insects and disease (Garrison-Johnston and others 2003). Research suggests a complex balance between underlying geology and the natural deficiency of potassium in northern Idaho (Garrison-Johnston and others 2003; Shen and others 2000). Whole-tree yarding and removal of treetops can lead to the direct loss of potassium (Morris and Miller 1994). On some sites, 45% of the available potassium is detained in trees, with the remainder being held in subordinate vegetation, forest floor, and soil pools. Within the trees, about 85 % of the potassium is held in the branches, twigs, and foliage (Garrison and Moore 1998). It is therefore vital to recycle as many nutrients as possible before removal by overwintering small-scale debris to leach out potassium and other important minerals (Barber and Van Lear 1984; Edmonds 1987; Baker and others 1989; Laskowski and others 1995; Garrison and Moore 1998; and Palviainen and others 2004).

  Retaining coarse woody debris (CWD) and organic matter is important in maintaining the soil's most productive layer. CWD is defined as woody material derived from tree limbs, boles, and roots greater than three inches in diameter and in various stages of decay. It performs many physical, chemical, and biological functions in forest ecosystems and is also a key habitat component for many wildlife species and for stream ecology (Graham and others 1994). Coarse woody debris in natural systems fluctuates with forest growth, mortality, fire, and decay.

  Ultimately, long-term productivity of managed forests depends on the health of the below-ground community including plants and animals that indirectly affect the soil conditions as these organisms depend on the soil for energy, nutrients, and/or habitat (Borchers and Perry 1990).

- Sensitive Landtypes:

  Highly sensitive landtypes are defined to have a moderately high to high mass failure potential, high sediment delivery potential, and/or a high surface, subsurface, or substratum erosion hazard (SW-17) (Table 23). Because the geology and relative climate in the project area has not changed extensively over the past thousands of years, the reference conditions are assumed to have been similar to the existing conditions (see below) (SW-19).

  Watersheds that have been severly denuded by a wildfire are often vulnerable to accelerated rates of soil erosion and, therefore, can yield large amounts of postfire sediment (*see Watershed* section). However, prescribed burns do not normally consume extensive layers of litter or accumulations of other organic materials (Neary 2005). Furthermore, after intense wildfires on the IPNF, little hillslope erosion generally occurs due to unique properties of the surface volcanic ash cap in addition to some tackifier properties of the burn ash (SW-17). Nevertheless, considerable overland flow runoff can occur from the burned area as the result of hydrophobic surface soil conditions. When hydrophobic conditions exist below the soil surface, the surface soil would erode down to the hydrophobic layer (DeBano 1981).

Existing Condition

The existing condition was assessed to provide a basis for comparing the effects of the proposed management activities and alternatives. All previous and ongoing activities in the project area are included in the analysis of existing conditions (ACT-1).

- Detrimental Soil Impacts:

  There are ~36 miles of existing system roads in the Avery Fuels Reduction Project Area (~12,740 total acres; 1.8 mi/mi^2) with most of the project area being within a designated roadless area. Of the 36 miles of road, 6 miles are state highway along the St. Joe River, 22 miles are on National Forest System land (~11,600 acres; 1.2 mi/mi^2), and 8 miles are on privately owned land (~1,250 acres; 4.1 mi/mi^2). The only recent road-building activity in the project area since the St. Joe Sub-basin Assessment (June 2000) was the construction of 0.1 mile of road along a ridgetop connecting Road 3318 to Road 1934.

  With the exception of replanting and prescribed burning, there are no other management activities recorded in the database for the proposed shrubfield and off-site ponderosa pine stands north of the St. Joe River (*see Management History Report*). Any harvest that may have occurred in these stands was prior to record keeping. There are no indications of past activity (including stumps and/or skid trails) observed in stands north of the St. Joe River during field visits between 2001 to 2006 (SW-6). Soil compaction levels are mostly (88%) class 1 (natural condition) with a few class 2 (slight disturbance); no class 3 (detrimental disturbance) soils were observed within the shrubfields transects (SW-6 ref 17, SW-28).

  Field visits to the main stem of Roundhouse Gulch, south of the St. Joe River, in 2004 and 2005 revealed detrimental soil impacts including remnant skid trails, remains of an old log flume, and an old cabin within the Riparian Habitat Conservation Area (RHCA) buffer zone (SW-8). However, these previous human-induced detrimental impacts do not extend into the proposed thinning units because of the proposed widened RHCA buffer of 300 ft.

  Overall, soils in the activity area currently meet the Regional soil standard (<15% detrimentally disturbed) and the Forest soil standard (<20%) based on field surveys and observations and the limited amount of documented management activities.

- Soil Productivity and Nutrients:

  The soils in the component stands for this project area are generally shallow, ash-capped (andic) soils with moderate to high concentrations of rock fragments derived from the underlying bedrock. Common soil types include Typic Vitrixerands, Typic Udivitrands, and Alfic Udivitrands. Surface rock outcrops are common and can be found on both ridges and mid slopes.

  In the Avery Fuels Reduction Project Area, the organic-rich layer is generally less than 1.75 inches (SW-6 ref 17). Underneath this organic horizon is volcanic ash from the 1980 eruption of Mt. St. Helens. Below this layer, the andic soil is mostly a result of ash from the eruption of Mt. Mazama (Crater Lake) in Oregon about 7,600 years ago. The volcanic ash influenced loess overlies gravel or cobble material derived from the underlying bedrock. Soils in the Avery Fuels Reduction Project Area developed on weathered metasediments (argillite and quartzite) of the Mesoproterozoic Belt Supergroup (the lower and middle Wallace Formation) and have relatively low to moderate soil productivities (USDA 1999) (Table 23).

  Hydrophobic conditions likely occurred within some of the soils after the 1910 and 1934 fires. These conditions would have decreased infiltration, exacerbated water runoff, and contributed to debris torrents. However, several years of frost heaving, duff accumulation, and decaying vegetation have mitigated these conditions. Some sites still do not support conifer regeneration and remain as shrubfields with shallow soils having organic layers generally ≤1.75 inches (SW-6 ref 17).

  Historically, fires and subsequent shrubfields moved around in time and space (SW-20). As some areas progressed from shrub to forest, other areas burned and new shrubfields were created. New shrub fields following a period of forest cover are likely to have higher nutrient content in the shrubs and soils than areas that burn on shorter rotations and do not have time to build up the nutrient capital generally found in forested areas. Coarse woody debris levels throughout the project area are therefore variable, but on average are very low (SW-6 ref 17), in part, reflecting wildfire activities in the early 1900s. Other surrounding shrubfields stands not included as proposed activity units would remain untreated to pursue the natural succession into forest regeneration.

- Sensitive Landtypes:

  Thirty-two landtypes have been identified and mapped in the project area (SW-19), of which twenty-nine overlap with proposed activity stands (Table 23) (SW-21). Hazard ratings have been compiled for each landtype and are broken into subcategories of surface erosion, sub-surface erosion, sediment delivery and mass failure potential to determine areas with highly sensitive land (SW-17; SW-22). Each subcategory is rated as low, moderate, or high for a particular landtype (SW-17). In an effort to reduce potential problems, hazard-prone landtypes were identified during the initial project analysis and addressed in the proposed activities (SW-23).

Table 22 - Summary of Sensitive Landtype Acres for Each Treatment

Sensitive Landtype Summary (acres)	Prescription Total	High Surface Erosion Potential (SEP)	High Sub-Soil Erosion Potential (SSEP)	Mass Failure Potential (MFP)	High Sediment Delivery Potential (SDP)
Shrubfield	3,497	0	0	314	956
Off-Site Ponderosa Pine	253	0	0	3	71
Commercial Thin	112	0	0	0	35
Total	3,862	0	0	317	1,062

Surface Erosion Potential (SEP) is a rating of the relative susceptibility of exposed soils to sheet and rill erosion. None of the proposed activity acres exhibit high potential for surface erosion, and 99.5% of the acres are rated as low potential (Table 23).

There are no acres within the proposed activity stands rated high for Sub-Surface Erosion Potential (SSEP), which can occur when the soil material is exposed below the surface volcanic ash layer (Tables 22 and 23).

Sediment Delivery Potential (SDP) is a rating of the probability of eroded soil reaching a stream channel. By using slope gradient, slope shape, and distance to channel, a rating of low, moderate or high potential is determined. Sediment yields are generally the highest during the first year following a fire and decline in subsequent years; however, the peak sediment delivery may be delayed a year or two if precipitation is below normal (Neary 2005). Of the proposed activity stands, 1062 acres (27%) are rated to have high sediment delivery potential (Tables 22 and 23).

Mass Failure Potential (MFP) is a rating of the relative probability of downslope movement of masses of soil material. These ratings consider slope gradient, slope dissection density, soil drainage characteristics, water input, soil texture and presence of mica. High mass failure includes slope creep, falls, topples, rotational and translational slides, lateral spreads, debris flows, and complex movements (Varnes 1978). Removal of forest canopy and cover from either clearcutting or wildland fire increases landslide occurrence (Megahan and others 1978; Gray and Megahan 1981). This is primarily due to root decay, soil disturbance, increased snow accumulation and altered melting rates, and soil water increases from reduced interception and transpiration. Megahan and others (1978) found that landslide occurrence increased only slightly when overstory canopy was reduced from 100% to 11%, but increased dramatically when canopy closure went below 11%. They also found that crown cover from shrubs affected landslide occurrence after 80% crown removal and indicated that landslide occurrence is more sensitive to shrub removal than tree crown removal. In the project area there are 317 acres (8% of proposed activity acres) identified with high potential for mass failure: 314 acres within shrubfield stands (9% shrubfield acres within 7 stands) and 3 acres within the off-site ponderosa pine stands (1% OSPP acres in 1 stand) (Table 22).

Table 23 - Proposed Action Landtype Acres and Associated Hazard Ratings (SW-22, SW-23)

Landtype Code	Total Acres	Landtype Acres / Total Acres (%)	Surface Erosion Potential (SEP)	Sub-Soil Erosion Potential (SSEP)	Mass Failure Potential (MFP)	Sediment Delivery Potential (SDP)	Overall Sensitivity	Productivity	Regeneration Limitation
130	4.46	0.11%	L	L	L	H	H	MH	M to S
190	18.56	0.48%	M	L	L	L	L	L	S
406	79.75	2.05%	L	L	L	L	L	L	S
409	69.48	1.79%	L	L	L	L	L	L-M	F
410	16.62	0.43%	L	L	L	L	L	L-M	F
415	61.70	1.59%	L	M	H	H	H	M	M
416	252.08	6.48%	L	M	H	H	H	M	S
440	4.17	0.11%	L	L	L	L	L	L-M	F
443	5.35	0.14%	L	L	M	M	M	M	M
462	41.42	1.07%	L	L	L	L	L	MH	F
463	0.78	0.02%	L	M	M	M	M	MH	F
464	1.30	0.03%	L	L	L	L	L	MH	F
465	122.55	3.15%	L	M	M	M	M	MH	F
466	53.17	1.37%	L	L	L	L	L	M	F
468	4.97	0.13%	L	L	M	M	M	MH	M
469	3.02	0.08%	L	M	M	M	M	M	M
470	945.83	24.32%	L	L	L	L	L	M	M
471	610.76	15.71%	L	L	L	L	L	L	S
477	83.89	2.16%	L	L	M	M	M	M	F
478	331.79	8.53%	L	L	M	M	M	L	S
479	531.29	13.66%	L	M	M	H	H	M	M
480	160.44	4.13%	L	M	M	H	H	MH	F
482	2.78	0.07%	L	M	H	H	H	M	M
483	389.43	10.01%	L	L	M	M	M	L	S
488	42.62	1.10%	L	M	M	H	H	L	S
489	6.18	0.16%	L	M	M	H	H	M	F
491	0.32	0.01%	L	L	L	L	L	M	F
492	32.24	0.83%	L	L	L	L	L	M	F
493	11.58	0.00	L	L	L	L	L	M	F
Total Acres:	**3889**		**0** **0%**	**0** **0%**	**317** **8%**	**1062** **27%**	**1062** **27%**	**-N/A-**	**-N/A-**

Legend: L = low M = moderate H = high F = few S = severe

** highlighted rows are landtypes classified as "sensitive" due to High potential of SEP, SSEP, MFP, and/or SDP*

Environmental Consequences

Other than the proposed activities, there are no ongoing or reasonably foreseeable management activities on National Forest System land in the analysis area that would detrimentally disturb soils in the activity areas. However, timber harvest activities are expected to occur on adjacent privately managed land (Forest Capital) within the next two years (SW-11). Timber harvest on private land must follow the rules and Best Management Practices (BMPs) set by the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code) to prevent sediment delivery to stream channels and to avoid any cumulative watershed effects. Activities on privately managed land are considered in the cumulative condition.

Alternative A

Direct, Indirect & Cumulative Effects

In the No-Action Alternative, no new management-induced detrimental impacts would occur in the Avery Fuels Reduction Project Area. Soil potassium and nitrogen would continue to cycle, build up at current rates, and not be subject to removal due to artificial fuels reduction. Soil nutrient cycling would continue at low rates from rock weathering, atmospheric deposition (mostly nitrogen), and nitrogen fixation. Soil nutrients would be bound in organic matter complexes and slowly released through decay. If uninterrupted by natural events, regeneration of successional vegetation likely would slowly establish.

The continued accumulation of dead and down fuel loads could contribute to an increased potential for locally severe fire effects on soil including physical alteration of soil structure, loss of soil nutrients, soil erosion, and development of hydrophobic layers. In the event of a wildfire, the effects could range from negligible to severe, depending on location, size, degree of burn, and subsequent administrative activities. Due to the numerous variable conditions, post-fire effects on soil and watershed conditions are difficult to predict and quantify.

In the No-Action Alternative, the off-site ponderosa pine stands currently at high risk for mortality would not be treated. This could increase the risk of residual stand loss due to wildfire (Goheen and Hansen 1993; see *Fire/Fuels* section) which could cause severe burning and loss of soil nutrients.

In the event of another severe wildfire, effects of the No-Action Alternative would likely exceed those predicted for the action alternatives. Any detrimental effects from activities on surrounding private land would have the same effect to both the No-Action and action alternatives.

Alternative B

Direct, Indirect & Cumulative Effects

The potential consequences of the three treatments (timber harvest, off-site ponderosa pine removal, and shrubfield burning) are discussed with respect to the (1) detrimental soil impacts, (2) soil nutrients and productivity, and (3) sensitive landtypes. All direct, indirect and cumulative effects are disclosed, qualitatively discussed, and quantified where possible.

Detrimental Soil Impacts:

The effects of the proposed action on the soil resource were assessed based on their potential to create detrimental impacts as defined by the R1 Soil Management Supplement (SW-16), and to ensure compliance with the Forest Plan Standard (SW-17). Although existing system roads are not considered to be part of the activity area at the Regional level, an analysis of the total impacts of roads to be used to complete proposed activities was conducted to ensure compliance with the Forest Plan Standard.

Soil compaction effects can last for decades, but most often are reversible. Depending on factors such as soil texture, aspect, slope, and degree of disturbance, conditions can be naturally restored over time through root growth, seasonal climate changes, and bioturbation. However, soil displacement that mixes or removes the volcanic ash surface layer, consequently reduces soil moisture holding capacity and associated productivity, which is essentially irreversible.

Timber Harvest:

Field notes (SW-6, ref 6) show the only evidence of pre-existing ground-disturbance within the project area is limited to the RHCA buffer zone in Roundhouse Gulch (site-specific buffer equals 300 ft, which is double the Inland Native Fish Strategy (INFS) recommendation for non-fish bearing streams). Therefore, the previous ground-disturbance sites are excluded from the activity

area, but are considered in the cumulative effects. Proposed thinning surrounding Roundhouse Gulch would be accomplished by helicopter, reducing the impact to the soil as compared to other logging methods. The helicopter fuel landing in this project would utilize an existing landing site along the St. Joe River (Avery lower landing). Helicopter log transfer sites would be located on approximately 6 acres on and immediately adjacent to Road 3465, which is located on the ridgeline of a hill. These sites would be the location for the burn piles of yarded tops, and are the only expected location associated with the thinning activity that would have Class 3 soil disturbances and most likely be hydrophobic. However, because the log landing sites would be located on an existing road, there would be minimal change to the area's detrimentally impacted soils (would meet Forest and Regional standards). In total, ~0.7 mile of existing Forest Service managed system roads within the project area would be used to move personnel, logs, and/or equipment to complete the harvest. The remainder of the haul route is outside the project area on existing roads. It has been documented on the IPNF that stands with 100% cable or aerial logging would meet soil quality standards (Niehoff 2002). Combining the predicted detrimental impacts of proposed activities and the total area of existing system roads to be used for project implementation with all reasonably foreseeable activities in this watershed indicates that the cumulative soil impacts would likely have ≤2% detrimental impact to the thinning activity area west of Roundhouse Gulch (SW-24).

Off-Site Ponderosa Pine:

There are no detrimental soil impacts anticipated with the off-site ponderosa pine removal as all trees would be felled by hand and left on site to retain nutrients. The proposed burning associated with this treatment would occur in stands with similar vegetation, topography, aspect, and soil landtypes as the shrubfield burning stands; therefore the effects would be similar as discussed below.

Shrubfield Burning:

The effects of fire on detrimental soil conditions (altering soil properties and runoff) relies to a large extent on the amount of organic residue remaining after the fire (Harvey and others 1979) and is often directly proportional to the severity of the fire: the more intense the fire is, the more damage to soil conditions occur. Higher intensity burns tend to occur where there is an abundance of fuels and also on steeper slopes due to the convective winds preheating the fuels on the uphill side of the fire front (Swanson 1981). However, this is only true to a certain extent because slopes of 40 degrees or greater tend to have a patchier (less) distribution of vegetation and fuels and more bedrock is exposed, restricting the spread of fire (Swanson 1981).

Burning under controlled conditions of high soil moisture reduces the chance of creating hydrophobic soils, which can lead to increased erosion, sedimentation and debris torrents (Neary and others 2005; Robichaud 2000; Swanson 1981). Risks of debris torrents and increased sediment movement are generally less for prescribed burns than for wildfires. Where prescribed fire in shrubfields is proposed, minimum soil moisture level guidelines of ≥15% in conjunction with monitoring would limit the potential to destroy organic matter, create hydrophobic conditions, impose detrimental impacts, or induce major nutrient losses (see Design Features).

Currently, IPNF guidelines to protect the surface soils recommend soil moisture contents of 25% or greater for prescribed burns (Niehoff 2002) (SW-25). However, this value was primarily based on studies from the 1980s in timbered stands where duff layers are generally thicker than in shrubfields, which allows for longer smoldering periods when temperatures can soar many hours after the initial flame front. Results from the First Order Fire Effects Model (FOFEM) suggest that flaming and smoldering should last less than one hour (FF-3, SW-26). Therefore, the 25% standard is not an all-inclusive value to base the prescriptions on for this project.

The retired Forest Soil Scientist (J. Niehoff) stated that he would not be comfortable with burning with soil moistures below 18 to 20% in shrubfields (SW-26). Based on data from the studies in the 1980s, scientific knowledge, and personal experience Rone recommends that initial burning of shrubfield stands should be undertaken at soil moisture levels no less than 18 to 20%. Rone stated that this project provides several good opportunities for evaluating burn and soil protection requirements and agreed to try burning with soil moistures as low as 15% for this project with monitoring to check soil conditions after part of the areas are burned (SW-26).

Information shared by Jimenez and Reardon (FF-4) points to the fact that complete consumption of shallow duff layers (<1 ½ inches) even in intense fires does not result in lethal temperatures in the soil layers.

As long as moisture is present throughout the burn, the temperature of the duff and soil would remain below 100°C, reducing the potential for detrimental impacts to the soil. As temperatures rise above 150°C, chemical and physical changes occur in the organic matter and soil nutrients (Hartford and Frandsen 1992), increasing the risk of detrimentally impacted soils.

The First Order Fire Effects Model (FOFEM) for shrublands with fuel loads representative of the proposed shrubfield units predicts that soil moisture levels of 5% would result in soil temperatures above 150°C down to 2 cm below the soil surface (FF-3), but soil moisture levels of 15% would not result in soil temperatures above 150°C (*Fire/Fuels* section Figure 3). According to the FOFEM run with soil moisture of 15%, the maximum soil temperatures would be close to 100°C; so detrimentally impacted soils are not expected, and soil temperatures would be adequate for regenerating redstem ceanothus. As a compromise the proposed prescribed fires would be ignited only when soil moisture content is greater than or equal to 15%, and soils would be monitored after the first 500 acres are burned (Design Feature 3.f.).

Recent (June 2006) monitoring conducted in prescribed-burned shrubfields along the North Fork St. Joe River (near the project area) with slopes and landtypes similar to those in the AWF project area revealed very minimal detrimental impact to the soils and ~95% of the duff layer appeared to have remained intact. Shrubfields were burned with moderate to high intensity immediately following snowmelt in May (SW-18). Vegetation was re-emerging within a few weeks following the burn.

Summary:

Overall, the proposed activities of helicopter logging and prescribed burning are expected to generate ≤2% soil impacts throughout the project area. The potential 2% impact, in addition to the current condition and reasonably foreseeable future impacts would have a minimal effect on the cumulative detrimental soil impacts and is in accordance with both Forest and Regional standards.

Soil Productivity and Nutrients:

Design features have been established to maintain site productivity by minimizing and/or avoiding compaction and displacement, burning when surface soil moisture levels are appropriate, maintaining coarse woody debris levels where debris is available, and by implementing RHCA buffers. Effects on long-term soil productivity are estimated from existing soil condition determined through monitoring and use of the Disturbance Spreadsheet Model by totaling soil disturbance values from logging methods and equipment and from slash treatment.

Timber Harvest:

Helicopter logging with up to a 60% canopy reduction and yarding tops is proposed for stands west of Roundhouse Gulch to help reduce fuels near the city of Avery. Although yarding tops for fuels reduction is proposed for three stands (112 acres), retention of existing CWD and fine organic material is expected to meet Forest and Regional standards. Limbs and needles of trees would likely break off during falling and yarding activities, retaining much of the nutrients on site because approximately 75% of the nutrients taken up by trees are held in the branches, twigs, and foliage (Garrison and Moore 1998). This method of harvesting causes less soil loss and compaction than conventional harvesting methods and indirectly reduces the loss of nitrogen and sulfur from reduced risks of high intensity fires (Powers 1990b; Little and Klock 1985). Overall, the effects of yarding tops on tree growth are greatly influenced by rotation cycles and logging prescription; therefore, as long as rotations are extended, the depletion of major nutrients needed by plants should not be excessive in relation to total reserves in the soil that should replenish between harvests (R. Rone, IPNF Soil Scientist, personal communication 2006: SW-26). Furthermore, existing levels of CWD and fines would be retained on site because there are no proposed broadcast burning activities within the treatment stands following harvest completion (note: pile burning would occur on helicopter log transfer sites). This would allow for retention of organics that would continue to leach nutrients into the soils.

Coarse woody debris guidelines to maintain 11 to 33 tons/acre have been adopted (Graham and others 1994) to ensure soil nutrient continuity (*Design Feature 4.f.*). Best Management Practices (BMPs) are also included as design features (3. g.) and would be applied during timber harvest to minimize soil erosion and maintain acceptable soil productivity (SW-29).

Off-Site Ponderosa Pine:

There are little to no effects on soil productivity and nutrient retention anticipated with the off-site ponderosa pine removal as all trees would be felled by hand and left on site to retain nutrients. Proposed broadcast and jackpot burning following OSPP felling would likely have minimal effects to the soil, as explained in the Shrubfield Burning section below.

Shrubfield Burning:

Soil heating alters infiltration rates, soils nutrients, and reduces protective vegetation, litter and duff (Hungerford and others 1991). Soil nutrients are often lost during fires as the insulating surface layer of organic matter is removed. Wildfires and many fall prescribed burns result in increased nutrient losses because these fires are generally more severe due to drier soil and duff conditions and the fires consume larger amounts of fuels, especially on south-facing slopes. Direct and indirect effects of fire on soil nutrients include reduced plant growth and yield (Hungerford and others 1991; McNabb and Cromack 1990; Neary and others 2005), increased susceptibility to pathogens such as root disease and insect infestation (Garrison and Moore 1998; Garrison-Johnston and others 2003), and increased depth and duration of seasonal thawing for a period of at least 15 years following a fire (Swanson 1981). However, these effects can be minimized by reducing the loss of forest floor by using a low-intensity burn when soils have adequate moisture conditions to retain their biological, chemical, and physical integrity (Barnett 1989; Frandsen and Ryan 1986; Hungerford and others 1991; McNabb and Cromack 1990). Precipitation and weathering of rocks will continue to make additional nutrients available on site, while annual twig fall, forbs, and shrub mortality will continue to recycle nutrients as well (Stark 1979).

Summary:

Overall, the proposed activities of helicopter logging and prescribed burning are expected to have a minimal effect on the productivity of and nutrients in the soils. There would be no burning within the commercially thinned stands (only pile burns on landings), so there would be no loss in existing CWD and ground cover. OSPP activities are expected to have minimal impact with shrubfield regeneration likely occurring shortly following the prescribed burns. Therefore, these activities, in addition to the current condition and reasonably foreseeable future effects, would have a minimal impact on the cumulative effects of soil productivity and nutrients.

Sensitive Landtypes:

Of the 3,862 acres of proposed treatment, 27% (1,062 acres) are identified as having either high mass failure potential and/or high sediment delivery potential (Tables 22 and 23, SW-22).

Timber Harvest:

There are 35 acres classified as having high sediment delivery potential within the commercial thinning stands near Roundhouse Gulch (Table 22). Since the area would be helicopter logged, there would be no ground-disturbing activities that would increase the sediment or erosion levels (*see Watershed* section). Additionally, the existing levels of coarse woody debris would be maintained because no prescribed burning is proposed, which would also help stabilize the soils and prevent erosion.

Canopy removal can affect soil moisture content in several ways. Precipitation may enter previously intercepted areas and may increase soil erosion, especially if the existing potential is high, and reduce the availability of a growing medium. However, in the activity area the retention of ground cover would greatly reduce the chances of erosion. Additionally, rain events may provide existing or establishing vegetation with additional needed moisture and increase decomposition rates. Furthermore, canopy reduction often leads to an increase in sunlight that may promote plant growth, or conversely heat up soils to the extent that vegetation is inhibited. The latter possibility is unlikely in the project area due to the retention of at least 40% canopy.

Off-Site Ponderosa Pine:

Falling of off-site ponderosa pine would occur on three acres identified as having a high potential for mass failure and 71 acres with high sediment delivery potential (Table 22). However, the hand felling of trees is not expected to exacerbate the potential for mass failure, sediment delivery and/or surface erosion due to established design criterion and the negligible ground impact. In fact, the fallen trees would likely provide additional sediment traps if felled along the contour of the land. The proposed burning associated with this treatment would occur in stands similar to the shrubfield burning stands; therefore the effects would be similar as discussed below.

Shrubfield Burning:

The shrubfield burning stands include 956 acres of land designated as high sediment delivery potential including 314 acres listed as high potential for mass failure (MFP) (Table 22). Stands 20903017 and 20903021 are at the highest risk to mass failure due to their surface slope being in alignment with the dip of the underlying bedrock. Inland Native Fish Strategy (INFS) recommends buffering landslide-prone areas in Non-Priority Watersheds unless it would prevent attainment of Riparian Management Objectives. The high MFP acres are located in a strategic place for fuels management of fire suppression (*see Fire/Fuels* section); therefore, the proposed action includes these acres in the shrubfield burning prescription.

The proposed prescribed fire activity would not change the natural geology, elevation, aspect, slope or landform of the project area; therefore, the burning activity is not expected to directly affect the natural inherent slope instability of the area or the stability of known landslides. Studies have shown that light-intensity prescribed burns produce no mass erosion on extreme slopes (Burroughs and Thomas 1977; Gray and Megahan 1981; McNabb and Swanson 1990), while McClelland and others (1997) found only 2 landslides in areas burned by wildfires within the past ten years on the Clearwater National Forest (similar area south of project area). However, prescribed fires would indirectly affect slope stability due to changes in vegetation and ground cover. Studies indicate that landslide occurrence is more sensitive to shrub removal than tree crown removal (Megahan and others 1978). The affected vegetation in the proposed action would likely burn in a mosaic pattern due to low fire intensities and therefore, is less likely to create slope instability (Robichaud 2000). Most of the root systems of trees and shrubs would remain intact and effectively provide slope stability while the vegetation reestablishes itself (generally within 1-3 years) (USDA 2003). The root strength would also help maintain evapotranspirational processes that remove excess soil moisture, consequently reducing mass wasting risks on individual sites. Landslide risk would also be minimized by avoiding ignition within streamside RHCA buffers.

If the fire severity increases to moderately high or high, it would likely result in detrimental soil conditions that consequently could increase the potential risk of mass failure, erosion and sediment delivery to stream channels. Predictions based on WEPP model results are an increase in erosion and sediment delivery from low severity to high severity fires with even higher increases from wildfires (Table 24, SW-14, and *Watershed* section). Therefore, the proposed low-intensity prescribed burn would be less detrimental to the watershed than if left untreated, which would increase the risk of higher severity fires. Increased fire severities can cause hydrophobic soil conditions that can contribute to overland flow and increased in-channel failures (DeBano 1981; Doerr and others 2000; Ice 2003).

In the long term, implementation of the proposed action would likely result in long-term beneficial effects on slope stability by decreasing the potential for high-intensity wildfire with its resultant effects of reduced vegetation and increased landslide potential. The purpose of this project is to reduce the risk of wildfire, thereby decreasing the risk of large-scale detrimental soil conditions. However, on an unpredictable site-specific basis, some drier sites may burn at a severity level that removes some or all of the protecting duff and litter layers, even under managed fire conditions. The duff and litter layer is important in protecting the soil horizons, both as reducing erosion potential and in maintaining soil moisture. Litter prevents the breakdown of soil aggregates and reduces the velocity of any overland flow, thereby reducing the erosion potential (Beschta 1990). Project design features are expected to minimize the probability of higher severity burns (*see Chapter 2, Design Feature 3*).

Table 24 - Disturbed WEPP Results

WEPP Disturbed Average Results	Runoff (inches) Return Period			Erosion (tons / acre) Return Period			Sediment (tons / acre) Return Period			1st Year Post-Disturbance % probability of …		
	1.5-yr	15-yr	30-yr	1.5-yr	15-yr	30-yr	1.5-yr	15-yr	30-yr	Runoff	Erosion	Sediment Delivery
Thinning (300-ft buffer)	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.04	13	3	13
Wildfire (no buffer)	1.46	5.50	7.77	47.25	166.87	232.19	47.20	168.01	231.81	100	100	100
High-Severity Fire (150-ft buffer)	0.10	1.16	2.08	45.30	161.88	207.32	1.43	24.30	30.56	86	100	86
Low-Severity Prescribed Burn (150-ft buffer)	0.08	0.76	1.44	21.28	107.18	144.25	0.38	14.71	15.85	73	94	73
Existing Condition Shrubfield	0.00	0.01	0.03	0.00	0.06	0.19	0.00	0.01	0.04	13	11	12

Complete data set and details in project file SW-14.

Summary:

The WEPP model results suggest that there likely would be localized, short-term small increases in erosion and sediment delivery following the prescribed burns and essentially no effect from the off-site ponderosa pine and commercial thinning treatments (Table 24). Therefore, the proposed activities would likely have little to no cumulative effect on the soil conditions since the proposal excludes ground-based activities that directly expose the soil or cause displacement. No new road construction is planned, although existing roads would continue to contribute to the overall sediment loading.

The shrubfield burning of acres designated as high potential for mass failure poses the highest risk for detrimental effects to the landtypes, particularly in the stands 20903017 and 20903021. Alternative B would meet the INFS Riparian Management Objectives (RMOs) by implementing appropriate stream buffers, having low burn severity conditions, establishing soil moisture levels for the increased retention of duff, and by having an early season burn period for the high MFP acres separate from that of other stands within those drainages (*see Design Features*). Furthermore, the high MFP acres included in Alternative B surround the headwaters of Rock and Storm Creeks, where the stream is intermittent.

The IPNF Forest Plan as amended by the Inland Native Fish Strategy (INFS) requires landslide-prone areas to be buffered. Alternative B includes prescribed burning on areas with high potential for mass failure (landslide-prone areas), so it would not comply with INFS standards for riparian habitat conservation areas (INFS A-5, A-6). Alternative C does not include shrubfield burning on landslide-prone areas, so it would comply with INFS standards (F-3).

Alternative C

Direct, Indirect & Cumulative Effects

Proposed activities in Alternative C would have the same effects as Alternative B with the exception of the sensitive landtypes within the shrubfield prescription. The prescriptions for the off-site ponderosa pine treatment and the commercial thinning are the same and therefore, would have the same effects as Alternative B.

Alternative C would treat 3,415 acres with 746 acres (22%) designated as having high sediment delivery potential (SW-22) (Table 25). Alternative C would not include 475 acres of shrubfield stands in the Rock Creek and Storm Creek drainages that contain 314 acres with high potential for mass failure (MFP). The exclusion of MFP acres is in accordance with INFS requirements for buffering landslide-prone areas (INFS A-5, A-6). The removal of these acres from the proposed treatment (Alternative B) would reduce the total burned shrubfield acres to 3,050 and would reduce the percent of activity within the individual drainage basins of Rock Creek from 31% to 25% and of Storm Creek from 49% to 39% (SW-5b).

Table 25 - Acres of Sensitive Landtypes and High Mass Failure Potential in Proposed Units (SW-22)

	Prescription Area (acres)				Sensitive Landtypes		High Mass Failure Potential	
Alternative	Shrubfields	Off-Site PP	Comm. Thin	Total	Total Acres	% of Total Area	Total Acres	% of Total Area
B	3,497	253	112	3,862	1,062	27.5	317	8.2
C	3,022	253	112	3,387	746	22.0	3	< 0.1

Alternative C would have reduced potential for erosion, mass failure and sediment delivery into Rock and Storm Creeks than Alternative B because shrubfields in high mass failure potential areas would not be burned. Overall, Alternative C has slightly less risk for detrimental soil conditions than Alternative B, although both alternatives have minimal potential for detrimental soil impacts due to established design features (see *Chapter 2, Design Feature 3*).

Regulatory Consistency

Forest Plan

All proposed activities are consistent with the IPNF Forest Plan soil standards. Minimal effects to soil are expected because of project design. Reintroducing fire into this ecosystem would allow the managers to encourage the benefits of burning while controlling future negative impacts such as extensive, high-severity fires. Due to the low prescribed burn severity and design features, effects on soil conditions in the proposed action are expected to be minimal while maintaining the long-term soil productivity.

As required by the Forest Plan, the effects of all activities would not detrimentally disturb ≥20% of the activity area. Furthermore, in compliance with Region 1 standards, the detrimental disturbance would not exceed the recommended 15% in any individual activity area. The Regional guidance to follow the coarse woody debris recommendations of Graham and others (1994) would adhere to the Forest Plan Standard to maintain sufficient microorganism populations for site productivity. Fine organic matter layer thickness would be retained as appropriate for local conditions. Where yarding tops is proposed, project design features would ensure compliance with the Forest Plan Standard to maintain sufficient nutrient capital. Management area directions to implement Best Management Practices are included in the proposed action.

The IPNF Forest Plan as amended by the Inland Native Fish Strategy (INFS) requires landslide-prone areas to be buffered. Alternative B includes prescribed burning on areas with high potential for mass failure (landslide-prone areas), so it would not comply with INFS standards for riparian habitat conservation areas (INFS A-5, A-6). Alternative C does not include shrubfield burning on landslide-prone areas, so it would comply with INFS standards (F-3).

National Forest Management Act

The alternatives would not exceed forest plan standards for soils, therefore soils and slopes would not be irreversibly damaged.

VEGETATION

(Project File Volume III, Section V)

Introduction

The forest vegetation of northern Idaho displays strong diversity in both composition and structure. This diversity is attributable to climate, geology, and disturbance patterns (insects, disease, fire history and extreme weather events). These elements combine to create some of the most varied and productive forest communities found in the Inland Northwest. The most dominant vegetative feature of the northern Idaho forests is coniferous trees. The major tree species growing in this area include western hemlock, mountain hemlock, western redcedar, grand fir, Douglas-fir, western larch, western white pine, lodgepole pine, ponderosa pine, subalpine fir, and Engelmann spruce.

The forest vegetation in the Avery Fuels Reduction Project Area will change through the interaction of plant succession and the influence of disturbances (both natural and human disturbance). Forest vegetation across the landscape will be impacted by these changes. This analysis focuses on the composition, structure, patterns and processes which affect change to forests expressed by the conifer tree component recognizing that associated layers of vegetation are important parts of the plant communities in the area.

Regulatory Framework

The regulatory framework providing direction for the management of forest vegetation is provided through the National Forest Management Act of 1976 (NFMA) and the Forest Plan for the Idaho Panhandle National Forests (1987).

NFMA provides for balanced consideration of all resources. It requires the Forest Service to plan for diversity of plant and animal communities. The Forest Plan, in compliance with NFMA, establishes Forest-wide management direction, goals, objectives, standards and guidelines for the management of forest vegetation and plant communities.

Direction concerning implementation of NFMA and the Forest Plan can be found in Forest Service manuals (FSM) and handbooks (FSH), as well as various written communications from the Forest Service's Washington Office, Regional Office and the Supervisor's Office for the Idaho Panhandle National Forests.

Analysis Area

This analysis area for vegetation contains approximately 12,740 acres. Within this total acreage 11,487 acres are National Forest System lands and 1,253 acres are in private ownership. This provides an appropriate analysis area for the vegetation resource related to characteristics such as species composition, forest structure, wildfire risk and insect/disease risk. This scale of analysis also provides an appropriately sized area to monitor changes in vegetation trends, whether they are natural or human-caused, over time.

The stands within this proposal fall within the following Management Areas (MA): MA-1, MA-4, MA-5, MA-6 and MA-9 and are defined in the Forest Plan. Each management area has a designated emphasis: MA-1 are lands designated for timber production; MA-4 are lands designated for timber production within big game winter range; MA-5 are lands designated for big game winter range; MA-6 are lands designated for timber production within important elk summer range; and MA-9 are lands designated as non-forest or lands not capable of producing industrial products. Although MA-1 consists of lands designated for timber production there is approximately 21,000 acres of non-forest or lands not capable of producing industrial products. Proposed treatments within these MAs meet the intent of the forest plan. Treatment needs were based on a comparison of the existing landscape conditions and existing stand conditions to the desired conditions.

Analysis Methods

The information used in this coniferous vegetation section is a combination of the available data, research material, literature, field reviews and field assessments. Diagnosis and analysis of stands within the Avery Fuels Reduction Project Area were accomplished using stand summary data, basic stand data, stand component data and stand activity data (project file: V-1 and V-2). Existing stand exam data generally displayed species composition, stocking levels and incidents of insect and disease. Additionally, a review of the annual insect and disease incidence reports was reviewed. Proposed stands for treatment resulted from a review of all the stand data for this area, with particular emphasis to the new stand exam data (V-2). Field reviews conducted by the district silviculturist and other team members were also used to identify treatment opportunities within the project area. The district silviculturist for this proposal felt that the existing stand data, supplemented with the 2005 exams, and field reconnaissance adequately represented the vegetative conditions for the proposed treatment area, and developed stand treatment recommendations from these reviews.

The proposed units were developed by the project team leader, district silviculturist, fuels specialists and sale preparation staff with consideration for the proposed treatments coupled with current access (stand remoteness), terrain characteristics related to logging systems, and economic considerations.

For this project analysis timbered stands (south of the St. Joe River) and a mix of timbered stands and shrubfields (north of the St. Joe River) near or adjacent to the town of Avery, ID were determined to pose a potential risk of a stand-replacing wildfire event. This risk determination was based on current stand density, the close proximity of tree crowns, species mix, decadence of shrubfields, and the deterioration of off-site ponderosa pine stands.

Large-scale context for the terrestrial vegetation and landscape ecology was provided by the *Integrated Scientific Assessment for the Interior Columbia Basin (*Quigley and others 1996) and the St. Joe Geographic Area assessment titled, *Toward a Forest Ecosystem Approach: An Assessment for the St. Joe Area*. This information and the objectives described under the purpose and need section of this document, as well as the IPNF Forest Plan, were used in evaluating the Avery Fuels Reduction Project Area's existing condition for coniferous forest vegetation and comparing it to the landscape and desired forest stand conditions.

Habitat types were used for the project planning and site-specific considerations in this environmental assessment. *Forest Habitat Types of Northern Idaho: A Second Approximation* (Cooper and others 1991) outlines the classification and characteristics of the habitat types. This information was used for stand-level diagnosis and analysis.

Habitat types were grouped to facilitate landscape-level analysis and planning because of similar environments and vegetation characteristics such as productivity, disturbance regimes, stand dynamics,

susceptibility to insect and disease, forest cover types, structural stages and successional pathways. *A Biophysical Classification, Habitat Groups and Descriptions* (USDA 1996) was used for this analysis.

The purpose of the Avery Fuels Reduction Project is to reduce the potential effects of wildland fire to adjacent landowners, the communities of Avery and Hoyt Flat, the Dunn Peak electronic site, the Bonneville Power Administration transmission line and increase the margin for firefighter safety. In addition treatments in existing shrubfields are proposed to reduce fuel loadings and promote browse more accessible and palatable for browse.

Forest stands were reviewed for insect and disease activity, production (growth rates), productive potential, regeneration potential, species composition, stand density, and stand structure. As a result of recent (2000 to present) observed losses from the bark beetle activity in this area were minimal and is considered to be at endemic population levels. Areas that are currently in a brush field state were reviewed for potential vegetation growth as it relates to conifer regeneration and maintaining as a brush field for big game browse or allowing the conifers to take over the site. Areas having been planted in the past with off-site ponderosa pine were reviewed for current species composition, potential for conifer regeneration of native species (artificial or natural), stand density, productive potential, insect and disease activity, and stand structure. In addition to field reconnaissance, determining reforestation potential involved review of the reforestation indices for the off-site ponderosa pine portion of this analysis area. These indices display our degree of success in reestablishing stands with artificial regeneration.

Commercial forest stand treatments were identified by the district silviculturist based on insect and disease activity and potential, existing vegetation conditions; desired stand conditions; and potential contribution to the larger landscape. Desired stand conditions were developed which are ecologically compatible with the site, as well as the current and historic disturbance patterns and successional pathways of the landscape vegetation. These desired stand conditions are also based on the IPNF Forest Plan management area direction for the sites. The stands within this proposal are classified as MA-1, MA-4, MA-5, MA-6 and MA-9 in the Forest Plan. Treatment needs were based on a comparison of the existing landscape conditions and existing stand conditions to the desired conditions.

Proposed treatments were developed that would move the existing condition toward the desired condition over time. Considerations included stand species composition, stand size class, stand structure, insect and disease risk, and stand replacing wildfire risk.

The measurement criteria used in analyzing these proposed treatments are acres of change in long lived early seral forest types and acres of change in stand structure by stand size class.

Affected Environment

The Avery Fuels Reduction Analysis Area includes four of the forest habitat type groups described in the Idaho Panhandle National Forest Plan (USDA Forest Service 1987). The relative distribution of the habitat type groups occurring in the project area is displayed in Table 26, and is characterized in the subsequent description.

Forest Composition

Throughout the Interior Columbia River Basin shade-intolerant, early-seral species have declined; and shade-tolerant species have become more dominant (Quigley et al, 1996). This same trend is seen at a step down in scale in Idaho. Table 27 displays the trend away from potentially long-lived, early-seral species of western white pine (WP), western larch (L) and ponderosa pine (PP); and towards more shade-tolerant and shorter-lived species of grand fir (GF), subalpine fir (SAF), Engelmann spruce (S), lodgepole pine (LP), Douglas-fir (DF) (O'Laughlin and others 1993) from 1952 through 1987 in Idaho. This trend has not changed since 1987, other than some areas experiencing large stand-replacing wildfires which has set these areas back to a grass/forb stage.

Table 26 - Distribution of Habitat Types in Avery Fuels Reduction Analysis Area

Habitat Groups	Potential Vegetation	Temperature and Moisture	% Area
1 & 2	Dry Forest	Warm and Dry and Moderately Warm and Dry	5%
3	Moist Forest	Moderately Dry and Moderately Warm and Moist	5%
4	Moist Forest	Moderately Dry and Moderately Warm and Moist	90%

Table 27 - Forest Type Changes in Idaho

Idaho Forest Type	WP	PP	GF/SAF	S/ L/ Other	LP	DF
% Change 1952-1987	-60%	-40%	+60%	+30%	+38%	+15%

In stepping down to the St. Joe River Basin, as displayed in *Toward a Forest Ecosystem Approach: An Assessment for the St. Joe Area,* we find a similar major decline in long-lived, early-seral species, particularly western white pine, western larch and ponderosa pine. There are ecological implications of changes in forest composition.

Western larch, ponderosa pine and western white pine are more fire adapted, relatively more drought resistant, and more root-disease resistant than other species and are capable of dominating the forest stands from establishment to 350 years (Shiplett and Neuenschwander 1994). Additionally, they are capable of producing tall trees of large diameter that serve important ecological functions.

Western hemlock and grand fir are two of the more moisture-demanding and drought-susceptible tree species. They are more susceptible to numerous insects and diseases, and less adapted to surviving fires than more seral species. Periodic drought increases this risk of loss.

Grand fir and Douglas-fir are highly susceptible to root diseases. Conversion of forests to these more shade-tolerant and disease prone species has contributed to an increase in the incidence of losses and damage associated with Armillaria root disease (Byler and Zimmer-Grove 1991). Increased dominance of these more susceptible species can change the relationship of root pathogens from one of thinning to a major disturbance agent in forest stands and across the landscape. Both of these species are susceptible to stand-replacing wildfire events when they occur in high densities and have high crown ratios (Smith and Fischer 1997). However, Douglas-fir is fairly fire-resistant to ground fire after they have developed thick bark (Herman and Lavender 1990) where as grand fir is highly susceptible to all fire.

Lodgepole pine is a relatively short-lived seral species, especially in the moist forest sites of northern Idaho. This species is moderately susceptible to fire; however, it generally regenerates well after major disturbance. Lodgepole pine is susceptible to various insects and diseases, especially mountain pine beetle (generally beginning at 80 years of age and 8 inches d.b.h.), at moderate stand densities and relatively smaller diameters compared to other forest cover types.

Table 28 displays the historic and existing forest types (defined by the species with the greatest basal area represented in the stand) for the St. Joe River Basin and Avery Fuels Reduction Project Area. The forest types are ponderosa pine (PP), western white pine (WP), western larch (WL), Douglas-fir (DF), grand fir (GF), western hemlock (WH), western redcedar (C), lodgepole pine (LP), subalpine fir (SF), mountain hemlock (MH), Engelmann spruce (ES), whitebark pine (WBP).

Table 28 - St. Joe River Basin and Avery Watershed Project Forest Types

Forest Type	PP	WP	WL	DF	GF/ WH	C	LP	SAF/MH/ ES/ WBP
St. Joe Historic Forest	2.1%	24.9%	14.8%	10.4%	5.4%	4.4%	13.8%	24.3%
St Joe Current Forest	1.2%	3.2%	3.8%	18.0%	16.8%	7.2%	20.7%	28.6%
Avery Watershed Project Current Forest	<1%	<1%	<1%	5.6%	13.4%	<1%	39.3%	41.9%

The shift in forest types displayed in Table 28 indicates a reduction or simplification of species representation. As the early seral species seed source continues to decrease, there is a potential increase

in the risk of probable loss when disturbances such as fire, insect outbreaks, or drought do occur. This increased risk of loss would affect both the stand and landscape scales.

Past timber harvest, generally starting in the St. Joe River Basin in the 1920-1930s, often focused on removal of the largest-sized trees and the most market-valuable species. The large and more dominant-sized trees, and the more valuable western white pine, western larch and ponderosa pine were preferentially removed over other size classes and species. Large, dominant western redcedar was also removed due to its market value. This practice reduced the contribution these species and size classes made to the individual stand composition, as well as their contribution to the general landscape of the St. Joe River Basin.

Within the majority of the Avery Fuels Reduction Project Area, however, substantial timber harvest has not occurred. Most of the project area is currently in a shrubfield state (north side of St. Joe River), with some harvest activity occurring in the off-site ponderosa pine portion and commercial thin portion of the project area. Approximately 168 acres have been harvested within the analysis area. The majority of harvest has been regeneration treatments such as clearcuts, shelterwood seed cuts and seed tree harvests. All stands which have received a regeneration harvest are satisfactorily restocked and progressing as planned (V-3).

The Avery Fuels Reduction Project Area sustained two stand-replacing fires that have influenced stand development as it occurs at present. The project area burned once in 1910, and some areas north of the St. Joe River burned again in 1934 (Zack and Morgan 1994). As a result, this project area has large areas dominated by shrubfields. With the continued implementation of fire suppression over the last 96 years, wildfire has essentially been eliminated from this area. Fire has historically been the primary natural thinning agent which encouraged retention and effective regeneration of shade-intolerant, early-seral species. Subsequently fire suppression has increased the representation of the more shade-tolerant, less fire-adapted species (grand fir, hemlock and Douglas-fir) over time. As these species occupy sites, they increase shading and other competitive conditions, which generally exclude adequate establishment of the less shade-tolerant early seral species such as western larch, western white pine and ponderosa pine. The result of essentially eliminating natural fire has also reduced site preparation which provided appropriate seed bed for germination and establishment of natural regeneration of early seral species. Additionally, the lack of fire has allowed increased stand densities.

The accidental introduction of the exotic white pine blister rust (*Cronartium ribicola*) decimated the white pine component, which was historically a major stand component. Western white pine has a natural rust resistance of less than ten percent (10%), and as a result, there has generally been a loss of ninety percent (90%) or more of the western white pine throughout this analysis area and over the landscape in general. Areas (approximately 312 acres) that were harvested using a regeneration method within the project boundaries were planted with a mix of native species including rust resistant western white pine (V-4).

The combined effects of these influences have resulted in substantial reductions in the representation of these long-lived, shade-intolerant seral species in the overstory and a substantial reduction in seed source to provide for natural regeneration of these species.

Within the Avery Fuels Reduction Project Area stands dominated by mid to late seral species (grand fir, Douglas-fir, western redcedar, and mountain hemlock) have had relatively small amounts of change. Stands with early-seral species composition (forests dominated by the shade-intolerant, early-seral species of western larch and western white pine) display a substantial decline. The stands that developed following the two wild fires discussed above have resulted in stands dominated by shrub species and grand fir, Douglas-fir, and lodgepole pine. The shrubfields show some evidence of natural regeneration which mainly is a mix of grand fir, Douglas-fir, lodgepole pine and some ponderosa pine (most of which has been identified as off-site ponderosa pine).

As a consequence of these changes in forest composition the risk of large area losses to fire, insects, disease, weather events and other major disturbances is increasing when compared to historical conditions.

Forest Structure

Existing and historic forest structure, based on size class groupings, within the St. Joe River Basin is presented in Table 29. Also, the current forest structure for the Avery Watershed Analysis Area, located within the St. Joe River Basin, is presented in Table 25.

Table 29 - Size Class Distribution

Forest Structure	Shrub/Seed/	Poles/Small/	Large Mature/	OG

	Sapling	Medium	Overmature	(allocated)
St. Joe Basin (all Lands) Mean Historic	20.5%	35.6%	23.7%	20.2%
St. Joe Basin (NFS Lands) Current	19.4%	49.4%	20.0%	12.0%
Avery Fuels Reduction (NFS Lands) Current	50.0%	46.6%	2.5%	<1%

Note: Allocated old growth % for the current acres within the St. Joe Basin is from FIA data (April 11, 2006).

There is a trend away from mature/overmature and old growth forest structure toward smaller trees (IPNF, 1997, *Toward a Forest Ecosystem Approach: An Assessment for the St. Joe Area*) in the St. Joe River Basin. Within the St. Joe River Basin, historic conditions are shifting to a more homogeneous structure. The primary causal factors influencing this shift have been the commercial harvest of the older and larger overstory starting in the early 1900s, large stand-replacing wildfires in 1910 and 1934, combined with efficient fire suppression starting in the 1930s. The resulting trend has been a more homogenous forest structure influenced by an increase in the stands having trees with a smaller average diameter and a reduction in the large mature and old growth structure.

This shift in age or size class distribution in the Avery Fuels Reduction Project Area results from successful fire suppression as discussed above combined with less timber harvest than the rest of the St. Joe River Basin. These circumstances promoted continued stand growth and development over a 60- to 90-year period within this project area.

In the absence of disturbance, either natural or human-caused, stands in the pole/small/ medium size classes have changed from their historic stand characteristics. They have generally become more densely stocked often developing closed, or nearly closed, crown canopies and are displaying reducing growth rates and vigor. They are becoming more susceptible to damage or destruction by wildfire, insects and disease. The effects of these damaging agents is enhanced or increased when these overstocked stands experience drought.

In the absence of disturbance, stands that are mature/overmature continue to develop old forest characteristics including a large tree component, large woody debris, increasing snag component, and over time will develop into old growth stands.

Historically the stands within this analysis area were generally one to two-aged, often referred to as even-aged stands. These stands were also characterized as generally having only one or two well-developed canopy layers. The current trend in the forested parts of the project area is towards a stand condition having two-age classes however, the species composition has a higher proportion of mid-seral to late seral species.

The historic landscape of the St. Joe River Basin included openings. These openings ranged in size from small openings of only a few acres to large openings ranging in size from several hundred acres to greater than a thousand acres in size.

Fire was historically the primary disturbance agent in this analysis area. Records show stand replacement fires burned within the Avery Fuels Reduction Project Area in 1910 and 1934. These fires involved acreages from a few hundred acres to greater than a thousand acres. Due to effective fire suppression since the early 1900s, only a few small openings have been created by fire in this analysis area over the last 80 to 100 years.

As a consequence of these changes in the timbered areas of the Avery Fuels Reduction Project Area the risk of large stand-replacing fire events, disease, weather events and other potential disturbances is increasing.

Vegetative Conditions Related to Past Harvest

Relatively little timber harvest occurred within the Avery Fuels Reduction Project Area prior to the late 1950s. Some very old stumps indicate that some harvest did occur prior to the late 1950s, although no records prior to that time were found related to those early harvest activities. This early activity may have been related to timber salvage and removal of specific products such as large western larch, western white pine, ponderosa pine, Douglas-fir and western redcedar. Review of the stand histories for this area did not

identify timber harvest activities prior to 1958 (V-3). Records show the following past harvest activities (Table 30).

Table 30 - Past Timber Harvest in the Avery Fuels Reduction Project Area

Timber Sale	Year of Harvest	Acres of Timber Harvest
Kelly Creek	1992	30
Hoyt Creek	1993	25
Avery Hill	2001	113
	Total	168

In 1992, 12 acres were clearcut and 18 acres were harvested using the seed tree method (Kelly Creek Timber Sale); in 1993, 10 acres of sanitation salvage and 15 acres were cut using the shelterwood method (Hoyt Creek Timber Sale); and in 2001, 113 acres of sanitation salvage (Avery Hill Timber Sale). A total 168 acres were commercially harvested during this time. The percentage of the area harvested is <2%.

There were three previous timber sales identified within the Avery Watershed Project Area**:** Kelly Creek Timber Sale- 1992, Hoyt Creek Timber Sale- 1993 and the Avery Hill Timber Sale- 2001. The project file for this analysis area contains a listing of commercial timber harvest activities from 1958 through 2004 (ACT-1, V-3).

Vegetative Conditions Related to Other Past Activities

Other past activities that have occurred in the Avery Fuels Reduction Analysis Area include: artificial regeneration (planting), site preparation (mechanical or prescribed burning), and pre-commercial thinning. Records reveal that planting activities have been occurring and recorded since the 1930s. The breakdown of acres planted by decade is as follows (Table 31).

Table 31 - Acres Planted in the Avery Fuels Reduction Project Area

Decade	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	Total
Acres	691	0	43	176	0	383	59	90	1,442

A total of 1,442 acres have been planted in the analysis area since 1935, of which 135 acres have been re-planted. In the 1930s some areas were planted with off-site ponderosa pine, which has shown to be unsuited for this area. Beginning in the 1950s through the 1980s Douglas-fir was the species of choice for planting. From 1993 to the present a mix of rust-resistant western white pine and western larch is the species mix generally planted.

Reviewing the records for site preparation treatment activities indicate that 1,641 acres were treated between 1959 and 2003. The types of treatments include chemical (393 acres), mechanical (81 acres) and prescribed burning (1,225 acres). Most of the chemical treatment activities occurred between 1963 and 1966, with one stand being treated in 1959 and another stand treated in 1982. The small amount of mechanical site preparation that occurred took place in 1959, 1964 and one stand in 1992. Prescribed burning has been implemented since 1959, most of which has been in the shrubfields. Approximately 177 acres of the prescribed burning activities has occurred in harvested areas in preparation for planting.

Relatively little pre-commercial thinning has occurred in the analysis area. Only 69 acres were treated in the mid-1980s.

Environmental Consequences

No Action

Direct and Indirect Effects

Forest Composition

The No-Action Alternative would continue the current trend of decreasing the contribution of western white pine and western larch in species composition within this project area. Generally, less than ten percent of western white pine is resistant to blister rust; and available natural seed sources in the Avery Fuels Reduction Project Area are relatively low and decreasing as mature white pine continue to die from blister rust infection and other factors. White pine is currently a minor component (less than one percent) in the forest stands considered for treatment in this assessment and would continue to decrease under the No-Action Alternative.

Through self thinning the percent of western larch will continue to decrease over time as grand fir and Douglas-fir and other late seral species continue to over top western larch. The composition of western larch, currently <1% of this analysis area, would decrease with the No-Action Alternative.

The current policy to suppress all fires in this area would continue. As a result, the composition of western larch would depend on the survival of existing trees. Due to the severe intolerance of western larch to shading it does not effectively compete once its position in the canopy is not dominant. In the absence of fire or other thinning agents (natural or human-caused) the more shade-tolerant species will continue to develop and compete with the western larch. Natural regeneration would continue to be the more shade-tolerant species. The impact of competition would continue, and over time a gradual replacement of western larch by more shade-tolerant species would be expected. In the absence of fire or other thinning agents that reduce competition, the contribution of western larch would be expected to decline under the No-Action Alternative.

Ponderosa pine has historically dominated a very small percentage (approximately 1%) of the project area and 2.1% of the St. Joe River Basin. Over time this component would remain only as very scattered individuals or very small groups, somewhat similar to its current contribution within this analysis area. Off-site ponderosa pine would continue to regenerate where it is present. Areas currently having off-site ponderosa pine would continue to increase in disease and insect activity due to being highly susceptible. As natural regeneration of the off-site ponderosa pine continues this process would be perpetuated.

Lodgepole pine contributes approximately 39.3% to the forest cover types within this project area. These stands have developed to ages, average tree size, and stand densities that put them at moderate to high risk for stand loss to mountain pine beetle (*Dendroctonus ponderosae*). For this project analysis, lodgepole pine trees with a d.b.h. of $\geq$8 inches were identified as moderate risk trees. With the current species composition, average age and densities of stands having lodgepole pine, lodgepole pine $\geq$8 inches d.b.h. is considered to be at moderate risk for a mountain pine beetle attack. These stands would be expected to regenerate naturally, predominantly to grand fir and Douglas-fir, with some lodgepole pine. In the absence of fire or other ground-disturbing disturbance expected under this alternative, this regeneration process may require from ten to thirty years to restock these stands.

Current conditions have resulted in much higher proportions of the more shade-tolerant species, especially the grand fir, Douglas-fir, western hemlock and lodgepole pine forest types, than historically existed in the area. This trend is expected to continue with the No-Action Alternative which would not harvest timber or plant trees while current fire suppression policies continue.

Under the No-Action Alternative, stand composition is expected to change over time with a continued reduction in the existing component of shade-intolerant, early-seral species and a continued increase in more shade-tolerant mid- and late-seral species. This alternative would result in decreased numbers of western white pine and western larch over time. This trend would be expected to continue. As a result of this shift in species composition, the risk of loss to wildfire, insect and disease is expected to increase.

This shift in stand composition to more shade-tolerant species, predominantly grand fir, western hemlock, and lodgepole pine, and to some degree Douglas-fir would also increase the risk and extent of loss from fire. These species are less adapted to surviving fire than are the more seral shade-intolerant species such as western larch, ponderosa pine and Douglas-fir. As these more fire-sensitive species increase as a percent of stand composition, the risk of losing entire stands increases if fire occurs.

Forest Structure

No-Action Alternative would result in no direct management induced changes to forest structure.

Indirectly, forest structure would change over time. Forest stands in the project area that are dominated by shade tolerant species such as grand fir, Douglas-fir and western hemlock can generally be classified as stands where the canopy is moderately closed, trees are crowded (moderately to heavily stocked), and live crowns are beginning to decline in both crown width and height. In the majority of the stands the trees are competing for growing space. Both diameter and height growth is decreasing, accompanied by a gradual decline in tree vigor. These stands are experiencing a gradual increase in susceptibility to wildfire, disease and insect attack.

The existing shrub/seed/sapling stand size classes are expected to continue to develop towards the small/medium size classes.

The small and medium stand size classes are generally represented at historical levels. Although growth rates are declining, these stands are expected to continue development towards the older and larger size classes. This developmental trend is expected to occur at a relatively slow rate due to reducing growth and vigor resulting from increasing stocking levels. In the absence of disturbance associated with this alternative little change in growth rates, stand densities, species composition or other stand characteristics would be expected in the foreseeable future.

In the large areas that occur as shrubfields (approximately 50%) some of the areas would continue to increase in conifer regeneration and slowly develop into young stands predominately consisting of grand fir and Douglas-fir. This increase in conifer regeneration generally occurs along the perimeter of the shrubfield adjacent to the timbered areas.

The large mature/overmature age or size classes would be expected to increase over time in the absence of disturbance. This is predominantly the result of in-growth from the younger/smaller size classes. Wildfire is a potential cause for change in this age/size class however the current fire suppression policy would continue which reduces the probability of fire as a primary vector for change. However, at some point in time wildfire would be expected to cause a stand-replacing event. The potential exists for other natural disturbances, more particularly insect or disease outbreaks, to act as stand-replacing agents and influence a shift of impacted stands towards younger/smaller size classes. If this were to occur, the shift would be a reduction in the mature/overmature classes and an increase in the shrub/seed/sapling classes. Under the existing conditions within this analysis area, this potential is highest in lodgepole pine forest cover types. As discussed above, mature lodgepole pine stands would be expected to shift from the large mature/overmature size class to the shrub/seed/sapling size class.

Another potential disturbance vector effecting potential change in the forest structure, as described by stand age/size class, would be increases in root disease. Within this proposal area, approximately 19% of the analysis area is dominated by the more root-disease-susceptible species, specifically Douglas-fir and grand fir. These species are the most susceptible to root disease of all the native forest trees in northern Idaho. A study on the Coeur d'Alene River Basin (Matthews 1995) simulated effects of root disease on mature stands of Douglas-fir and grand fir cover types on these habitat types. Reductions of stand basal area was significant (net decline over 100 years), mean diameters never exceeded nine inches over a 50-year period (without root disease it exceeded 14 inches) and canopy closure decreased from 75 percent to 45 percent and did not regain 75 percent closure for a period of approximately 80 years. This would indicate the effects that severe root disease can have on these habitat types. Crown closure, average diameters and other stand characteristics recover over time when western redcedar and hemlock become predominant components. This recovery process may take up to 100 years to occur. The occurrence of root disease is currently at endemic levels within the project area. With declining growth and vigor, these stands are expected to have increasing effects of root disease. Increased mortality from root disease and other agents can be expected in the larger sized, more susceptible trees. This would create small openings due to losses of individual and small groups of medium and large trees throughout the project area. These openings would regenerate with shade-tolerant species.

As we lose the larger trees over time, these stands would experience a reduction in mean tree size. As a result, over the next 30 to 50 years, these stands may experience a decrease in mean diameter as well as a decrease in canopy closure resulting from individual tree and small group mortality. This would begin to develop a very minor increase in the smaller size class representation, and an equivalent decrease in the older/larger size class representation in this area. This would be expected to be a very slow process, and

in-growth by smaller trees to larger size classes would be expected to exceed the size reductions resulting from this type of disturbance.

Cumulative Effects

Forest Composition and Structure

As a result of reduced disturbance patterns and continuing successional development of existing stands, this alternative would maintain the current species composition trend. The number and extent of western larch, western white pine and ponderosa pine would continue to decrease, being replaced by grand fir, Douglas-fir, western hemlock, western red cedar. This same slow process of succession would gradually shift Douglas-fir and grand fir forest types towards western hemlock and western red cedar types. Only incremental changes in these forest cover types would be expected.

Under this alternative only incremental cumulative effects on species composition, or forest type, would be expected.

The resultant cumulative effects would be a moderate increase in the conifer representation in the brush fields. In the forested areas a moderate increase in the shrub/seedling/ sapling size class associated with a similar moderate decrease in the mature/overmature size class would be expected. The cumulative effects on the pole/small/medium size classes would be only incremental.

Alternatives B and C

Direct and Indirect Effects

Forest Composition

Commercial Thinning:

Alternatives B and C would increase the percent of western larch and western white pine in treated stands where commercial thinning would occur. This would be accomplished by removing other species (listed by priority) such as grand fir, lodgepole pine, Douglas-fir, western hemlock, and western redcedar. The amount of tree removal would be approximately 50% of the existing stand with a range of 40 to 60% of the canopy being removed. This commercial thinning would primarily be a thinning from below, where the smaller diameter class trees (8” to 15” d.b.h.) are the priority for removal. The larger diameter trees along with enough of the smaller diameter class trees would be retained to meet the desired residual basal area for each stand. Subsequently, the acres treated would increase in the percentage of western larch and western white pine. Approximately 112 acres are proposed to be treated. The direct effect would be a moderate increase in open canopy stands in these two areas.

The current policy to suppress all fires in this area would continue. As a result, the contribution of western larch in untreated areas would depend on the survival of existing trees. Due to the severe intolerance of western larch to shading it does not effectively compete once its position in the canopy is not dominant. In the absence of fire or other thinning agents (natural or human-caused) the more shade-tolerant species would continue to develop and compete with the western larch. Natural regeneration would continue to be composed of the more shade-tolerant species. The impact of competition would continue, and over time a gradual replacement of western larch by more shade-tolerant species would be expected in untreated areas within this proposal. Under this proposal the number of acres treated would remain the same for both Alternative B and Alternative C.

Off-Site Ponderosa Pine (Mechanical and Mechanical/Prescribed Burning):

With Alternatives B and C 253 acres are proposed for mechanical treatment, of which 160 acres (7 stands) would be treated with prescribed fire (jackpot burn: 91 acres or broadcast burn: 69 acres) one to two years following the mechanical treatment. The mechanical treatment would be chainsaw felling of all off-site ponderosa pine, leaving all other species in place. The prescribed burning would be either broadcast burning (areas consisting mostly of shrubfields) or jackpot burning (areas mostly timbered) on approximately 160 acres. Artificial regeneration could occur on approximately 91 acres where both a mechanical treatment (chainsaw felling) and a jackpot burn treatment are applied.

Ponderosa pine has historically dominated a very small percentage (approximately <1%) of the project area and 2.1% of the St. Joe River Basin. Over time this component would remain only as very scattered individuals or very small groups, somewhat similar to its current contribution within this analysis area.

Artificial reforestation of off-site ponderosa pine treatment areas would consist of planting a mix of seventy percent (70%) western larch and thirty percent (30%) rust-resistant western white pine, and where appropriate native ponderosa pine (<1%). This would increase the representation of these long-lived, seral species on approximately 91 acres, or 0.8 percent of the analysis area. The intent of this project would be to artificially regenerate these sites with early seral western larch and rust resistant western white pine. However, the removal of the off-site ponderosa pine would increase the overall heath of these stands.

Following treatment, 253 acres of off-site ponderosa pine would be regenerated, with the intent of planting approximately 91 acres with early-seral native species. Following the removal of the off site ponderosa pine and planting, the percent of western larch and western white pine would increase by approximately 0.8 percent. The health and vigor of stands would increase in areas where off-site ponderosa pine was removed and a follow-up planting of native species, western larch, western white pine and ponderosa pine took place. These same stands would be expected to regenerate naturally, predominantly with grand fir, Douglas-fir and in some areas native ponderosa pine. Natural regeneration is occurring and is expected to continue. However, in the absence of fire or other ground disturbance, natural regeneration of early seral species may be delayed for some time. Under this proposal the number of acres treated would remain the same for both Alternative B and Alternative C.

<u>Shrubfield Prescribed Burning:</u>

Following treatment under this alternative, the percent of shrubfields in an older, less palatable state would be reduced by 30.3 percent (3,497 acres in Alternative B) and 26.3 percent (3,022 acres in Alternative C). Alternative C proposes to treat 475 less acres than Alternative B due to a higher potential of mass failure in some areas. Approximately 632 acres under this proposal have been treated in the past using prescribed fire. The following is a list by year and acres treated: 1965- 31 acres; 1979- 11 acres; 1982- 52 acres; 1983- 227 acres; and 1986- 311 acres. Shrubfield treatments would occur over a three- to five- year period. Approximately 350 to 1,000 acres would be treated annually, depending on juxtaposition of treated units, length of burn window, length of time a since any individual unit was last treated, and vegetative condition. In addition, treated units and proposed units would be reviewed annually. The timing and juxtaposition of all shrubfield treatments is important to reduce the potential for mass failure and obtain the desired age class distribution of the brush species under both alternatives.

Current conditions include much higher proportions of older less palatable brush species for browsing by herbivores in this area. In addition the potential for extreme fire behavior and thus the threat to the community of Avery and surrounding private land has increased. Treatment of the shrubfields would tend to occur at the drier end of the prescribed parameters as described in the burn plan. The reason for this would be to reduce the amount of existing brush and maximize the effects of the treatment. In addition the drier end of the prescription would allow for a longer implementation window and a more desirable response of shrub species from the burn treatment. The treatment would maintain the shrubfields where they are. The resultant effect would be shrubfields having younger, more palatable plants available as browse and a reduction in the potential for unwanted effects from wildfire.

During the review of shrubfields in the analysis area some stands were removed from this proposal. The removal of these stands was due to conifer regeneration in these shrubfields and was based on the amount of existing conifer regeneration, stand age, size class, and structural stage as well as the potential for the entire shrubfield to become established with conifers. Units with high mass failure potential were eliminated from Alternative C.

Forest Structure

Alternatives B and C would increase the percent of western larch and western white pine in treated stands where a commercial thinning occurs. The change in stand structure would be minimal. The treated units would be reduced in stocking density however the structure would remain similar due the even aged nature of these stands. In addition the species composition would be altered favoring western larch and western white pine as leave trees, but this would not affect the stand structure. The stand structure would remain as even-aged, 2-storied (70-90 years old) stands. Approximately 112 acres are proposed to be treated.

In the off-site ponderosa pine treatment units the forest structure change would be minimal by only removing the off-site ponderosa pine. In the treated areas the off-site pine would be removed from the understory and in some cases small openings would be created. The size and location of these are dependent on how much off-site ponderosa pine is present. Approximately 253 acres are proposed to be treated.

The alternatives would result in 3,862 acres (Alternative B) and 3,387 acres (Alternative C) affected by direct management induced changes to forest and shrubfield structure. The structural change from closed-canopy, immature sawtimber size class to open-canopy, immature sawtimber size class would result where areas are commercially thinned.

Where shrubfields are treated the size, composition, and age class of shrub species would be altered. Although a similar composition of species is expected, the size and age class would be reduced, making it more palatable to herbivores and reducing the risk of uncontrollable wildfire. Shrubfields having existing shrub/seed/sapling stand size classes are expected to continue to develop towards the pole/small/medium size classes. Due to density of the shrubfields, generally only shade-tolerant species such as grand fir, Douglas-fir, western hemlock and western redcedar are able to successfully regenerate under the shade of the shrubs. However, as treated shrubfields show evidence of successful natural conifer regeneration, future burn treatments may be postponed or eliminated.

Cumulative Effects

Forest Composition and Forest Structure

Following treatment the contribution of long-lived, early-seral species, predominantly western larch and western white pine, is expected to increase as part of the forest composition. This would be the result of artificial reforestation activities that would preferentially plant and/or maintain these long-lived early seral species on 253 acres within the project area. In addition, where commercial thinning activities would take place the percentage of western larch and western white pine present in the residual stand would increase by focusing on removing mostly late-seral, shade-tolerant species.

Cumulatively, a relatively small increase (approximately 3.7%) is expected in the contribution of long-lived seral species resulting from vegetation management activities under both of the action alternatives (B and C) within this analysis area. The biggest change 2.2% acres would occur in the off-site ponderosa pine portion of the project. Approximately 112 acres or <1% in the commercial thin portion of the project would contribute towards an increase in long-lived, seral species. No contribution towards an increase in long-lived, seral species is expected from the shrubfield treatments.

Changes in forest structure from the commercial thinning and off-site ponderosa pine treatments would change these sites from a closed canopy to an open canopy having a higher percentage of long-lived, seral species.

Aggressive suppression of wildfires is expected to continue. As a result, the trends in stand structure and composition related to the absence of fire are also expected to continue. The rate of change influenced by the lack of wildfires is relatively slow over time, resulting in expected incremental cumulative effects on the vegetation resource over time.

Other activities including field survey and data gathering, weed control, public use activities, and road and trail maintenance would have only incidental or no cumulative effects on the vegetation resource.

Activities completed by Shoshone County within the project area include fuels reduction around and adjacent to the structures in the town of Avery and the Forest Service administrative site. These activities were conducted in 2005 and 2006. The entire length of the town of Avery was completed (approximately one mile on each side of town). In addition, the Forest Service administrative site (located within the town limits) was also completed. The project consisted of felling trees 4 inches d.b.h. and removing existing brush for 100 feet along the perimeter of town. The slash and brush was then piled and burned.

Regulatory Consistency

Specific goals, objectives and standards for timber management are described in the Forest Plan on pages II-2, II-8 and II-32. The action alternatives are consistent with these guidelines and comply with Appendix A (Silvicultural Prescriptions), Summary of Timber Information and Vegetation Management, providing direction for silvicultural practices on the Idaho Panhandle National Forests. The activities described for the action alternatives are consistent with this direction. Proposed management activities are designed to improve stand health and vigor, and maintain or enhance species composition and stand structure. This would minimize risk of future stand loss from forest insects and disease as well as reduce risk of stand loss to weather, fire or other disturbances.

Small openings in the off-site ponderosa pine treatment areas are expected to be created, ranging in size from 0.2 acres to 2 acres in size. Treating some of the area with prescribed fire following the felling of the

off-site pine may cause a slight increase in opening size. These opening would be artificially regenerated with long-lived seral species. Review of regeneration indices for the St. Joe Ranger District and the analysis area display adequate ability to regenerate these openings. These stands are proposed for treatment to remove the off-site ponderosa pine. The intent is to eliminate as much of the off-site ponderosa pine as possible whether or not it has reached the culmination of mean annual increment of growth (16 USC 1604 (m); FSM 1921.12f; FSH 1909.12 Chapter 60). Off-site ponderosa of all sizes and ages would be cut or burned, but none of the trees would be removed as forest products.

Proposed vegetative treatments in the commercial thinning area and the off-site ponderosa pine area are on lands classified as suitable for timber production or where salvage and miscellaneous products may be removed on an unscheduled basis. Parts of the shrubfields are currently classified as suitable for timber growth, while other areas are classified as unsuitable. Prescribed fire would be used as needed to meet silvicultural objectives as prescribed in the stand silvicultural prescription. In addition, treating the shrubfields would provide wildlife habitat in the form of browse (Forest Plan III-2 and III-4).

VISUAL QUALITY

(Project File Volume III, Section VQ)

Regulatory Framework

Visual Quality direction is contained in the Idaho Panhandle National Forests Land and Resource Management Plan of 1987 (Forest Plan). Managing for visual quality is an integral activity in management areas (MA) and is described in terms of meeting Visual Quality Objectives (VQOs). Each MA has a range of VQOs that define the degree of acceptable alteration to the characteristic landscape. The highest visual concerns for the proposed Avery Fuels Reduction units are from viewpoints along Forest Highway 50 (FH 50). The project area VQOs of Retention (R) and Partial Retention (PR) reflect the high sensitivity for landscape appearance along this route.

Geographic and Temporal Scope of the Analysis

The geographic scope of the visual quality analysis for the Avery Fuels Reduction Project was confined to boundaries of the project area while taking into consideration the appearance of the surrounding natural landscape. The temporal scope of the analysis is confined to the decade following a decision.

Affected Environment

Analysis Methods

Visual Quality Objectives (VQOs) were established during the Forest planning process and mapped by computer. The mapping was based on the area seen from sensitive travel corridors and other features having a high visual sensitivity level. VQOs were assigned according to guidance provided in the Visual Management Handbook, Chapter I of the National Forest Landscape Management Series (USDA Forest Service, 1974).

As of December 1995, The Scenery Management System (SMS) Agriculture Handbook Number 701 "Landscape Aesthetics, A Handbook for Scenery Management " officially replaced the Visual Management System (VMS) defined in Agriculture Handbook #462 as the USFS visual resource guide. The Idaho Panhandle National Forests (IPNFs) are currently under the 1987 Forest Plan. Until a revised or new Forest Plan is adopted, both analysis tools are necessarily referenced. The new SMS expands on the original VMS concepts, integrating scenery management with ecosystem management.

This situation necessitates use of VMS terminolgy in combination with equivalent SMS terminolgy. For clarification purposes, the old VMS terms will be used, followed by the new SMS equivalency. For example, the term "VQO" will be followed by its equivalent "Scenic Integrity Objective" (SIO) in parenthesis.

Effects to the scenic resource were measured using the following criteria or indicators:

- Would activities meet established Forest Plan VQOs (SIOs) and what design features would be needed to accomplish this?
- What changes to the existing landscape character would occur because of proposed activities?

Variety Class (Scenic Attractiveness [SA])

Variety (SA) classifications are: Class A- Distinctive; Class B- Common (Typical), and Class C- Indistinctive (Undistinguished).

> Class A – Distinctive: Areas where landform, vegetation patterns, water characteristics and cultural features combine to provide unusual, unique or outstanding scenic quality. These landscapes have strong positive attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.
>
> Class B – Common (Typical): Areas where landform, vegetation patterns, water characteristics and cultural features combine to provide ordinary or common scenic quality. These landscapes have generally positive attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance. Normally they would form the basic matrix within the ecological unit.
>
> Class C – Indistinctive (Undistinguished): Areas where landform, vegetation patterns, water characteristics and cultural features have low scenic quality. Often water and rock form of any consequence are missing in class C landscapes. These landscapes have weak or missing attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.

The characteristic landscape of the Avery Fuels Reduction Project Area units includes Class A - Distinctive and Class B - Common or Typical Variety Class (SA).

Existing Condition (Existing Scenic Integrity)

Landscape Character

Landscape character describes the visual (and cultural) image of a geographic area. It consists of the physical, (biological and cultural) attributes that make each landscape identifiable or unique. The combination of vegetative patterns, landforms, rock formations, waterforms, (and cultural values) constitutes an area's landscape character.

The Avery Fuels Reduction Project Area is located in the Upper St. Joe River Subsection of the Bitterroot Mountain Section of the Northern Rocky Mountain Forest Coniferous Forest Alpine Meadow Province in the southern part of the Idaho Panhandle. It is located in the Spokane River Basin, a component of the upper Columbia River Basin.

The landscape character of the Avery Fuels Reduction Project Area includes forested and shrubfield landscapes.

Landforms

Volcanic uplifting created the characteristic landforms of the Avery Fuels Reduction Project Area landscape. Steep-sided slopes and narrow, incised valley bottoms are typical of the area.

Waterforms

The St. Joe River is the focal water-related landscape element in the project area. The St. Joe River is a congressionally-designated "Wild and Scenic River", and the portion that flows through the project area is designated as "Recreation River".

Vegetation

Wildfire, subsequent wildfire suppression efforts, logging, and associated road development activities are the driving forces that have shaped vegetative patterns within the Upper St. Joe.

Cultural Elements

The primary cultural element within the St. Joe River corridor is Forest Highway 50, a double-lane, paved road that goes between St. Maries, Idaho and Gold Pass. This is the main transportation conduit linking the small population center of Avery to the towns of St. Maries in Idaho and St. Regis in Montana. The St. Joe River is sandwiched between Forest Highway 50 on the north and the old river road on the south within the analysis area. Forest Roads 1237 (Kelly Creek) and 1934 (Dunn Peak) access the analysis area.

Landscape Visibility

Landscapes are viewed to varying degrees from different locations and subsequently differ in perceived importance. To assist in scenery analysis, Sensitivity (Concern) Levels are used to rank this importance. Sensitivity (Concern) Levels are a measure of the degree of public importance placed on landscapes viewed from travel ways and areas of use. The levels are classified as High, Moderate, or Low calibrated on the importance of the travel route, the volume of use, duration of the view, and connection to National Forest System land. Travels route importance is calibrated on the following numeric scale:

- Level 1 (Primary travel ways) - Highest Sensitivity (High Interest in Scenery),
- Level 2 - Average Sensitivity (Moderate Interest in Scenery)
- Level 3 – Lowest Sensitivity (Low Interest in Scenery)

The St. Joe River and Forest Highway 50 along the river in the project area are the only currently identified areas with High Levels of Sensitivity (Concern) associated with the Avery Fuels Reduction Project Area.

Visual Quality Objectives (Scenic Integrity Objectives)

Visual Quality Objectives (Scenic Integrity Objectives [SIOs]) consist of five (six) levels that describe the degree of modification acceptable for a given area, according to the Forest Plan. VQOs range from Preservation (Very High SIO) to Modification (Very Low SIO). The levels are: Preservation (Very High SIO), Retention (High SIO), Partial Retention (Moderate SIO), Modification and Maximum Modification (Low and Very Low SIOs) and (Unacceptably Low SIO).

The Forest Plan VQO (SIO) mapping was digitized and placed in a VQO (SIO) GIS data layer for the project area. See the project file map showing site-specific VQOs (SIOs) for the area (VQ-2). The table below summarizes the treatment acreages within the project area of each of the five visual quality integrity levels previously described.

Table 32 - Forest Plan VQOs (SIOs) of the Avery Fuels Reduction Project

VQO (SIO)	Proposed Treatment Acres	Percent of Total Proposed Treatment
Preservation (VH)	0	0
Retention (H)	315	8%
Partial Retention (M)	887	23%
Modification (L)	1134	29%
Maximum Modification (VL)	1526	40%

Environmental Consequences

Introduction

Land management activities can affect the scenic resource by creating contrasts - between natural or naturally appearing forested landscapes and those unacceptably modified by management activities. These contrasts consist of changes in line, form, color, and texture of the vegetation and soil. The effects these alterations have are somewhat dependent upon individual values. In general, a specific VQO (SIO) can be achieved by decreasing the visual contrast of the deviation viewed.

Commercial Thin (CT): This treatment can meet Retention in all viewing zones if unit boundaries are blended with surrounding vegetation patterns and topographic features such as natural openings (use similar shapes and avoid straight line boundaries).

Prescribed Burning: The treatment of shrubfield burning can meet Retention in all viewing zones. Loss of vegetation would be short-term, lasting one growing season. The shapes of burned units need to blend with existing topography, natural openings, and surrounding vegetation texture, and avoid straight lines and uniformly geometrical shapes.

No Action

The visual characteristics of the area would continually change as the natural vegetation proceeds through normal life cycles.

Proposed Action (Alternative B)

The proposed commercial thin unit falls with in the VQO (SIO) of Retention (H) and Partial Retention (M). This unit would be viewed from Forest Highway 50. The unit is above the old St. Joe River Road. There would be a no-entry buffer from the road uphill for approximately 200 feet. An electrical power line is located in this buffer. The buffer would be used to screen and transition into the harvest unit above. The harvest would be accomplished with a helicopter flying the logs and tops uphill to a landing. Sale prep personnel would coordinate with the district VQO (SIO) specialist during layout to avoid straight lines and to use natural features in the layout phase. An average of 40% of the crown would be removed. Removal would focus on understory smaller sized trees, with the intent to retain larger sized trees whenever possible.

The off-site ponderosa pine felling and prescribed burning would fall within the VQOs (SIOs) of Retention (H) and Partial Retention (M). The off-site ponderosa pine does not have any commercial value, therefore the trees would be felled on site and the areas would be treated with a prescribed burn. The felling and burning needs to be coordinated with the district VQO (SIO) specialist so that straight lines are avoided and the use of natural features are incorporated into the project.

Alternative C

This alternative would not burn as many acres of shrubfields due to mass failure potential. Effects would be the same as Alternative B.

Forest Plan Consistency

All alternatives with associated design features are consistent with management direction in the IPNF Forest Plan and would meet VQOs (SIOs).

WATERSHED RESOURCES

(Project File Volume III, Section SW)

Regulatory Framework

IPNF Forest Plan Standards

The IPNF Forest Plan outlines standards that meet Forest-wide goals to not significantly impair the long-term productivity of the water resources and to meet or exceed State water quality standards (USDA, 1987, p. II-33). It requires implementation of project-level standards and guidelines for water quality contained in the Soil and Water Conservation Practices Handbook (USDA, 1988), including those defined by State regulation or agreement between the State and Forest Service. Forest-wide standards and guidelines for Management Areas 1, 4, 5, 6 and 9 are presented in the IPNF Forest Plan (USDA, 1987, p. III-4, 20, 24, 30, and 40).

INFS Forest Plan Amendment

Standards for managing riparian areas were established as Forest Plan Amendments based on the Inland Native Fish Strategy (1995), commonly referred to as INFS. Riparian Habitat Conservation Areas (RHCA) are determined for watersheds and essentially promote water quality benefits through stream shading, vegetative buffers for sediment control, and channel stabilizing features of woody debris and streambank vegetation. INFS standards state that interim RHCAs are 300 feet slope distance along fish-bearing streams, 150 feet slope distance along non-fish bearing streams, and 50 feet slope distance along intermittent streams (USDA, 1995).

Idaho Water Quality Act

The State of Idaho established the Idaho Water Quality Law (§ 39-3601 et. seq.) and Water Quality Standards (IDHW, 2003) to protect beneficial uses. The State's Antidegradation Policy (IDAPA 58.01.02.051) directs that existing uses and the level of water quality necessary to protect those uses must be maintained and protected. In order to meet the intent of the Clean Water Act (CWA), the Forest Service is responsible for implementing non-point source pollution control and the Idaho Water Quality Standards on

National Forest System lands through a Memorandum of Understanding with the State of Idaho (IDWR, 1993).

Clean Water Act

The intent of the CWA of 1977 (33 USC 1323) is to "...restore and maintain the chemical, physical, and biological integrity..." of streams (US Congress, 1988). The CWA also directs the States to administer the act and to develop an antidegradation policy (40 § 31.12).

Analysis Area

The project area is between Hoyt Flat and Avery, Idaho along the middle portion of the St. Joe River, just downstream of the North Fork St. Joe confluence (hydrologic unit code (HUC) 1701030414) (SW-2). The St. Joe River drains into Coeur d'Alene Lake near St. Maries, Idaho, approximately 50 miles downriver from the project area.

The project area encompasses approximately 12,740 acres (20 mi^2) of mostly National Forest managed land (~1250 acres privately owned) surrounding many first and second-order streams (sixth-level HUCs) including Hoyt Creek, Hamilton Creek, Rock Creek, Storm Creek, Trego Gulch, Setzer Creek, Avery Creek, Kelly Creek, Roundhouse Gulch and several smaller (less than 400 acres) unnamed drainages. The proposed activity area includes approximately 3,862 acres of land within the project boundary that drain into the St. Joe River. The landscape of the project area is rugged terrain with moderately high relief (elevations ranging from 2390 to 5685 ft).

The watershed analysis area (SW-2) (cumulative effects area – slightly different than the project area) encompasses 12,712 acres of land (19.9 mi^2) and includes approximately 7.5 miles of the St. Joe River in addition to all drainages of the previously named tributaries except Kelly Creek. Kelly Cr. was excluded from the watershed analysis area because no proposed management activities are within this watershed.

Watershed resources (watershed condition, stream channel condition, water quality and beneficial uses, and water yield) are analyzed for the Avery Fuels Reduction Project within the watershed analysis area boundary. Watershed effects are scale-dependent: the magnitude of change in water and sediment yield is inversely proportional to stream-order (MacDonald 2000). Therefore, detectable changes should be expected high in a watershed where activities overlap in time and space. The scale of the Avery Fuels Reduction Project Area in relation to the much larger St. Joe River sub-basin would tend to render any effects immeasurable beyond the temporal and spatial boundaries of the analysis area. As a result, individual streams are used to base the cumulative effects because the streams are small and the effects from the proposed activities are expected to be minimal. The expected effects on the St. Joe River are qualitatively addressed.

Analysis Methods

The assessment of environmental effects focuses on four factors for watershed resources: (1) watershed condition, (2) stream channel condition, (3) water quality and beneficial uses, and (4) water yield. The following tools were used in assessing these four factors.

Watershed Condition Model

A comparative analysis of existing watershed condition (status) based on GIS data was conducted for the IPNF Forest Plan Revision effort at the 6th-code hydrologic unit level (SW-3). Although the tributaries in the project area are not individually addressed in this model, existing conditions were identified for the reach of the St. Joe River within the project area. The current watershed conditions were estimated based on the level of watershed disturbance as measured by road density, roads on sensitive landtypes, stream crossing frequency, equivalent clearcut area, and detrimental soil disturbance (SW-3). Inherent sensitivity is defined in the model by the average annual precipitation along with the dominance of depositional stream reaches, sensitive landtypes, and sensitive snow zones in the watershed (SW-3).

Water Erosion Prediction Project (WEPP)

The WEPP model (Flanagan and Livingston 1995) is a physically-based soil erosion model that can provide estimates of soil erosion and sediment yield considering the specific soil, climate, ground cover, and topographic conditions. Model outputs are primarily intended to indicate trends and to compare

management alternatives, and secondarily to provide quantified estimates of sediment yield. For further information on WEPP, refer to project file SW-4.

StreamStats

StreamStats is an online, integrated GIS application established by the United States Geological Survey (USGS) (http//.streamstats.usgs.gov/html/idaho.html). This program provides estimates for reference peak flows and basin characteristics of major streams in the project area using the procedures outlined in Berenbrock's 2002 report (SW-5a). The equations used to estimate streamflow statistics for ungauged sites were developed through a process know as regionalization, which involves use of multiple-regression analysis to relate streamflow statistics computed for a group of selected stream gauging stations to basin characteristics measured for the stations. The estimates provided assume natural flow conditions at the site.

Field Review

All named tributaries and most unnamed tributaries were surveyed in 2004 from their confluence with the St. Joe River upstream (SW-6). Survey notes included riparian and stream channel conditions, fish habitat and other observations. Additional field work, including soil assessment and RHCA buffer evaluation, was conducted from 2004 to 2006 (SW-6). Roads, stream crossings and drainage structures were inventoried during the 2001 and 2002 field seasons. Information gathered on road-stream crossings included approximate fill volumes, culvert sizes, erosional features and other observations.

Additional Information

Additional watershed data was estimated based on maps, models, aerial photograph interpretation, and GIS data. Additional reference information was collected from previous NEPA projects including the Broadaxe EA (USDA 2005), Weitas Fuels Reduction Project (USDA 2003), the North Fork St. Joe River EIS (USDA 1998), and other scientific literature.

Affected Environment

Reference Condition

The reference conditions are based on natural, physical events and processes that historically shaped environmental conditions across the St. Joe River basin prior to human activities. Effects from natural disturbances such as volcanic eruptions (*e.g.* Mt. Mazama (~7600 years ago) and Mt. St. Helens (May 1980)), alpine glaciations, fires, landslides, and flooding interacted with other land-shaping processes like geologic uplift and stream channel incision to form the basic character of soil resources and watersheds.

Watershed Condition

Over the course of its evolutionary history, a watershed may experience all vegetative conditions; from a lack of vegetation caused by high-intensity wildfire creating hydrophobic soil conditions and extreme runoff events to overstocked dense stands of timber that utilize most soil moisture and intercept much precipitation (especially snow) reducing water yields to minimal levels. Fire may alter hydrologic regimes due to changes in vegetation and soil properties (see Soils Report), which can lead to an increase in the movement of sediment through waterways (Swanson 1981). Every part of the project area may have had some disturbance over time, such that at any one time a variety of watershed conditions, from highly supportive of native species to unsupportive, might have been present across the Avery Fuels Reduction Project Area (USDA 1997).

The average size of a tributary drainage basin within the project area is 1,300 acres (2 mi^2). Proposed activity units generally have southerly aspects and slopes are typically steep to very steep (average 57%; max 90%) (Table 33). The mean annual precipitation in the Avery Fuels Reduction Project Area is 38 inches per year (approximately 50% as snowfall). The elevation within the project area ranges from 5685 feet to 2390 feet, with total relief for individual drainage basins averaging 2470 feet (SW-5b).

Table 33 - Slope and Aspect Summary for Stands within Proposed Treatment Areas

Aspect	Brushfields total acres = 3862		Thinning total acres = 112		Offsite P. Pine total acres = 253	
	acres (%)	average slope (%)	acres (%)	average slope (%)	acres (%)	average slope (%)
NW	0.0	0	7.1	70	3.5	60
N	0.0	0	0.0	0	0.0	0
NE	0.0	0	80.4	68	0.0	0
E	11.8	61	12.5	55	2.5	60
SE	35.8	55	0.0	0	39.0	58
S	25.4	55	0.0	0	17.9	35
SW	17.1	59	0.0	0	15.4	60
W	10.0	50	0.0	0	21.7	60

Stream Channel Condition

Stream channels throughout the project area have eroded north-south trending V-shaped valleys with little to no floodplain. The average channel gradient generally ranges between 10 and 20%, steepening (up to 65%) near their mouths as the tributaries plunge to meet the St. Joe River. Overall, the watershed has a dendritic drainage pattern.

Based on geomorphological characteristics like valley slope and dominate bed material, the named tributaries in the project area primarily are classified as Rosgen type “A” channels with a few reaches having type “B” channels (Rosgen, 1996). The Montgomery and Buffington (1997) classification scheme classifies the project area tributaries as fluvial and colluvial bedrock (Bf and Bc), cascade (Ca), channeled colluvial (Cc), and step pool (SP) morphologies. These channel types are relatively confined and are capable of transporting moderate increases in water and sediment from their drainage areas without changing dimension, pattern or profile (Rosgen 1996; Montgomery and Buffington 1997).

Water Quality and Beneficial Uses

Water quality refers to the physical, chemical and biologic characteristics of water in reference to a particular use. Beneficial uses were designated by Idaho Department of Environmental Quality (IDEQ) based upon assessment of the historic and current value of the water in each stream segment as a function of nutrients, bacteria, pH, dissolved gas, toxic substances, dissolved oxygen, temperature, ammonia, habitat, sediment, and turbidity. The only major aspect of beneficial uses that cannot be assessed based on water quality elements listed above is aquatic habitat. See the Fisheries section for a discussion of reference condition of aquatic habitat.

Water Yield

Water yield is primarily a function of precipitation, landtype, vegetative cover, and drainage area. Natural disturbances such as wildfire would tend to increase water yields by reducing canopy cover and plant uptake of subsurface flows and by producing hydrophobic soils after severe burns (USDA 2002). The reference condition for water yield in the Avery Fuels Reduction Project Area was likely similar to the existing conditions (see below) given that (1) there would have been similar precipitation conditions, (2) no change to the size of drainage area, and (3) the amount of sensitive landtypes and the amount of land within the rain on snow zone does not extensively change over time. Nevertheless, a range of varying water yield conditions could have been present in the project area through space and over time.

Existing Condition

The existing condition was assessed to provide a basis for comparing the effects of the proposed management activities and alternatives. All previous and ongoing activities in the project area are included in the analysis of existing conditions (*see Chapter 3; Past, Present, and Reasonably Foreseeable Activities*).

Watershed Condition

The St. Joe River, from the North Fork confluence near the eastern edge of the project area downstream to its confluence with the St. Maries River, is not identified as being a "Priority Watershed" as defined by INFS (USDA 1999). Tributary watersheds within the analysis area are not individually listed on the IDEQs 2002 Integrated 303(d) and 305(b) Report (IDEQ 2005); rather, they have been grouped into the Middle St. Joe River Assessment Unit (AU) (SW-7). The tributaries in this AU are considered to be "not supporting" beneficial uses (coldwater aquatics and Salmonid spawning) due to thermal modifications and habitat alteration based on 1997 temperature data from Harvey and Blackjacks Creeks (both downstream from the project area). This reach of the St. Joe River and its tributaries are also considered to be "functioning at risk" due to it's moderate to high watershed sensitivity, moderate to high riparian disturbance, and moderate overall watershed disturbance (SW-9). Past human disturbances that may have affected basin hydrology within the analysis area include vegetative treatments, road building, prescribed fire, fire suppression, some salvage harvesting near Roundhouse Gulch and private land development activities.

Stream Channel Condition

The drainages in the Avery Fuels activity area have steep, transport-efficient channels (Montgomery-Buffington Cc, Ca, SP; Rosgen type A & B) and are unlikely to respond to minor management-induced changes in sediment and water yield. All named tributaries are perennial streams, while the smaller, unnamed tributaries are intermittent and ephemeral streams. Most of the drainages in the analysis area are relatively unaffected by roads and logging activities (roadless area within project area) and appear to represent natural conditions; the exceptions are Avery Creek and Roundhouse Gulch. The lower reach of Avery Creek, near its confluence with the St. Joe River, has been channelized into a culvert (~250 feet long) beneath a parking lot (note: underground culvert replaced September, 2006). In Roundhouse Gulch, the channel is aggraded, likely due to historic harvest practices in addition to more recent harvest activities and extensive roading on privately managed land in the upper part of the drainage (SW-8).

Water Quality and Beneficial Uses

The State of Idaho designated the following beneficial uses for this reach of the St. Joe River: (1) domestic water supply, (2) salmonid spawning, (3) cold-water biota, (4) primary contact recreation, and (5) special resource water (IDAPA 58.01.02.110.11). All tributaries in the project area are undesignated surface waters; therefore, they are assigned beneficial uses of cold water aquatic life and primary or secondary contact recreation (IDAPA 58.01.02.101.01). Wildlife habitat (IDAPA 58.01.02.100.04) and aesthetics (IDAPA 58.01.02.100.05) are designated as beneficial uses of all waters of the state of Idaho. Consumptive use of surface water within the project area is primarily by wildlife. There are no identified point sources pollutants within the project area. An old petroleum spill was discovered while replacing an underground culvert at the Avery Work Center in September, 2006. Lab test results revealed a high level for diesel, but the potential pollutant had degraded to a point where no PAHs (polycyclic aromatic hydrocarbons) were detected (SW-27), and the contaminated soil was removed from the area and disposed of (ACT-3); therefore, it is not an existing point source pollutant.

IDEQ's 2002 Integrated 303(d) and 305(b) Report (IDEQ 2005) lists the middle St. Joe River assessment unit (from North Fork St. Joe River to St. Maries River) as impaired or not supporting assigned beneficial use due to temperature. None of the streams in the project area are listed for non-support due to sediment or other pollutants. The only activity in the project area since IDEQ's subbasin analysis was the construction of 0.1 mile of road (June 2000) connecting Road 3318 to Road 1934. Because the new section of road is located along a ridgetop with no stream crossings, it is unlikely to have any measurable effects that would impair or change support of existing beneficial uses.

Water Yield

The mean annual precipitation throughout the Avery Fuels Reduction Project Area is 38 inches, producing two-year peak streamflow (Q2.33) for all named tributaries in the analysis area between 13 and 123 cubic feet per second (cfs) (average 49 cfs) (Berenbrock 2002) (SW-5b). The two-year recurring peak flow is approximately representative of the average bankfull or channel-forming flow (Hortness and Berenbrock 2004). Regional data shows that peak flows with return intervals of 50 to 100 years can be three times higher than normal bankfull flows in the vicinity of the project area (SW-5b). In 1996, the St. Joe River experienced the third highest discharge in nearly 100 years of streamflow records at the Calder gauge station with peak discharges more than double normal conditions (SW-10). It is highly likely that the

tributaries within the project area also experienced the same high discharge conditions as the St. Joe River in 1996.

Many peak flows in northern Idaho are associated with mid-winter rain-on-snow events and rain-on-spring-snow events with peaks that are usually higher and of shorter duration than normal spring high flows (MacDonald and Hoffman 1995). These types of peak events can be difficult to predict because their frequencies are random and they do not occur on an annual basis. They are dependent on certain climatic conditions such as air temperature, snowpack characteristics, rain-on-snow elevations, and intensity and duration of precipitation (Berris and Harr 1987; Kappesser 1991). Although the bankfull flow tends to be the main channel-forming flow, these higher peakflows can induce considerable channel changes, particularly if they are accompanied by mass failures. However, as previously stated, the channels in the analysis area are not likely to be affected by any potential changes in water yield.

Environmental Consequences

Other than the proposed and on going activities, there are no reasonably foreseeable management activities on National Forest System lands in the analysis area. Timber harvest activities are expected to occur on nearby privately managed land (Forest Capital) within the next 2 years (SW-11). Timber harvest on privately managed land must follow the rules and Best Management Practices (BMPs) set by the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code) (SW-29) to prevent sediment delivery to stream channels and to prevent any cumulative watershed effects. Activities on privately managed land are considered in the cumulative condition.

Alternative A

Direct, Indirect & Cumulative Effects

In the No-Action Alternative, no new management-induced detrimental effects (direct or indirect) would occur in the Avery Fuels Reduction Project Area; therefore, there would be no change to the existing channel conditions, beneficial uses and water yields.

Without the proposed thinning near Avery, the area would be at an increased risk to higher severity crown fires (see *Fire/Fuels* section), which could indirectly modify the existing hydrologic condition of the watershed with increased runoff, erosion and sediment delivery to stream channels. Similar conditions can be expected in the off-site ponderosa pine stands currently at high risk for mortality. If left untreated, the dead trees could increase the risk of residual stand loss due to wildfire (Goheen and Hansen 1993; see *Fire/Fuels* section) and consequently could produce increased runoff and erosion rates.

Additionally, the continued accumulation of dead and down fuel loads throughout the shrubfields could contribute to an increased potential for locally severe wildfire effects on the watershed conditions, indirectly resulting in a potential increase in erosion rates and sediment delivery to streams (SW-12). In the event of a wildfire, the effects could range from negligible to severe, depending on location, size, severity of burn, and subsequent administrative activities. Due to the numerous variable conditions, post-fire effects on soil and watershed conditions are difficult to predict and quantify.

In the event of another severe wildfire, effects of the No-Action Alternative would likely exceed the effects predicted for the Proposed Action. Any detrimental effects from activities on surrounding privately managed land would have the same effects on the resource, regardless of the selected alternative.

ALTERNATIVE B

Proposed Action: Direct, Indirect & Cumulative Effects

The direct, indirect and cumulative effects of the three proposed actions (timber harvest, offsite ponderosa pine treatment, and shrubfield burning) are discussed with respect to the (1) watershed condition, (2) stream channel condition, (3) water quality and beneficial uses, and (4) water yield. All effects are analyzed within the watershed analysis (cumulative effects) area.

Watershed Condition

No ground-based activities (except for tree felling with chainsaws), no new road construction, and no fireline would be built in this project; therefore, there would be minimal to no new detrimental effects on the watershed.

Timber Harvest:

Indirect effects of canopy reductions (up to 60%) within the proposed thinning units were modeled for peak flow (rain-on-snow) increases using Kappesser's (1991) method. The procedure identified a small increase in the two-year peakflow of 2% in Roundhouse Gulch from 17.6 cfs to 17.9 cfs (SW-13) (Table 34). The WEPP model results predict no change in runoff and a potential small increase in erosion and sediment delivery to the channel of 0.03 tons/ac and 0.04 tons/ac, respectively, over a 30-year return period (SW-14) (Table 35). However, because the channels within the project area are transport reaches (Rosgen 1996; Montgomery and Buffington 1998) the Roundhouse Gulch channel is not expected to change from the water yield and sediment delivery changes predicted using the Kappesser method and WEPP model. With no change to the stream channel dimension, pattern or profile, the proposed thinning is not expected to affect the overall condition of the Roundhouse watershed. Cumulatively, sediment routed through Roundhouse Gulch and into the St. Joe River could produce minor pool infilling with fine sediment, but overall is likely to be undetectable because of dilution in the much larger stream.

Due to previous and proposed management activities on National Forest System lands and privately managed land within the Roundhouse watershed (ACT-1, SW11), INFS-recommended buffers of 150 feet would be doubled to 300 feet to help remediate possible cumulative effects. Research shows that unchannelized sediment rarely travels more than 300 feet (USDA 1995).

Table 34 - Summary Results of Peak Flow (Kappesser 1991) (SW-13)

	Current Condition	Rain-on-Snow Estimate
St. Joe Subbasin		
Total Watershed (acres)	135	
2-Year Peak Flow (ft^3/sec)	5.34	6.88
100-year Peak Flow (ft^3/sec)	25.11	32.33
Roundhouse Gulch		
Total Watershed (acres)	627	
2-Year Peak Flow (ft^3/sec)	17.60	17.90
100-year Peak Flow (ft^3/sec)	70.50	71.71

** The St. Joe Subbasin refers to the area of land within the timber harvest area that drains directly into the St. Joe River rather than into Roundhouse Gulch.*

Off-Site Ponderosa Pine:

The offsite ponderosa pine (OSPP) treatment may reduce the canopy closure in some areas by up to 20%. However, the effects of this treatment to the watershed are minimal because approximately 50% of the existing OSPP are already dying or dead from insect and disease, in part due to poor site adaptation of planted stock following wildfires in the early 1900s (*see Forest Vegetation section*). Furthermore, the non-OSPP canopy would be retained and would continue to mature providing stream shading and in-stream woody debris recruitment.

The proposal calls for falling of approximately 25 OSPP trees within the RHCA buffers along Avery Creek and two unnamed tributaries directly west of Avery Creek. This would not detrimentally affect the soil or water resources because the trees would be left onsite to retain nutrients and provide habitat (*see Fisheries Report*). Off-site ponderosa pine treatment within RHCAs would be directed by a fisheries specialist. All off-site ponderosa pine felled within the RHCAs would be left on the ground and used to enhance the riparian area as directed by a fisheries specialist (*see* Chapter 2 Design Feature 3). Such a minimal reduction in canopy is not likely to alter the stream temperature because the ~25 trees within the RHCA are spread over approximately 60 acres (less than 1 tree per two acres), and the tree boles would provide shade within the RHCA. Furthermore, the removal of these off-site trees would be beneficial to the long-term condition of the watershed by improving the overall stand health.

The proposed burning associated with this treatment would occur in stands with similar vegetation, topography, aspect, and soil landtypes as the shrubfield burning stands; therefore the effects would be similar as discussed below.

Shrubfield Burning:

The proposed burn action would directly affect the vegetative condition of the project area in the relative short term. Based upon modeling of historic wildfires on the IPNF and in the Northern Rocky Mountains, the proposed level of vegetative change and resulting water yield would be well within the historic range of variation (McCaughey and others 1997; USDA 2002). Furthermore, low- to moderate-intensity prescribed burns generally have minimal hydrologic impacts on watersheds due to the partial burning (mosaic) of the surface vegetation and litter (Baker 1988; Robichaud 2000). Riparian areas would not have new impacts because the RHCA buffers would be imposed, and prescribed fires would not be ignited in the RHCAs (*see* Chapter 2 Design Feature 3).

Summary:

Overall, it is anticipated that there would be no measurable direct, indirect or cumulative effects on the watershed condition within the Avery Fuels Reduction Project Area. In fact, the fuels and vegetative treatments would reduce the risk of severe wildfire effects on the watershed allowing the watershed to move towards a more natural fire regime. Consequently, this would provide a long-term benefit of reducing the risk of degradation of the watershed from potential increases in runoff and sediment delivery and would also reduce potential beneficial use impairment.

Design features would reduce the potential for detrimental effects of Alternative B by implementing appropriate stream buffers, establishing soil moisture levels, and by having an early season burn period for the high mass failure potential acres separate from that of other stands within those drainages (*see Chapter 2 Design Feature 3.d.*). Furthermore, the high mass failure potential acres included in Alternative B surround the headwaters of Rock and Storm Creeks where no fish are present, and it is likely that any effects downstream would be diluted prior to reaching to fish-bearing reach of the stream and the St. Joe River.

Stream Channel Condition

Implementation of RHCA buffers on project activities would ensure that riparian areas and stream channels are not subjected to any direct effects from harvest or fuels treatment activities. Indirect effects would also be substantially moderated by the presence of these buffers as large woody debris would be retained aiding in stabilizing stream banks and in reducing sediment delivery potential.

Timber Harvest:

It is unlikely that any potential short-term peak flow increase from harvest activities (see *Water Yield* below) would be sufficient to increase in-channel erosion or decrease existing pool volumes because the sediment supply would not likely exceed transport capacity (Montgomery and Buffington 1997). In reality, spring and mid-winter floods due to climate fluctuations (temperature and precipitation) are more likely to cause channel changes than the proposed management activities.

Off-Site Ponderosa Pine (OSPP):

There are no changes in channel conditions anticipated due to the offsite ponderosa pine treatment. As previously stated, the non-OSPP canopy would be retained and would continue to mature providing stream shading and in-stream woody debris recruitment, which would likely help stabilize the stream banks (see *Fisheries* section).

The proposed burning associated with this treatment would occur in stands with similar vegetation, topography, aspect, and soil landtypes as the shrubfield burning stands; therefore the effects would be similar as discussed below. Although OSPP trees would be felled within the RHCA buffer, prescribed burns would not be ignited in RHCAs, so stream channels would be buffered.

Shrubfield Burning:

Streamflow and channel responses to prescribed low-severity fires are smaller in magnitude in contrast to the responses to wildfire (Neary and others 2005). Increased fires severities can cause hydrophobic soil conditions that can contribute to overland flow, increased sedimentation and increased in-channel failures (DeBano 1981; Doerr and others 2000; Ice 2003).

The proposed shrubfield burning is expected to have a low to moderate intensity with low burn soil temperatures, in part due to the timing of implementation and established design features of the burn. Therefore, the proposed action would reduce the overall risk of potential detrimental effects to the stream channel conditions when compared to the potential effects of wildfire in the untreated Alternative A.

Summary:

Stream channels within the project area are primarily transport-type and are unlikely to be adversely affected by minor, short-term predicted water and/or sediment yield increases. Therefore, there are no anticipated cumulative effects on tributary channels within the project area from proposed Forest Service activities. Furthermore, there would be no cumulative effects on the St. Joe River due to the negligible effects the proposed management activities would have on its subbasins.

Water Quality and Beneficial Uses

Introduction:

The proposed action is designed to maintain water quality and protect beneficial uses through established design features. The use of BMPs, with overall effectiveness for all BMPs expected to be high (Burroughs and King 1989; Lynch and Corbett 1989 and 1991; Seyedbagheri 1996; USDA 2002), would minimize the direct and indirect effects to the watershed.

Timber Harvest:

The implementation of RHCA buffers would prevent any harvest activities near streams. This would preserve the potential for future woody debris recruitment to streams, minimize the potential to increase stream temperatures, and reduce the likelihood of sediment from proposed activities from reaching the stream channels, thereby preserving water quality. Additionally, the enhanced buffer of 300 feet would allow Roundhouse Gulch to move toward its target canopy cover and support of beneficial uses.

The helicopter fueling site would utilize an existing landing along the St. Joe River (Avery lower landing) within the RHCA buffer because there are no other reasonable landing sites near the project area (PD-49). Provisions have been established in accordance with INFS recommendations to prevent fuel contamination into the ground and adjacent St. Joe River. Design features should prevent any type of fuel contamination (SW-29); therefore, it is unlikely to have any measurable effect on the water quality.

Helicopter log transfer sites would be located on and adjacent to Road 3465 (approximately 6 acres). Pile burning is proposed at these sites; however, the road is located on a hilltop so there are no expected detrimental effects on water quality or beneficial uses.

Offsite Ponderosa Pine:

No detrimental effects on water quality and beneficial uses are anticipated with the offsite ponderosa pine treatment as all trees would be felled by hand and left on site to retain nutrients (see *Soils* section). The minimal loss in canopy (≤20%) would not likely alter the stream temperature because only about 25 trees within the stream buffers would be removed (<1 tree per 2 acres). Furthermore, the fallen trees would likely provide habitat for aquatic life (if felled into the stream) (see *Fisheries* section) and provide additional sediment traps if felled along the contour of the land. This could reduce the amount of sediment entering the streams, which would likely maintain and/or slightly improve the existing water quality and beneficial uses.

As previously stated, the proposed burning associated with this treatment would occur in stands similar to the shrubfield burning stands; therefore the effects would be similar as discussed below.

Shrubfield Burning:

Possible effects to water quality and quantity depend upon the extent and severity of the prescribed fire. Stream buffers are in place to prevent an increase in stream temperature so that the riparian overstory would remain. Minimum soil moisture levels prior to burning would help ensure a low-intensity burn allowing for retention of roots and soil shear strength; therefore, reducing the potential for mass failure and debris torrents (see *Soils* section). Any potential small increase in peak water yield (refer to data) would not affect the stream channel because these channels are transport reaches (Rosgen 1996; Montgomery and Buffington 1998). Therefore, existing water quality and beneficial uses throughout the watershed would be maintained. Monitoring of burn units before and after implementation would help determine the effectiveness of the design features in meeting project objectives.

Shrubfields located in the Slate Creek and Marble Creek watersheds (adjacent to and just downriver from project area) were burned in the spring of 1999 in addition to shrubfields in the Big Creek watershed (downriver from project area) in 2000. These projects were field checked for soil and water problems (erosion and sedimentation) in the fall of 1999, spring of 2000 and fall of 2001, respectively. Additionally, post-burn monitoring occurred in the North Fork of the St. Joe River in 2003 and 2006 (adjacent to project area) (SW-15; SW-18). No noticeable effects were detected in any of the nearby burned shrubfields; therefore, it is logical to expect similar results in the Avery Fuels Reduction Project Area because the landtypes, aspect, slope, elevation, and vegetative conditions in Slate, Marble, Big Creek, and North Fork watersheds are the same types as those proposed in the Avery Fuels Reduction Project Area.

Summary:

No measurable effects from project activities are anticipated on water quality or beneficial uses for any of the tributary watersheds or for the St. Joe River. No new point sources of discharge would be created. Furthermore, the characteristics that resulted in the determination of support of beneficial uses (IDEQ, 2003) for the St. Joe River and its tributaries would continue to be protected.

Water Yield

Effects from the proposed activities were modeled using WEPP (Table 35) (SW-14). Overall, there are little to no expected changes from rain-on-snow events, which typically occur between 2,500 feet and 4,500 feet in elevation (majority of project area) (Kappesser 1991).

Timber Harvest:

Reduced crown cover would decrease interception and transpiration and could increase snowpack levels, evaporation and sublimation of snow. This could potentially result in increases in soil water retention and/or slightly increased water yields and peak flows in Roundhouse Gulch over the short-term. However, these detrimental effects are not likely due to the retention of ground cover and the wider stream buffer width, which would slow delivery and protect snow layers near the stream.

Models show that rain-on-snow events could increase Roundhouse Gulch's 2-year peak flow from 17.6 cfs to 17.9 cfs and the 100-yr would increase from 70.5 cfs to 71.1 cfs (~1% increase) (Table 34) (SW-13) (Kappesser 1991). Results for the adjacent St. Joe subbasin (SW-13), which includes portions of the thinning stands not draining into Roundhouse Gulch, predict an average peak flow increase of 29%. This potential increase would not likely detrimentally affect the watershed as the flow in this area is intermittent and likely does not have channelized flow. Any effects of water and/or sediment delivery from this small subbasin would be diluted by the much larger St. Joe River and have no detectable consequences on water yield. Predictions based on the WEPP model results are essentially no change in runoff, erosion, and sediment delivery to the stream due to proposed harvest activities (Table 35) (SW-14).

Offsite Ponderosa Pine:

There are no changes in water yield anticipated with the of-fsite ponderosa pine removal due to the minimal change in vegetation and ground cover. The proposed burning associated with this treatment would occur in stands similar to the shrubfield burning stands; therefore the effects would be similar as discussed below. Although OSPP trees would be felled within the RHCA buffer, burn activities would be buffered from the stream channels; therefore, there should be no detectable impact on the water yield.

Table 35 - Disturbed WEPP Results (SW-14)

WEPP Disturbed Average Results	Runoff (inches) Return Period			Erosion (tons/ac) Return Period			Sediment (tons/ac) Return Period			1st Year Post-Disturbance probability of …		
	1.5 yr	15 yr	30 yr	1.5 yr	15 yr	30 yr	1.5 yr	15 yr	30 yr	Runoff (%)	Erosion (%)	Sediment Delivery (%)
Thinning Units (300-ft buffer)	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.04	13	3	13
Wildfire (no buffer)	1.46	5.50	7.77	47.25	166.87	232.19	47.20	168.01	231.81	100	100	100
High-Severity Fire (150-ft buffer)	0.10	1.16	2.08	45.30	161.88	207.32	1.43	24.30	30.56	86	100	86
Low-Severity Prescribed Burn (150-ft buffer)	0.08	0.76	1.44	21.28	107.18	144.25	0.38	14.71	15.85	73	94	73
Existing Condition Shrubfield	0.00	0.01	0.03	0.00	0.06	0.19	0.00	0.01	0.04	13	11	12

Shrubfield Burning:

Proposed stands selected for burning are currently classified as openings and no further canopy reduction would be created. The WEPP model shows a 73% chance of a small increase in runoff of 0.08 inches within the first eighteen months following a low-severity burn, which is the expected condition for the prescribed burn (Table 35) (SW-14). Erosion and sediment values are also predicted to increase due to the prescribed burn activities, but the increase for the low severity burn is less than the increase following a high severity burn (i.e. wildfire) (Table 35). However, these predicted small increases may produce short-term localized, small magnitude changes to the watershed (i.e. mass movement), but would not significantly alter channel conditions of tributaries within the project area or of the St. Joe River due to RHCA buffers and the stream channel types (Rosgen A & B (1996); Montgomery and Buffington Cc, Ca and SP (1998)). Therefore, no long-term detectable changes in water yield above current conditions is expected as a result of proposed burning activities.

A high-severity fire, which is more likely if the project area is left untreated (No-Action Alternative), would increase water yields with recovery likely back to existing conditions within 20 years (Legleiter and others 2003). Furthermore, high severity fires have a higher loss of protective cover and fire-induced soil repellency that can induce flooding and erosion after rain events (DeBano and others 2000; Neary and others 2005; Lavine and others 2006). In severely burned areas, high-intensity, short-duration rain events have increased peakflows from 2 to 2000 times (DeBano and others 2000; Neary and others 2005). The WEPP model shows runoff, erosion and sediment values for wildfires and high severity burns roughly double the values predicted for low severity prescribed burns in the activity area (Table 35).

Summary:

Overall, the cumulative effects on water yield from the proposed fuels and vegetative treatments would be less than the effects of the No-Action Alternative A, which consequently would have an increased risk of higher intensity wildfire (*see Fire/Fuels Report*). The streams in the project area have resilient channel types and high transport capacities (*see Stream Channel Conditions above*); therefore, in-stream effects from the potential small increases in water yields and peak flows due to management activities are expected to be inconsequential. No cumulative water yield effects are expected in the St. Joe River downstream of the project area due to the negligible effects on its tributaries.

Alternative C

Direct, Indirect & Cumulative Effects

Proposed activities in Alternative C would have the same effects as Alternative B with the exception of the sensitive landtypes within the shrubfield prescription (see *Soils* section), which would indirectly affect watershed conditions. Alternative C would not include 475 acres of shrubfield stands with high potential for mass failure (MFP), which are in Rock Creek and Storm Creek drainages (*note:* 3 acres of high MFP remain in Alternative C because they occur in the OSPP treatment, which would not have any noticeable detrimental effect on the watershed). The exclusion of high MFP acres in Alternative C is in accordance with INFS. The removal of these acres reduces the total burned shrubfield acres to 3,022 and reduces the percent of activity within the individual drainage basins of Rock Creek from 31% to 25% and of Storm Creek from 49% to 39% (SW-5b) as compared to Alternative B.

Table 36 - Acres of Sensitive Landtypes and High Mass Failure Potential by Alternative

	Prescription Area (acres)				Sensitive Landtypes		High Mass Failure Potential	
Alternative	Shrub-fields	Off-Site PP	Comm. Thin	Total	Total Acres	% of Total Area	Total Acres	% of Total Area
B	3497	253	112	3862	1062	27.3%	317	8.2%
C	3022	253	112	3387	746	21.8%	3	< 0.1%

Although the proposed treatment (Alternative B) is not expected to detrimentally reduce soil strength, Alternative C would not treat the shrubfield acres with high potential for mass failure. Therefore, Alternative

C would reduce the potential risk for erosion and sediment delivery into the stream channels of Rock and Storm Creeks and could have reduced detrimental effects on the water quality and stream channel conditions as compared to Alternative B. Overall, Alternative C has fewer risks to the watershed condition than Alternative B, although both Alternatives have minimal potential for detrimental effects due to the established design criterion.

The Alternative C prescriptions for the offsite ponderosa pine treatment and the commercial thinning are the same as Alternative B and therefore, would have the same effects on the watershed condition, stream channel condition, water quality and beneficial uses, and water yield.

Regulatory Consistency

IPNF Forest Plan and INFS

The IPNF Forest Plan as amended by the Inland Native Fish Strategy (INFS) requires landslide-prone areas to be buffered. Alternative B includes prescribed burning on areas with high potential for mass failure (landslide-prone areas), so it would not comply with INFS standards for riparian habitat conservation areas (INFS A-5, A-6). Alternative C does not include shrubfield burning on landslide-prone areas, so it would comply with INFS standards (F-3).

State Water Quality Standards and the Clean Water Act

All proposed activities are consistent with the Idaho State Water Quality Standards and the Clean Water Act. The design of this project is such that minimal effects to water resources are expected, as discussed throughout this report. Reintroducing fire into this ecosystem would allow the managers to encourage the benefits of burning while controlling future negative impacts (such as extensive, high severity fires). Due to the low to moderate prescribed burn severity, short time frames, and design features, effects of the proposed action to the watershed are expected to be minimal and inconsequential.

All proposed alternatives would maintain the chemical, physical, and biological integrity of the streams in the project area, in adherence with 33 U.S.C. §1251. The proposed action would comply with the Idaho Water Quality Standards (IDAPA 58.01.02) for Special Resource Waters and would adhere to the Antidegradation Policy to provide water quality protective of existing uses (IDAPA 58.01.02.051). Models have been used in conjunction with field data, research, and professional judgment to refine estimated effects of proposed activities and to make recommendations for management alternatives, design criteria, and mitigation measures. These recommendations include sufficient soil moisture levels, feasible retention of duff, timing of ignition, and parameters for low to moderate burn severity, which would all contribute to the prevention of increased sediment delivery to streams from proposed activities. Therefore, watershed conditions would remain the same as current conditions. Additionally, RHCA buffers would be implemented and would limit ground disturbance near all tributaries. Water yield is not expected to have a detectable increase from the proposed activities so the current channel system would remain in the same physical condition, meeting the objectives of the Clean Water Act and Idaho Antidegradation Policy.

Sediment: Sediment load reductions are not required in the Avery Fuels Reduction Project Area. Indirect, short-term sediment generated by project activities would not reduce water quality or impair beneficial uses (Idaho Code § 39-3601; 40 CFR 131.12).

Temperature: In compliance with TMDL requirements (IDEQ, 2005, p. 94-96), thermal modifications in the middle portion of the St. Joe River sub-basin would not be exacerbated. RHCA buffers on units would allow riparian canopies along streams to recover to levels established for the St. Joe River and its tributaries.

Nutrients: No nutrient load reductions are required in Avery Fuels Reduction Project Area. Nutrient levels in the St. Joe River and its tributaries within the project area would not be affected by project activities.

Habitat Alteration: Aquatic habitat conditions would not change with the implementation of the alternatives.

National Forest Management Act

The alternatives are consistent with Forest Plan standards, state water quality standards, and the Clean Water Act, therefore watershed conditions would not be irreversibly damaged.

WILDLIFE

(Project File Volume III, Section W)

Introduction

This section discusses and displays the potential direct, indirect and cumulative impacts to wildlife that could result from implementation of the proposed action or alternatives. Changes, primarily in forest vegetation and human disturbance/access, could affect existing habitat for Threatened, Endangered and Sensitive (TE&S) species and Management Indicator species (MIS); and could affect future habitat suitability and management options for some wildlife species.

Regulatory Framework

The regulatory framework providing direction for the protection and management of wildlife habitat comes from the following main sources:

- The Endangered Species Act of 1973 as amended (ESA),
- The National Forest Management Act of 1976 (NFMA), and
- The Forest Plan for the Idaho Panhandle National Forests (FP).

Section 7 of the ESA directs federal agencies 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 habitat.

NFMA provides for balanced consideration of all resources. It requires the Forest Service to plan for diversity of plant and animal communities.

The Forest Plan, in compliance with NFMA, establishes Forest-wide management direction, goals, objectives, standards and guidelines for the management and protection of wildlife habitat and species including: old growth habitat, management indicator species, sensitive species, and threatened and endangered species.

Direction concerning implementation of the ESA and NFMA can be found in Forest Service Manuals (FSM) and various letters/memos from the Forest Service's Washington Office, Regional Office, and the Idaho Panhandle National Forests (IPNF) Supervisor's Office.

Geographic Scope

The Avery Fuels Reduction Project Area was delineated based on watershed boundaries encompassing the proposed shrubfield burns and the area affected by off-site ponderosa pine; with a small extension added south of the river to cover the proposed commercial thinning. The geographic scope of potential effects on wildlife for this project level analysis was determined based on the spatial distribution of proposed federal actions and the home range of species that may be impacted. Adjacent watersheds are added to the project area as needed to create the analysis area for species with larger home ranges such as fisher and goshawk. South of the river, timber compartments 248 and 249 (6,350 National Forest System (NFS) land acres) are used as the wildlife analysis area for most species, as they take in the proposed commercial thin units within the Roundhouse Gulch drainage. The Lower Fishhook Lynx Analysis Unit (LAU), which contains Roundhouse Gulch, is the cumulative effects area for lynx. The project area north of the river (timber compartment 209 and subcompartments 210-1 and 262-1) is an appropriate size (10,997 NFS land acres) to analyze effects from the proposed shrubfield burning and off-site pine treatment. For some species with very large home ranges (i.e. wolf and wolverine) habitat adjacent to the project area was considered in the analysis. Also, for some species, due to the nature of species occurrence, distribution of capable/suitable habitat, the scope of the alternatives and lack of impacts throughout the wildlife analysis area, the geographic scope of the analysis was restricted to the area of potential impact. A more specific description of the geographic scope of the analysis is found under each habitat or species/guild section of this document.

Analysis Methods

The appropriate methodology and level of analysis needed to determine potential effects is influenced by a number of variables including:

- the potential for impacts
- the scope of the action
- the risk to resources and species (Leonard, 1992)
- available information
- the ability to differentiate between alternatives
- the information necessary for an informed decision

This analysis starts at a course/medium level and proceeds to a finer level of analysis as needed to determine potential effects and was done at different levels of intensity (i.e. course filter - medium filter - fine filter) as appropriate to address the issues and concerns. It is tiered to the following documents which provide the primary direction used to develop the analysis for potential effects on wildlife.

- Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin (ICB Assessment)
- Integration of Forest Planning into Ecosystem Management: Toward a Forest Ecosystem Approach: An Assessment for the St. Joe Area aka St. Joe Geographic Assessment (USDA 1997)
- Available Conservation Assessments and Strategies for wildlife species
- Additional scientific literature as appropriate

This analysis is organized by habitat and/or species. The main sections are:

- Terrestrial Habitat
- Threatened and Endangered Wildlife Species (T&E)
- Sensitive Wildlife Species
- Management Indicator Species (MIS)

Quantitative modeling approaches to assessing potential effects are not always plausible because of limited information about many species. Available models were used, when appropriate, based on available information and applicability (W-4, W-8).

The analysis evaluates habitat in terms of human disturbance and the capability and suitability of vegetation (e.g. structure and composition) for wildlife species or groups of species with similar habitat needs. For the purposes of this analysis, *capable habitat* is wildlife habitat that has the fixed attributes that enable it to produce the habitat requirements for a given species currently or in the future. These fixed attributes include soils (or parent material, or landtype), slope, aspect, elevation, and habitat type. *Suitable habitat* is wildlife habitat that currently has both the fixed and variable stand attributes that enable it to produce the habitat requirements for a given species. Variable attributes change over time and may include seral stage, cover type, stand density, tree size, stand age, or stand condition.

Existing forest habitat information was determined using stand data from FSVEG (which summarizes information obtained from stand exams done in the field) and stand activity and component data from TSMRS (W-9, W-10). This information reflects conditions that are a result of previous management activities and natural conditions. Acre figures displayed in the wildlife section come from the TSMRS database. Some information pertinent to this analysis from the database has been revised based on recent field and air photo reviews. All values should be considered approximate due to such factors as rounding of acres and combining/grouping of stands.

The interaction of disturbance (both human induced and naturally occurring) and forest succession determine the quality and quantity of habitat on a spatial and temporal scale. The existing condition and availability of habitat in the landscape would change regardless of management actions. This change could be sudden and readily apparent (e.g. a stand-replacing wildfire or blowdown event) or slow and subtle (e.g. stand aging). As they pertain to this analysis, natural changes are random and unpredictable. Forest succession normally takes place at a rate that is essentially too slow to measure within the temporal scale of this project level analysis.

The fire history and human activities in the Avery Fuels Reduction wildlife analysis area and surrounding landscape have influenced the availability and distribution of wildlife habitat present today, particularly the level of late successional habitat (see *Past, Present, and Reasonably Foreseeable Activities* section of *Chapter 3*). The amount of late successional habitat in the project area is below historic average levels for the St. Joe River Drainage (USDA 1997 p. 71). See Table 37 below. The emphasis of the proposed action

on shrubfield burning, off-site pine treatment and commercial thins, while retaining structure provided by other species and stands and avoiding allocated old growth and potential old growth, influences the level and intensity of analysis.

Table 37 - Late Successional Habitat in Wildlife Analysis Areas

Avery Analysis Area			Roundhouse Analysis Area	
Size class	**Acres**	**%**	**Acres**	**%**
MSAW	301	2.5	781	12.3
IMSA	4384	36.9	4365	68.8
POLE	1033	8.7	97	1.5
SAPL	500	4.2	918	14.4
SEED	134	1.1	-	-
HGHB	3915	33.0	-	-
LOWB	1031	8.7	5	0.1
NONS	302	2.5	136	2.1
No data	266	2.2	47	0.7
TOTAL	11866	99.8	6349	99.9

Late successional habitat equates to MSAW, which is comprised of the sawtimber, mature low risk sawtimber, and mature high risk sawtimber size classes from the TSMRS database.

MSAW = mature saw timber
IMSA = immature saw timber
POLE = pole-sized trees
SAPL = saplings
SEED = seedlings
HGHB = high brush
LOWB = low brush
NONS = nonstocked

The dominant influences (e.g. road densities, amount and distribution of forest structures) on the abundance and distribution of many threatened, endangered, sensitive, and socially important/desirable species are the result of past and current management activities (See Past, Present, and Reasonably Foreseeable Activities section of the EA). These conditions then influence the species present in the wildlife analysis area and the methodology and/or need to analyze potential effects. More specific discussions of analysis methods can be found under the section for each species or group of species.

Species Relevancy Screen

The National Environmental Policy Act directs the Forest Service to focus on a full and fair discussion of significant issues, and identify and eliminate from detailed study the issues that are not significant. Some elements of wildlife habitat require a detailed analysis and discussion to determine potential effects. Other elements may not be affected; may be affected at a level that does not influence use, occurrence, or the decision to be made; or can be adequately addressed through design of the project. These elements then do not necessarily require detailed analysis.

TE&S species, MIS, and other wildlife species of interest or concern known to occur on the IPNF were reviewed for their relevancy to the proposed action and the wildlife analysis area. Relevancy was determined if there is evidence of species occurrence, capable and/or suitable habitat present, or potential for the proposed action to affect a species or its habitat. Some species or habitats do not occur in the wildlife analysis area and no further analysis is necessary. Other wildlife species or habitats may occur in the wildlife analysis area, but are not measurably affected because they would not be affected by the proposed action, the impacts would not influence species use or occurrence, or design of the project adequately addresses the concerns.

The assessments of the potential for effects made in this screen consider the scope and nature of the activities associated with the proposed action, the potential risks for adverse impacts, and the ability to determine potential effects based on available information at the time of this phase of the analysis. If the potential for effects cannot be determined with a reasonable degree of confidence in this process, then additional analysis was conducted.

Table 38 displays the results of the relevancy screening process and provides an explanation of the rationale. Further information on species not requiring further analysis and the rationale is discussed in the Wildlife Report (W-21).

Table 38 - Screening Process and Results

Species/Habitat	Habitat / Species Present in St. Joe drainage?*	Potential for Measurable Effects in Analysis Area?	Need for Detailed Further Analysis?	Rationale for no further analysis**
Endangered				
Gray Wolf***	Y	Y	Y	
Woodland Caribou	N	N	N	1
Threatened				
Bald Eagle	Y	Y	Y	
Grizzly Bear	N/I	N	N	1
Canada Lynx	Y/I	N	N	2
Sensitive				
Black Swift	Y/U	N	N	2
Black-Backed Woodpecker	Y	Y	Y	
Western Toad	Y	Y	Y	
Coeur d'Alene Salamander	Y	N	N	2
Common Loon	N/I	N	N	2
Fisher	Y	N	N	2
Flammulated Owl	Y	Y	Y	
Harlequin Duck	Y	N	N	2
Northern Bog Lemming	N	N	N	1
Northern Goshawk	Y	N	N	2
Fringed Myotis	U	N	N	2
Peregrine Falcon	Y/I	N	N	2
Townsend's Big-Eared Bat	U	N	N	2
Pygmy Nuthatch	U	N	N	2
Wolverine	Y	N	N	2
Management Indicator				
Elk	Y	Y	Y	
Moose	Y	Y	N	3
Marten	Y	N	N	2
Pileated Woodpecker	Y	Y	Y	
Other				
Forest Land Birds	Y	N	N	3
Cavity/Snag Habitat	Y	Y	N	2

**Yes, No, Unknown or Incidental (if at all).*
***1 Rationale and documentation is provided in the project file (W-1) for the determination that the species or habitat is not present within the St. Joe River drainage and/or wildlife analysis area.*
2 Species or habitat may be present, but due to the scope of the proposed actions - including design criteria - there would not be any effect on habitat or the species (e.g. harvest of trees would not impact habitat for species associated with lakes). Rationale is provided in the project file (W-21).
3 Species does not apply, or is adequately addressed by other species, or is not appropriate for the Project. Rationale is provided in the project file (W-21).
****South of Interstate 90, gray wolves are classified as nonessential experimental populations; this classification treats wolves as proposed for listing under the ESA.*

Rationale for No Further Analysis

See the Wildlife Report in the project file for additional information (W-21).

Canada lynx: The shrubfield burn and off-site pine treatment portion of this project area north of the St. Joe River are not in a Lynx Analysis Unit. Therefore, activities in this part of project area would not affect lynx. None of the stands proposed for treatment in the Roundhouse Gulch commercial thin project area are capable lynx habitat. As this portion of the project does not treat any lynx habitat, as well as for reasons mentioned above, it will have no effect on lynx. Based on the project area's location, the lack of capable or suitable habitat, existing human disturbance associated with the project location, and the inconsiderably small potential for species presence; the proposed action would have no effect on the Canada lynx.

Black Swift: There are no known waterfalls or wet cliffs within the project area. There is no potential habitat known in the project area. There would be no change to conditions for black swifts with the implementation of the proposed action. This project would have no impact on this species.

Coeur d'Alene Salamander: There is one known salamander site in the Avery Fuels Reduction Project Area (W-2). No activity is proposed along the old river road, and the uncut 200-foot buffer above the power line would prevent disturbance of this site. There are no fractured rock seeps for potential habitat known of in the vicinity of the proposed units. Potential habitat within the project area along FH50 and Road1934 has been surveyed, and no salamander sites were found (Wilson 1991 p. 40, 42). The requirement for riparian buffer zones means that any suitable habitat associated with stream edges and waterfall spray zones would not be affected by timber harvest. This project would not change the watershed conditions in the project area (see Watershed section). There would be no change to conditions for Coeur d'Alene salamanders with the implementation of the proposed action. This project would have no impact on Coeur d'Alene salamanders.

Common Loon: There are no lakes in the wildlife analysis area that may serve as potential habitat. The species is not known or suspected in the project area. Based on the lack of suitable habitat and occurrence there would be no impact on habitat or the species.

Fisher (and Marten): Fisher and marten occupy similar habitat (Ruggiero and others 1994 p. 7) and potential impacts are analyzed for both species using the same methodology. Late successional habitat is an essential component of forest carnivore habitat. Management guidelines from *Fisher Biology and Management in the Western United States* (Heinemeyer and Jones 1994 p. 35-41) and *Habitat Conservation Assessments and Strategies for Forest carnivores in Idaho (Draft)*, (IDFG 1995 p.65-70), are used to help determine habitat quality in an analysis area.

Table 39 - Analysis Area Guidelines for Forest Structure for Fisher and Marten

Forest Structure	High Quality	Moderate Quality	Low Quality
Mature forest**	65-75%	≥40%	30-40%
Young forest***	10-25%	10-25%	10-25%
Pole/sapling	10-25%	10-25%	10-25%

Table 40 - Existing Forest Structure by Fisher/Marten Analysis Area

Forest Structure	Avery Area 9,472 Acres of Capable Habitat		Roundhouse Area 5,920 Acres of Capable Habitat	
	Acres	%*	Acres	%**
Mature forest**	66	0.7%	675	11.4%
Young forest***	4,055	42.8%	4,137	69.9%
Pole/sapling	1,099	11.6%	1,015	17.1%
	0.1% of capable habitat is suitable		10% of capable habitat is suitable	

** % of capable habitat in each fisher/marten analysis area*
*** Mature forest equates to database size classes mature low risk sawtimber & mature high risk sawtimber*
**** Young forest equates to database size class immature sawtimber & sawtimber*

The relatively young age and small size of the majority of the timber and the amount of shrubfields, both due to past wildfires, is the main reason the project area is not quality habitat for fisher. With the current amount of mature forest below the Low Quality habitat guideline, and a range of only 0-10% of the capable habitat in suitable condition for fisher (W-5, W-6) it is unlikely the area can support a fisher population. No treatment of suitable habitat is proposed with this project. Based on the lack of treatment to suitable habitat, i.e. closed canopy mature forest, and the inconsiderable potential for the area to support fisher/marten, there would be no impact on fisher or marten from this project.

Fringed myotis: There is very limited suitable habitat in the Avery Fuels Reduction Project Area (80 acres or 0.6%). No treatment of mature ponderosa pine or dry Douglas-fir cover types is proposed, and there are no known mines or caves in the project area. The species is not known or suspected to occur in the area. Existing habitat capability and suitability, and the nature and scope of the project preclude the potential for effects on habitat or the species. This project would have no impact on this species.

Harlequin Duck: Within the project area the St. Joe River is the only stream listed in the Harlequin Duck Conservation Assessment and Strategy (Cassirer and others 1996 pp. 27, 29, 31) as having the potential to support harlequin ducks. Harlequin ducks are rarely seen in this stretch of the river (District records). With roads on both sides, and the amount of traffic and activity (i.e. fishing, rafting, etc.) between Avery and Hoyt Flat, it is unlikely that ducks would successfully nest within the project area. Project activities would have no effect on riparian habitat that could potentially be used by ducks. Based on the lack of suitable habitat and occurrence there would be no impact on habitat or the species.

Northern Goshawk: Only 143 acres (3% of the capable habitat) of suitable nesting habitat are present, and none of these stands are large enough (approx. 30 acres), to be considered a suitable nest stand. Due to past fires, most of the capable habitat in the area is too young to possess the large timber needed to provide suitable goshawk nesting habitat. With this lack of suitable nest stands, it is unlikely the area can support goshawks. No treatment of suitable nesting habitat is proposed with this project. Based on the lack of treatment to suitable nesting habitat and the inconsiderable potential for the area to support goshawks, there would be no impact on Northern goshawks from this project.

Peregrine Falcons: There are no known historic eyries in the wildlife analysis area. There is no known potential habitat within the Avery Fuels Reduction Project Area. The species is not known or suspected to occur in the area. Existing habitat capability and suitability, and the nature and scope of the project preclude the potential for effects on habitat or the species. This project would have no impact on this species.

Pygmy nuthatch: There is no suitable mature, open, ponderosa pine habitat in the Avery Fuels Reduction Project Area. The species is not known or suspected to occur in the area. Existing habitat capability and suitability and the nature and scope of the project preclude the potential for effects on habitat or the species. This project would have no impact on this species.

Townsend's Big-eared Bat: Townsend's big-eared bats are only known to occur on the Kaniksu portion of the IPNF. There are no known mines or caves in the wildlife analysis area that may serve as potential habitat. The species is not known or suspected in the project area. Based on the lack of occurrence and the absence of potential habitat, there would be no impact on habitat or the species.

Wolverines: The proposed activities are unlikely to affect wolverines due to their wide-ranging nature and the relative lack of preference for special habitat. The location of the project, opposite and between the communities of Hoyt Flat and Avery, and within four miles of Highway 50 reduces the likelihood of wolverine use. There is no potential wolverine denning habitat in or adjacent to the project area. There would be no change to the existing road system, and therefore the level of disturbance; and no effect on potential denning habitat from project activities. Based on the above reasons, there would be no impact on habitat important for wolverine (i.e. denning) or the species.

Moose: Moose are known to occur in the wildlife analysis area. The parameters used to evaluate effects on elk (e.g. road density, security) and mature and old growth associated species are applicable and sufficient for addressing potential effects on moose. Riparian areas important for moose would be protected from treatment by the implementation of no-entry buffers. Therefore, no analysis specifically for moose is warranted.

Forest Land Birds: Various land birds are known to be present in the wildlife analysis area. Any treatment, including no action, affects some species in this group at the expense of others. Species likely to be affected by activities are represented by other species and habitat elements that are addressed in this screen and/or analyzed further. These include: general forest species (elk), dry site species (flammulated owl), wetlands/riparian habitat (western toad), old growth (flammulated owl, pileated woodpecker and northern goshawk), and snag dependent species (pileated and black-backed woodpeckers). Therefore, no analysis is warranted specifically for land birds.

Snag/Cavity Habitat: The amount of snags and down woody material present has been identified as a measure of forestland integrity (Quigley and others 1996 p. 97). Snags of varying size, condition, and tree species provide habitat for a variety of wildlife species. The species totally or largely dependent on cavity habitat include some sensitive (e.g. black-backed woodpecker, flammulated owl) and management indicator species (e.g. pileated woodpecker).

Existing cavity habitat is a function of past and present disturbances (e.g. fire, insects, disease, and timber harvest), stand initiation, and succession. Providing numbers of snags that have been shown to support viable populations is a prudent approach to managing for viable/sustainable populations of woodpeckers and other species that use snags. Recent studies indicate that viable woodpecker populations occurred in areas with about four snags per acre (Bull and others 1997 pp. 28, 31), and recommends providing snags in every 5- to 25-acre stand to satisfy distribution needs.

In the action alternatives some snags (i.e. cavity habitat) would be lost due to the proposed lightly timbered shrubfield broadcast burning. Some snags may also be cut for safety reasons in the commercial thin units. However, the potential impacts on snags and down wood are alleviated by a number of factors.

Areas outside of proposed treatment units would continue to provide snags and leave trees at existing levels in the short term and the number of snags and down woody material in these areas would increase as stands succeed. Snags would be retained in the off-site pine units as only live off-site ponderosa pines are to be cut. Areas would be reserved from treatment within Inland Native Fish Strategy buffers. Snags would also persist in unloggable areas of the commercial thin stands, i.e. terrain breaks or out of reach spots. The burning of lightly timbered shrubfield stands would also create snags within the project area. Green tree retention needs would be met as the commercial thin prescriptions call for thinning from below, leaving adequate numbers of larger leave trees on site.

Design features of the project were devised to ensure the retention and selection of snags at a level and distribution which has been shown to support viable populations of species that use snags and down logs (Chapter 2 Design Feature; W-3). Snags and snag replacements would be retained at levels recommended by scientific literature based on recent studies (USDA 2000 p.6). Snag retention objectives exceed Forest Plan standards.

The analysis for snag and cavity habitat dependent species such as black-backed woodpecker, flammulated owl, and pileated woodpecker, would provide analysis of snag and cavity habitat specific to those species.

The project would meet Forest Plan goals and objectives for snag and cavity habitat, and Forest Plan standards would be met or exceeded in both alternatives.

Issue Indicators

Changes in forest vegetation and human disturbance/access could impact existing habitat for wildlife species, and project activities could cause or increase risk of mortality. Based on habitat relationships, indicators of potential impacts on relevant species were measured. Indicators and units of measurement for habitat and species are displayed in the following table. Queries of the timber stand data base (TSMRS) and information from field reviews/surveys were used to identify types of habitat and capable and suitable habitat for wildlife species (W-9, W-10). The changes in habitat conditions and habitat for species are disclosed and a discussion of the effects are displayed. The analysis of effects on species are tiered to the analysis of effects on the types/components of habitat displayed in the table.

Table 41 - Measurement Issues for Wildlife

Habitat/Species	Indicator of Effects	Measurement
Terrestrial Habitat		
Disturbance/Access	Changes in human access	Changes in road status & open road densities
Connectivity	Changes in vegetation in travel routes & barriers to movement	Maintenance of vegetation along ridges and riparian areas
Threatened and Endangered Species		
Bald Eagle	Changes in nesting habitat and disturbance to the river corridor	Changes in nest habitat conditions
Gray wolf	Changes in disturbance & prey availability	Road density/security and potential elk use
Sensitive Species		
Black-backed Woodpecker	Changes in suitable habitat	Acres of suitable habitat
Flammulated Owl	Changes in suitable habitat	Acres of suitable habitat
Western Toad	Impacts on breeding habitat and direct mortality	Impacts to riparian habitat and risk of mortality
Management Indicator Species		
Pileated Woodpecker	Changes in suitable habitat	Acres of suitable habitat
Elk	Changes in forage habitat and vulnerability	Changes in road status & open road densities, & acres of forage treated

Disturbance/Access

Many wildlife species are sensitive to human disturbance and/or adversely affected by human access. The effects caused by the disturbance from timber sales and related activities are generally common to wildlife species, and so are considered together. There are differences in the degree of response to disturbance between species and even between individuals of the same species. However, in general, the responses would be similar. Potential temporary disturbance of wildlife is inherent in most human activity (e.g. project implementation) and may include alteration of normal use patterns and potential relocation to avoid disturbance (e.g. using alternate forage or cover areas). This type of disturbance is not based on loss or long-term alteration of habitat and would not appreciably affect populations.

Displacement and avoidance are the major responses to disturbance. It is expected that most animals would avoid an area being disturbed by broadcast burning, logging, and timber hauling activities. This could displace animals from the area of activity to other areas within and outside the analysis area. This effect is somewhat mitigated by the fact that there is a moderate amount of habitat useable for cover in and adjacent to the project area available for displacement. Species that are more tolerant of disturbance would probably just avoid the immediate vicinity of the activity. Displacement is expected to last for the duration of the burn or the length of the timber sale, but it is likely some species would use portions of the project area during periods of sale inactivity. Due to the closing of any existing gates daily after hauling and the presence of small unroaded areas within and adjacent to the project area for animals to displace to, (see project area map), the disturbance for the proposed activities would not likely cause any permanent relocation of wildlife. The storage and/or closing of roads after the timber sale would also help reduce the amount of time displacement effects persist.

Most potential adverse impacts from human disturbance are associated primarily with access levels and roads. Effects on wildlife are caused by roads themselves and by the increased contact with humans that they facilitate. High levels of open roads (i.e. roads and trails used by motorized vehicles) can affect wildlife species by increasing their vulnerability to mortality and displacing them from preferred habitats for one or more seasons. The Interior Columbia Basin Ecosystem Management Project assessment (ICBEMP) identified that those species vulnerable to human disturbance have relatively low amounts of secure habitat at the landscape scale. The St. Joe Geographic Assessment also identified security as a concern.

The degree of effects on wildlife from roads is related to the amount and type of use on them. For the purpose of assessing impacts on wildlife from roads, only roads that impact wildlife (through some level of

motorized use) are included in this wildlife analysis. For example, a road that is re-vegetated to the same composition and size class as the surrounding forest would have no measurable impact on wildlife (but may constitute an impact on other resources). Road density goals for wildlife vary depending on the species, the area under consideration, and the objectives and designation assigned to the drainage.

Affected Environment

The scope and design of this project, with no changes to the current road system or management, and only a small short-term change in road use, means quantitative measures are not required for analysis. Many of the current and foreseeable actions in the analysis area influence disturbance and access. Past road building and current road management, particularly on private industry timber lands in the checkerboard ownership south of the St. Joe River; has led to high open road densities and a reduction in secure habitat for wildlife. The project area north of the river has lower open road densities and a large (3,000+ ac.) block of secure habitat resulting from the mostly unroaded condition of the shrubfield dominated area.

Environmental Consequences

Direct, Indirect, and Cumulative Effects of No Action

There would be no new road construction or reconstruction with the No-Action Alternative. No existing gated roads would be opened to access proposed timber sale units. The open road density would remain unchanged. Conditions for wildlife related to access (i.e. fragmentation, security, vulnerability), would not change under the No-Action Alternative.

Direct, Indirect and Cumulative Effects of Action Alternatives (B & C)

There would be no new road construction or reconstruction.

The action alternatives would open the gate on Road 3465 to access the commercial thin units and allow for its use as the log landing. This would be a temporary increase in open road density for the duration of the timber sale activity. This is a short-term increase that would mainly be limited to the 1- to 3-year duration of the timber sale. Road 3465 opened to access the commercial thin units would be restored to its previous gated condition. Post-sale conditions for wildlife related to access (i.e. fragmentation, security, vulnerability) would not be changed from the existing condition.

Connectivity

The spatial arrangement of existing forest structure, land uses (e.g. Avery and Hoyt Flat) and roads (especially Forest Highway 50) affect movement of wildlife and have most likely created impediments to movement for some species. Maintenance of connectivity was one consideration in the development and design of the proposed action. The design criteria prohibiting ignition within timbered portions of proposed burn units is the major method for maintaining connectivity within the project area.

Affected Environment

The effects of past and present actions continue to affect and alter wildlife movement in and through the analysis area. Areas typically used by wildlife for travel include ridges, riparian areas, and saddles. Prominent ridges that provide potential corridors and connectivity have been mapped (W-15). Areas that create an impediment to travel within these corridors, (for this analysis, areas having less than 30% canopy cover and exceeding 100m wide [IDFG 1995, p.57]) for some species have also been identified. The proposed commercial thin units for this project are not within major travel corridors. The majority of the timber cover in potential travel corridors is not in the shrubfield stands proposed for burning. Past harvest, past fires, existing roads, and other human activities have reduced the amount of ridgetop and riparian cover in the landscape of the wildlife analysis area. This is affecting connectivity/travel corridors for some species.

Environmental Consequences

Direct, Indirect and Cumulative Effects of No Action

This alternative would not build any roads or propose any commercial timber harvest. Existing travel cover would be maintained. There would be no impact on the travel corridors that were identified and mapped for analysis purposes. Conditions in the project area for wildlife movement and travel would not be changed from the existing situation. The No-Action Alternative would not have any adverse effects on connectivity.

Direct and Indirect Effects of Proposed Action Alternatives

The action alternatives are expected to have little effect on identified travel ways. No-entry, riparian buffers would retain canopy cover along project area stream courses that are also potential travel corridors. The design features to preserve ridgetop timber cover (Design Feature 4.d) would minimize the potential for trees to be burned. As the extent of the burns is not entirely predictable, it is understood that some timber cover may be lost if fire creeps outside burn boundaries. It is estimated that an occasional 30- to 40-foot wide strip of timber (see fire/fuels section) could be burned under either action alternative. Alternative B has a slightly greater chance of burning some timber in travel corridors as it would treat more stands adjacent to the ridges than Alternative C. The amount of potential fire expansion into travel corridors under either action alternative is not anticipated to exceed guidelines for openings in travel corridors, i.e. limited to one side of the ridgetop, less than 300 feet wide, and less than 25% of the corridor (IDFG 1995 p. 57). The travel corridors are further protected because most treated stands with ridgetop timber would have the shrubs adjacent to the trees burned under moist (spring) conditions to create a black buffer to retard the spread of burns ignited under drier (fall) conditions. Where shrubs dominate the ridges of stands to be burned, it is expected there may be a reduction in travel corridor effectiveness. This is considered a temporary short-term inconsequential effect, as there would be adequate shrub cover remaining adjacent to the burns, and it is expected to take less than ten years for the stand to regain its former shrub heights and densities. Opportunities for wildlife movement and travel would be maintained.

Cumulative Effects of Proposed Action Alternatives

There would not be any further appreciable changes in permanent impediments to movement. The effects of past, present, and reasonably foreseeable actions would continue to affect and alter wildlife movement in and through the analysis area. Based on the lack of deliberate treatment of travel cover, as well as existing and foreseeable conditions, the area would still maintain corridors suitable for wildlife movement. Given the relatively limited potential for tree mortality through fire moving beyond its ignition area, the design features of the proposed action alternative, and the conscious desire to minimize impacts through alternative design, (i. e. burned buffers below timbered ridges) this alternative would not have unacceptable, irreversible and irrevocable adverse impacts on connectivity. Alternative areas for movement by wildlife exist and opportunities for movement/travel would be maintained.

Threatened and Endangered Wildlife Species

The U. S. Fish and Wildlife Service (USFWS) identified three listed or proposed wildlife species that may occur on the Idaho Panhandle National Forests (Species list: Shoshone County, Idaho, March 1, 2006): bald eagle, gray wolf, and Canada lynx. Based on direction provided by the USFWS, the Species List, review of the area, a search of district records, scientific literature, and professional knowledge of the area, species requiring analysis were identified.

The U. S. Fish and Wildlife Service is in the process of taking the bald eagle off the threatened and endangered species list. When that becomes effective the bald eagle will be treated as a “sensitive” species for the Northern Region of the Forest Service.

Table 42 provides a short synopsis of the listed species, their habitat, and the existing condition within the wildlife analysis area.

Threatened and Endangered species were screened for their relevancy to the wildlife analysis area and the proposed action. See the Species Relevancy Screen and Rationale for no Further Analysis sections above for additional discussions regarding analysis needs of T&E species. Further information can also be found in the project file (W-21). Based on species occurrence, habitat capability and suitability, and the likelihood or risk of potential impacts on habitat and the species, there would be no effect on species identified in the species relevancy process as needing no further analysis.

Table 42 - Listed Wildlife Species

Common Name	Habitat	Existing Condition in the Wildlife Analysis Area
Bald Eagle	Nest near large bodies of water (≥80 acres) or major rivers in areas relatively free from disturbance. Winter habitat is mostly associated with areas of open water.	Species may be incidentally present in the project area, about 7.5 miles of the St. Joe River is within the project area. Human disturbance at Hoyt Flat and Avery, and along FH 50 also limits liklihood of eagle presence.
Canada Lynx	Mesic conifer forests that provide a prey base of snowshoe hare (generally above 4,000'). Late and early successional stages.	Species presence unknown but very unlikely. The project area north of the St. Joe River is not in a LAU. The Roundhouse Gulch area (south of the river) is within the Lower Fishhook LAU. Based on elevation (<3,700'), the commercial thin portion of the project area is not capable lynx habitat.
Gray Wolf	Large areas with high prey densities and isolation from human activities. Availability of den and rendezvous sites.	The project area is within the Central Idaho wolf reintroduction area. There is evidence of wolf pack activity within the surrounding landscape and the project area is within a known territory.

Bald Eagle

Bald eagles select isolated shoreline areas with larger trees to pursue such activities as nesting, feeding, loafing, etc. Components of nesting habitat include proximity to sufficient food supply, the presence of dominant trees, and line-of-sight to a large body of water (often within 0.33 mile of water [MBEWG 1991 p. 9]).

The U. S. Fish and Wildlife Service is in the process of taking the bald eagle off the threatened and endangered species list. When that becomes effective the bald eagle will be treated as a "sensitive" species for the Northern Region of the Forest Service.

Affected Environment

Bald eagles are occasionally seen within the project area at any time of year (District Records). There are no known nests or communal roosting areas along the roughly 7.5-mile stretch of the St. Joe River that is within the project area.

Environmental Consequences

Direct, Indirect and Cumulative Effects of No Action

As no activities are proposed and this alternative does not change habitat conditions within the project area, or affect existing disturbance levels along the St. Joe River, it would have no effect on the bald eagle.

Direct and Indirect Effects of Proposed Action Alternatives

The helicopter flights crossing the river corridor for the shrubfield burning and commercial thinning are the only disturbance effects with the potential to directly affect bald eagles. For the shrubfield burning, this would be several flights per day during the burning windows, generally 5- to10-day periods a few times a year between March and November. Two helispots, one at Hoyt Flat and one near Avery, may be used for shrubfield burning. For the commercial thinning there should be a few flights per day to and from a service landing near Avery, and this would most likely occur daily over the several-month period of active logging. This could take place at any time of year, although it is less likely during the winter months due to poorer flight conditions.

This project will have no effect on habitat structure likely to be used by bald eagles within the project area. No treatment of large trees is proposed, and therefore no change to potential nesting, roosting, or perching

habitat within the river corridor would occur. Helicopter flights within the river corridor are the main disturbance that would affect bald eagles. Crossing of or flying along the river would generally occur within ½ mile on either side of the landings. Less than 30% of the river corridor within the project area would be affected by helicopter flights. The one to two additional days of helicopter flying needed for Alternative B as compared with Alternative C would not have a consequential effect on eagles. It is expected that temporary displacement and avoidance of the immediate area during the times of helicopter activity would be the main effect on eagles. As the overlap between occasional eagle use of the area and the sporadic, short-term helicopter flights would be infrequent; this disturbance is unlikely to have an adverse effect on the continued use of the area by eagles.

Cumulative Effects of Proposed Action Alternatives

The helicopter activity from the logging portion of this project may occur over a 1- to 2-year period, and over a 3- to 5-year period for the shrubfield burning. Occasional administrative helicopter use from Hoyt Flats is the only potential federal action that would add to disturbance along the river corridor within the project area. This activity is generally short-term in nature and limited in amount. Since nearly all helicopter use is for fire suppression and occurring mainly during summer, it is not expected there would be much overlap with this project's helicopter activity. Eagles that may be affected by this project are expected to make use of areas of undisturbed river habitat within and adjacent to the project area. Based on the scope and location of the project, and the short-term intermittent nature of the disturbance, the proposed action may affect but is not likely to adversely affect bald eagles.

Gray Wolf

Historically wolves were distributed throughout most of Idaho in unknown populations. Wolf packs of 4 to 10 animals appear to have ranged widely in the mountains of northern and central Idaho. A decline of native ungulates, control programs designed to eradicate wolves and conflicts with livestock and humans caused the decline of wolf populations in Idaho and led to the absence of a breeding population in Idaho (Hansen 1986 p.19).

The Avery Fuels Reduction Project Area falls within the Central Idaho wolf reintroduction area where gray wolves are classified as nonessential experimental populations. This classification treats wolves as proposed for listing under the ESA (i.e. instead of endangered). The reintroduction of wolves in Central Idaho did not envision conflicts with current or anticipated management actions. Wolf population recovery goals have been met since 2002 (Nadeau and others 2006 p. 2). This removes any requirement for land-use restrictions associated with the reintroduction, including areas around den sites or other critical areas (USDI 1994 p. 60271).

Methodology

Wolves exhibit no particular habitat preference. High prey densities, particularly big game, and isolation from human disturbance characterize quality wolf habitat. Other important habitat features for wolves include den and rendezvous sites (Hansen 1986 p. 50). Dens are commonly located on southerly aspects of moderately steep slopes, usually within 400 yards of surface water and tend to be located away from sources of human disturbance such as roads and campsites. Rendezvous sites are usually complexes of meadows and adjacent hillside timber (USFWS 1987 p. 8).

Effects analysis is based in part on the quality of elk and deer habitat, as this is one indicator of the ability of the project area to support an adequate prey base for wolves. While the exact size of their home range is not known, wolves in the area are known to use an area larger than the project area. The cumulative effects area used for this analysis is the project area and the adjacent 44,167-acre Slate Creek Drainage. This provides an area of approximately 56,000 acres, large enough to analyze effect on a wide-ranging species such as the gray wolf. Human disturbance as measured by open road densities within the analysis area is also used to disclose potential effects in this analysis. Human caused mortality, rather than human disturbance itself, can affect the ability of an area to support wolves. The potential for mortality is related to the open road density and the amount of secure habitat, so these factors are also used to analyze effects on wolves.

Affected Environment

The project area is within a known territory (Nadeau and others 2006 p.14), and there has been wolf sign (tracks, howling) within the project area (District records). Based on a combination of field review and aerial photo assessment, there are no areas usually associated with denning or rendezvous sites in the project

area. Based on an examination of the project area (e.g. generally steep shrubfields and timbered stands,) and descriptions of common den and rendezvous sites, the potential for denning and rendezvous site(s) in the area of treatment is low. The project area is considered good quality habitat for wolves with a high prey base and a large (3,000+ ac.) block of secure habitat in its center.

Environmental Consequences

Direct, Indirect and Cumulative Effects of No Action

As no activities are proposed and this alternative does not change the open road density or the secure habitat conditions within the project area, it would have no effect on the gray wolf.

Direct, Indirect and Cumulative Effects of Action Alternatives (B & C)

The timbered stands proposed for commercial thinning are not presently important habitat for wolves or big game, their main prey base. The commercial thins would reduce canopy cover of the treated stands but would not change their forest structure. The thinning of these stands is expected to allow an increase in underbrush, while retaining some overhead cover. This change in habitat may enhance conditions slightly for big game, but the limited treatment and relatively light removal (as compared to regeneration cuts); means the effects on wolves would likely be inconsequential. The off-site pine slashing and shrubfield burning are expected to have a positive effect on conditions for wolves. The timing and conditions under which the burning would be conducted would result in low- to high-intensity fires in open areas. Under these conditions wet areas and areas with forested canopies within and adjacent to burn units are not expected to burn. The increased quality and availability of the browse provided by the treated shrubfields is expected to noticeably enhance forage conditions for big game. The resulting improvement in elk and deer condition and potentially numbers is expected to benefit wolves by increasing the prey base. Alternative B would treat 12% more shrubfield acres than Alternative C.

Disturbance effects on wolves from the commercial thinning portion of the project are expected to be minimal. The timbered stands slated for treatment are not currently important habitat for wolves or their prey. While there would be daily activity for a several-month period during the timber sale (between 2008 & 2009), this activity is confined to a relatively small portion (<10%) of the project area. The disturbance from the off-site pine slashing would also be limited to a short time, about one to two months during 2008, and a similarly small percentage of the area. There is sufficient cover and habitat within the surrounding landscape for wolves and their prey to displace to if need be, and wolves would be able to avoid the disturbance.

The shrubfield burns would be ignited by helicopter or by hand, and there would be no change in road access within the project area. The disturbance associated with the shrubfield burning is expected to have little effect on wolves or their prey as it is generally confined to brief periods of a few days at a time, for only a few times a year. The extra day or two needed to burn the additional 475 acres in Alternative B, as compared to Alternative C, would not create a noticeable difference in disturbance. With the project spread out over a three- to-five year period (2008 - 2012), the area of disturbance at any one time would only be a small percentage of the project area, and an even smaller fraction of the wolves' territory. For a highly mobile species such as wolves, avoiding the areas and times of disturbance from all phases of project implementation would not have any consequential impacts.

Cumulative Effects of Action Alternatives (B & C)

This project is not designed to change the overall cover/opening ratios in the project area. There would be no consequential change in the amount or distribution of shrubfield or forested area. The alternatives would have no measurable effect on forest structure beyond the project area level. There are no reasonably foreseeable activities that would impact forest vegetation within the project area.

The proposed project would occur entirely on National Forest System lands. Routine road maintenance mainly along the periphery of the area, and administrative site use and maintenance are known U.S. Forest Service management activities planned for the project area that would contribute to disturbance effects from the proposed action alternatives. Effects from these activities are a part of the baseline existing conditions.

The proposed project would not directly or indirectly change long-term access or road densities. The potential displacement of big game or change in elk use would be negligible and would not affect potential elk use or wolf prey base populations. Any effect would be localized, minor, and would not affect species occurrence or populations at a landscape level. The nature of the project would not significantly affect the

forest structure component of habitat for wolves or interrupt any linkages or connections between habitats. One purpose of the proposed project is to improve forage conditions for ungulates, and therefore it is expected to have a positive impact on existing/baseline prey availability.

Proposed activities are not expected to affect species or population occurrence within the landscape. Based on the assessment documented above the proposed project is not likely to jeopardize the continued existence of the species or result in destruction or adverse modification of proposed critical habitat.

Sensitive Wildlife Species

Sensitive species are determined by the Regional Forester (FSM 2670.5) and are those species for which population viability is a concern. The ICBEMP assessment found that species that are likely in decline (includes many Sensitive species) are associated with landscape and habitat components that are declining. Forest Plan direction for the Idaho Panhandle National Forests (IPNF) states that habitat of sensitive species would be managed to prevent further declines in populations to prevent federal listing.

The U. S. Fish and Wildlife Service is in the process of taking the bald eagle off the threatened and endangered species list. When that becomes effective the bald eagle will be treated as a “sensitive” species for the Northern Region of the Forest Service.

Methodology

This analysis identified capable and suitable habitat based on the latest scientific literature for each species and available data in the TSMRS database (W-8). Stand information from the database was closely reviewed to determine if it was still valid. Aside from any activity on private lands, and the declining off-site ponderosa pine, there has been only one timber sale in the project area over the last 10 years (ACT-1), so the stand information is still applicable to current conditions. The proposed commercial thin units received new field exams in 2005. Impacts on acres of suitable habitat (W-9, W-10) were calculated by alternative and discussed for each species as appropriate. The total stand acres including riparian buffers, of the stands to be treated are used to evaluate effects on wildlife habitat.

Sensitive species on the Regional Foresters list were screened for their relevancy to the wildlife analysis area and the proposed action. See the Species Relevancy Screen and Rationale for No Further Analysis sections above for additional discussions regarding analysis needs of sensitive species. Further information can also be found in the project file (W-21).

Based on species occurrence, habitat capability and suitability, and the likelihood or risk of potential impacts on habitat and the species, there would be no impact on species identified in the Species Relevancy process as needing no further analysis.

The table below displays sensitive wildlife species from the U.S. Forest Service Region One list (USDA 2004) that may be affected by the proposed action, a short description of habitat requirements, and comments regarding habitat capability/suitability. The more detailed analysis for each species follows the table.

Table 43 - Sensitive Wildlife Species and Habitats

Common Name	Habitat	Comments
Black-backed Woodpecker	Conifer forests, dead/dying trees (especially fire killed).	Suitable habitat in wildlife analysis area.
Flammulated Owl	Mature to old Douglas fir and ponderosa pine forests.	Limited suitable habitat within wildlife analysis area.
Western Toad	Breed in lakes, ponds, streams and persistent water sources.	Potential breeding habitat limited in wildlife analysis area.

Black-Backed Woodpecker

Black-backed woodpeckers are specialists in forests that have insect outbreaks from either wildfire or other reasons. They nest in snags or in live trees with heart rot, which are at least five inches in diameter. Black-backed woodpeckers feed primarily on wood-boring beetles and specialize on large areas of recently killed, beetle-infested timber. Black-backed woodpeckers prefer mature and old growth forests and fire- or insect-damaged stands. Lodgepole pine forests are also considered source habitat for black-backed woodpeckers

(Wisdom and others 2000 p. 209-210). Breeding densities of black-backed woodpeckers vary considerably in response to prey availability. They are specialists in exploiting recent forest fires, especially for the first three to five years after burning, and rapidly utilize new burns (Hutto 1995 p.1041). Historically on the IPNF, mixed-severity and stand-replacing fires produced new habitat annually in greater amounts than is presently produced under a fire suppression strategy (Zack and Morgan 1994 p. 27).

There have been no recent observations of black-backed woodpecker in the Avery Fuels Reduction Project Area, but their feeding sign has been found (W-11). Based on literature descriptions and field verification of habitat, capable and suitable habitat is available within the Avery Fuels Reduction Project Area. Distribution of black-backed woodpeckers is presumed to coincide with existing stands of mature old forest structure, as more dead trees from insects and disease would have accumulated as stands age. While larger, older trees may be preferred for suitable habitat, black-backed woodpeckers commonly use trees ranging from 11-15 inches d.b.h. for nesting, roosting, and foraging (WDW 1991 p. 1). They are suspected of occurring at or above levels comparable with other areas on the Forest and District.

Affected Environment

The 10,997-acre Avery analysis area and the 6,350-acre Roundhouse analysis areas are of sufficient size for cumulative effects analysis as they are large enough to contain several home ranges (Wisdom and others 2000 p. 210). The Roundhouse analysis area contains 781 acres of mature and/or old forest (12%) that is considered suitable habitat (W-10). 4,365 acres (69%) of immature sawtimber size class (9-14" d.b.h.) forest is also present in this area and has the potential to provide habitat in the future.

No recent fires or insect or disease outbreaks have occurred in the Roundhouse analysis area. If black-backed woodpeckers are present here, it is likely in low numbers commensurate with existing endemic insect and disease levels throughout the area.

The Avery analysis area contains 301 acres of mature and/or old forest and 696 acres of off-site ponderosa pine that is considered suitable habitat (9% of this analysis area). 4,384 acres (37%) of immature sawtimber size class (9-14" d.b.h.) forest is also present in this area and has the potential to provide habitat in the future. 61% of the declining off-site ponderosa pine stands being affected by insects and disease are in this immature sawtimber size class. The fading off-site ponderosa pine stands have a mix of dead, dying and live trees and constitute suitable habitat for black-backed woodpeckers. 119 acres of previously suitable habitat off-site pine stands were cut in 2001 with the Avery Hill project, and are now seedling habitat (W-9). In addition to the proposed treatment stands, there are roughly 378 acres of off-site pine stands containing enough recently (last five years) dead trees to provide higher quality suitable habitat.

Timber mortality from insects and disease (especially in the off-site ponderosa pine stands) is continuing in the project area. There are some root rot areas as well as continuing endemic levels of mountain pine beetle and Douglas-fir bark beetle (Vegetation section). This trend, as well as the continued succession of immature sawtimber stands, is slowly increasing the amount of suitable habitat available for black-backed woodpeckers. Due to the fire history (virtually all of the analysis area was burned in 1910, see Fire History Map), there is a low level of mature/old forest structure in the project area. The low levels of mature and old trees, endemic insect and disease levels, and the limited amount of off-site related mortality, indicate a trend of static to slightly increasing habitat quality for black-backed woodpeckers.

Environmental Consequences

Direct and Indirect Effects of No Action

There would be little change from existing conditions as there would be no harvest of any suitable habitat. Succession would continue on immature timber stands and improve their suitability as black-backed woodpecker habitat. Mortality through insect and disease agents is expected to persist at or above endemic levels (Vegetation section), providing a continuing supply of feeding and nesting habitat throughout the project area.

Cumulative Effects of No Action

Allocated old growth would be maintained at existing levels, and untreated stands would continue to age. The trend for continuing tree mortality through insect and disease agents is expected to persist. The amount and quality of suitable habitat would continue to increase. The project area's ability to support black-backed woodpeckers would improve over time. The No-Action Alternative would not reduce any

suitable habitat; nor would it create any potential habitat through burning. Therefore, no action would have no impact on black-backed woodpeckers.

Direct and Indirect Effects of Action Alternatives (B & C)

Both action alternatives would treat 112 acres of low quality immature sawtimber stands in the Roundhouse Gulch area with commercial thinning from below. This treatment would leave more open stands with a larger average d.b.h., but with fewer dead or diseased trees. Both action alternatives would treat 253 acres (stand acres minus riparian buffers) of off-site ponderosa pine stands in the Avery area with a combination of slashing/felling of live pine and burning, or just slashing/felling of live pine. This would remove the pine that is the major component of this higher quality suitable habitat. In units not burned, the remaining timber of other species and any existing pine snags would still provide habitat, although of lower quality. In units that are burned after the pine slashing/felling, it is reasonable to expect mortality of some of the other species of trees retained, and this would offset the loss of suitable habitat trees to some degree. Under both action alternatives, through the proposed cutting of the live off-site pine, which would eliminate future pine snags; the habitat quality would be reduced in these units. The broadcast burning proposed for shrubfield improvement would have a likelihood of improving habitat for black-backed woodpeckers by providing some fire-killed trees. Although ignition in clumps and stringers of timber would be avoided, it is expected that there would be some mortality of trees within and adjacent to these shrubfield units (*Fire and Fuels* section). Alternative B proposes to burn 475 more shrubfield acres than Alternative C, and is therefore expected to create slightly more snags and black-backed woodpecker habitat.

Cumulative Effects of Proposed Action Alternatives

Retention of snags and live recruitment trees at levels in the design criteria would maintain some habitat value for black-backed woodpeckers (albeit at a lower level), within the commercial thin treatment stands. The shrubfield burning is expected to slightly improve habitat conditions through the incidental creation of snags. Alternative B would burn 12% more acres than Alternative C, so it is expected to create slightly more suitable habitat for black-backed woodpeckers. Each alternative would lose the same amount of higher quality habitat through the off-site pine treatment. The presence of an equal or greater amount (378 total stand acres, 54%) of suitable off-site ponderosa pine habitat than is being treated (318 total stand acres, 46%), would continue to provide sufficient habitat for black-backed woodpeckers to persist at current levels in the project area. Both action alternatives would reduce habitat quality in places and increase habitat quality in places. Overall, the reduction in habitat and habitat quality through the commercial thins and off-site pine treatment would be somewhat offset by the increase in habitat quality through snags created during the shrubfield burning; resulting in an essentially neutral to slightly negative effect on black-backed woodpeckers in the project area. With the amount of suitable mature forest and off-site ponderosa pine habitat remaining, it is not anticipated that any proposed federal action would contribute to adverse impacts on black-backed woodpecker populations within the project area or at a landscape level.

Samson (2005 pp. 51, 52) concluded that short-term viability of the black-backed woodpecker in the Northern Region is not an issue for the following reasons:

- No scientific evidence exists that the black-backed woodpecker is decreasing in numbers.
- Increases in the extent and connectivity of forested habitat have occurred since European settlement.
- Increases in amounts of small and mid-size trees have increased since European settlement.
- Well-distributed and abundant blacked-back woodpecker habitat exists on today's landscape.
- The level of salvage timber harvest (in 2004, 1210 ha of 2,276,588 ha or 0.0005%) or overall timber harvest (0.0009% of forested landscape in the Northern Region) is insignificant.

Consequently, none of the alternatives would likely result in appreciable adverse habitat modification or a perceptible change in populations of black-backed woodpeckers. For reasons listed above, the action alternatives may impact individuals or habitat, but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Flammulated Owl

Flammulated owls are seasonal migrants that occupy home ranges in the northern latitudes during late spring through early fall. They are cavity nesters that depend upon naturally occurring or excavated cavities for nesting. Consequently, snags and other defective trees are an important component of their breeding

habitat. These owls are associated with relatively open, older forests featuring ponderosa pine and Douglas-fir that are correlated with drier habitats.

Flammulated owls have a relatively small home range, with the average size ranging from 25 to 35 acres, with a home range/territory density no greater than one per 100 acres (Hayward and Verner 1994, p.22, 37). Stands composed of ponderosa pine or Douglas-fir cover types, in mature (>14") size classes, on dry habitat types, with a range of 35-65% canopy cover are considered suitable habitat. Capable habitat is habitat that is able to support the above stand conditions. Reynolds and Linkhart (1992 p.166) reported that all published North American records of nesting, except one, came from forests in which ponderosa pine was at least present, if not dominant. Flammulated owls generally reoccupy the same territory each year. The flammulated owl's preference for ponderosa pine and/or Douglas-fir can also be linked to prey availability (primarily moths, beetles, crickets). Reynolds and Linkhart noted a stronger correlation between prey availability and ponderosa pine and Douglas-fir, than with other common western conifers. Territories with large, (>14" d.b.h.) ponderosa pine are higher quality than those without ponderosa pine. Samson (2005, p.62) concluded that short-term viability of the flammulated owl in the Northern Region is not an issue for the following reasons:

- No scientific evidence exists that the flammulated owl is decreasing in numbers.
- Increases in the extent and connectivity of forested habitat have occurred since European settlement.
- Well-distributed and abundant flammulated owl habitat exists on today's landscape.
- The level of timber harvest ([in 2004] 0.0009% of the forested landscape in the Northern Region) is insignificant.

Affected Environment

Due to their relatively small home range, the 10,997-acre Avery analysis area and the 6,350-acre Roundhouse analysis area are of sufficient size for flammulated cumulative effects analysis. Approximately 384 acres of capable flammulated owl habitat exists in the Roundhouse wildlife analysis area. One 80-acre stand of suitable habitat is present. With an average home range size of 25-35 acres, this area may be able to provide habitat for two to three pairs of owls. As it is a single stand, only one or two pairs of owls are more likely given territorial behavior. This stand has large live and snag Douglas-fir but no ponderosa pine, which reduces the chances that it would be occupied. The stands proposed to be treated with commercial thins are not capable habitat because they do not occur on drier habitat types.

There are approximately 3,927 acres of capable flammulated owl habitat in the Avery wildlife analysis area. 67 acres in two stands of suitable habitat are present. With an average home range size of 25-35 acres, this area may be able to provide habitat for two pairs of owls. These stands are far enough apart that they would avoid territorial competition and could support two pairs at the same time. These stands have large live and snag Douglas-fir but no ponderosa pine, which reduces the chances that they would be occupied. The stands proposed for treatment with the shrubfield burn and off-site pine treatment portion of the Avery Fuels Reduction project are not suitable habitat for flammulated owls. 966 acres of capable habitat are proposed for broadcast burns (BB). 50 acres in two stands are off-site ponderosa pine (OSPP). The BB stands and the 31-acre OSPP stand are shrub-dominated, and their maintenance as shrubfields would have little effect on owls, as they would not have progressed to timbered stands for decades. The other OSPP stand is 19 acres and is an immature sawtimber Douglas-fir cover type. This stand is not a big enough block to function as an effective home range.

The low amount of suitable habitat present in both areas indicates that a flammulated owl population is not likely to occur in the project area. Though suitable habitat is present, the low percentage of suitable nest stands and the lack of occurrence of ponderosa pine in these stands reduce the likelihood of use by flammulated owls.

Environmental Consequences

<u>Direct, Indirect, and Cumulative Effects of the No Action Alternative</u>

There would be no management-created changes to habitat conditions for flammulated owls under the No-Action Alternative. The increase or decrease in canopy cover resulting from normal growth and mortality would not make a measurable difference over the short-term, i.e. 10-20 years. The continued decline and increasing mortality of the off-site ponderosa pine in the analysis area north of the river would have little effect on flammulated owls due to the relatively small size (shrub to immature sawtimber size class) and

young age (<75 yrs.) of those stands. Not all these stands are capable habitat, and those that are would not become suitable because the majority of the pines are expected to die (see *Vegetation* section) before becoming large enough timber to provide suitable habitat conditions. The potential of the analysis area to provide flammulated owl habitat would be unchanged with this alternative. This alternative would have *no* impact on flammulated owls.

Direct and Indirect Effects of Action Alternatives (B & C)

The seven stands included for broadcast burning with Alternative B that are not in Alternative C are not capable habitat for flammulated owls. Therefore, there is no difference between the alternatives with regard to flammulated owls, and the effects can be analyzed together. The stands proposed for treatment with the Roundhouse commercial thin portion of the Avery Fuels Reduction project are not capable habitat for flammulated owls. There is a limited amount of suitable habitat in this analysis area, and no treatment of it or any capable flammulated owl habitat with these alternatives. There is no treatment of suitable habitat in the Avery analysis area, and 98% of the capable habitat stands to be treated are shrubfield dominated (W-5). Since these stands would not have their condition changed with regard to owl habitat needs from the existing composition, there should be no direct effects on flammulated owls. A portion of one of the shrubfield burn stands in the Avery analysis area is adjacent to the base of one of the potentially suitable nest stands. If this stand is occupied it is possible that some smoke from the burn or the helicopter noise could disturb owls. Temporary displacement of the owls is the only potential indirect effect that may occur as a result of the proposed action.

Cumulative Effects of Action Alternatives (B & C)

Post-activity habitat conditions for flammulated owls would be essentially unchanged from the existing condition, because no suitable habitat or capable habitat of consequence is being treated. The burning of sparsely timbered shrubfield-dominated habitat would have little effect on flammulated owls. Those shrubfields with greater potential to progress to timbered stands and possibly provide habitat in the future were not included in the proposed action. There are no reasonably foreseeable actions in the project area that would have an impact on flammulated owls. None of the action alternatives would result in appreciable adverse habitat modification or a perceptible change in populations of flammulated owls. Due to the lack of treatment of suitable habitat, inconsequential effects from treatment of low quality capable habitat, and the inconsiderable potential for flammulated owls to be present in the project area; the proposed action alternatives may impact individuals or habitat, but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Western Toad

Affected Environment

Western toad breeding habitat includes shallow, quiet water in lakes, marshes, bogs, ponds, wet meadows, slow-moving streams, backwater channels of rivers and other persistent water sources. Young toads are restricted in distribution and movement by available moist habitat, while adults can move several miles and reside in marshes, wet meadows, or forested areas. Toads hibernate in the winter in habitats that maintain a high humidity and above-freezing temperatures. Areas that provide shelter for hibernating toads include rodent burrows, beaver lodges, and beaver dams (Loeffler 1998 p.7).

Since this species depends on wetlands to breed, the reduction of wetlands or adverse impacts on wetlands potentially have detrimental effects on western toads.

It is important that toads be able to move among their seasonal habitats. The biggest potential barrier to their movement is roads. Steep road cuts can be a barrier to toads moving between seasonal habitats. Juvenile toads are vulnerable to being killed by motorized vehicles when they are dispersing from their natal ponds. The mesic nature of much of the forests of the IPNF indicate that toads have opportunities to find persistent small water sources for breeding, and could successfully disperse through moist forest.

There are no known observations of western toads within the project area. There are some mesic timbered stands present that could provide suitable habitat. These are most likely to occur along the lower reaches of Roundhouse Gulch and Storm, Setzer, and Rock Creeks. It is unlikely the proposed shrubfield burn and off-site pine units are providing suitable habitat as they occur mainly on drier, south-facing slopes with open canopies. The commercial thin units, while on east to northwest aspects, are not especially mesic habitat types. Potential breeding habitat, if present, is likely very limited, as there are only a few small beaver-created ponds along Storm Creek present; and no other known locations of shallow, still water. Breeding

habitat is probably confined to the riparian zones of any slow-flowing, low-gradient creeks that exist in the area. Temporary pools from snowmelt and rainwater may also be used for egg laying, but these would have to be warm enough and persist long enough for tadpoles to metamorphose. It is possible but unlikely western toads are present in the project area.

Environmental Consequences

Direct, Indirect, and Cumulative Effects of the No Action

There would be no change to habitat conditions for western toads with the No-Action Alternative. This alternative would have no impact on western toads.

Direct and Indirect Effects of Proposed Action Alternatives

Habitat alterations from timber harvest and recreation have not been shown as causative agents for population declines (Loeffler 1998 p.11). Given the minor amount of mesic, timbered stands present and the relative scarcity of ponds or wetlands, it is likely that breeding habitat is limiting for western toads in the project area. The riparian buffer zones established on creeks in the project area means there would be no changes to potential breeding habitat. These no-cut buffers would also protect the majority of the timbered areas near water that would be most likely to be used by toads if they were present. The nature of the proposed commercial thins, in retaining 20-30% canopy cover of larger trees, means it is unlikely these stands would become completely unsuitable habitat for western toads. The dry shrubfields proposed for burning are unlikely to be suitable toad habitat. The increase in shrubfield acres to be burned in Alternative B over Alternative C would make essentially no difference in effects on toads.

This species can breed along roadside ditches and can be found in upland habitat that would not have any special protection. Some mortality occurs to adults and metamorphs in these situations, but it is unlikely to be significant to the population as a whole because of the low level of traffic on forest roads and the high number of other opportunities for breeding habitat throughout the forest. The highest potential for mortality would occur on existing open roads adjacent to potential breeding habitat. The action alternatives do not propose any new road construction. Any cumulative mortality from the action alternatives is unlikely; and potential adverse effects would not significantly exceed existing levels of risks to the species.

Cumulative Effects of Proposed Action

The impacts from proposed federal actions under this alternative would not contribute appreciably to existing impacts and would not affect population viability. The protection of potential breeding habitat along streams, and only minor changes to timbered habitat toads may use, coupled with the low probability of western toad presence, means the action alternatives may impact individuals or habitat, but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Management Indicator Species

Management indicator species (MIS) are species selected to estimate the effects of management activities on wildlife populations. The Forest Plan identified the MIS for the Forests. They include several categories of species including: threatened, endangered and sensitive, commonly hunted or trapped, and species whose population changes are believed to indicate effects of management on other species or biological communities. In this analysis TE&S species are addressed separately. Those species from the IPNF Forest Plan that are applicable to the St. Joe District and project area are displayed in Table 44.

MIS were screened for their relevancy to the wildlife analysis area and the proposed action. See the *Species Relevancy Screen* and *Rationale for no Further Analysis* sections above for additional discussions regarding analysis needs of MIS. Further information can also be found in the project file (W-21).

Marten and potential effects on their habitat are addressed with fisher and are not addressed further in this section. The goshawk is analyzed as a sensitive species and is not addressed further in this section. The Species Relevancy Screen determined that there was no benefit to analyzing potential impacts on moose and that further analysis is not warranted.

Table 44 - Wildlife MIS for the St. Joe District

Species	Reasons Species are Used as Management Indicator Species	Existing Habitat / Need for Further Analysis
Goshawk	Associated with late successional forest habitat.	Limited suitable nesting habitat exists; no further analysis is needed, see below.
Marten	Trapped, associated with late successional mesic conifer forest habitat.	Limited amount of suitable habitat exists; no further analysis needed, see below.
Pileated Woodpecker	Primary cavity excavator, dependent on large snags, associated with late successional habitat.	Habitat and species present, further analysis completed.
Elk	Hunted, important big game species, affected by human disturbance and human use of roads.	Habitat and species present, public issue, further analysis completed.
Moose	Hunted, relatively unique big game species, occurs in low numbers throughout the IPNF.	Habitat and species present, elk analysis meets analysis needs, no analysis specifically for moose completed.

Pileated Woodpecker

The pileated woodpecker was identified as an old growth indicator because of its strong tie to the availability of large snags. Pileated woodpeckers require tall, large-diameter dead or live defective trees within forested stands for nesting. Nest trees average nearly 30 inches; the minimum nest tree diameter is 20 inches (USDA 1990, p.10).

Carpenter ants make up the bulk of their diet. Feeding habitat includes large snags with advanced decay, the moist decaying butts of live trees, logs greater than 10 inches diameter, and natural or cut stumps. Large trees, canopy cover and the number and size of feeding sites (e.g. dead trees greater than 10 inches diameter) are all important features of quality pileated habitat (Aney and McClelland 1985 pp. 4, 13). Activities that reduce these habitat features would reduce pileated habitat suitability. Pileated home ranges average from 500 to 1,000 acres (USDA 1990 p.15); therefore the 10,997-acre Avery analysis area, and the 6,350-acre Roundhouse analysis area are of a sufficient size for the analysis of cumulative effects.

Affected Environment

Approximately 3% (301 acres) of the Avery analysis area and 12% (781 ac.) of the Roundhouse analysis area are large timber and are considered to provide suitable nesting habitat. At these levels, it is likely that pileated woodpeckers are only present in low numbers. While pileated woodpecker feeding sign has been seen in the project area, the low numbers of large snags present needed for nest habitat (>20” d.b.h.) due to the 1910 fires limit the amount of suitable nest habitat available for woodpeckers. 95% of the Avery analysis area is dominated by either shrubfields or young timber, which has not had time to develop large snags. 2005 stand exams in the Roundhouse Gulch area show the proposed commercial thin stands as having adequate numbers of small snags, but missing the >20” snag component. Feeding habitat is not thought to be limiting, with approximately 37% (4,384 ac.) and 69% (4,365 ac.) of immature sawtimber sized (average 10-14” d.b.h.) stands in the Avery and Roundhouse areas, respectively (W-5, W-6).

Pileated woodpeckers are known to use the project area. Pileated feeding sign was noted in some stand exam reports and in recent field reviews (W-7). Timber mortality from insects and disease is increasing in the project area (Vegetation section). The amount of snag habitat available for use as feeding and nesting sites for pileated woodpeckers is increasing because of this. The low levels of mature and old growth forest present indicate low habitat quality for pileated woodpeckers in the wildlife project area (Old Growth section).

Environmental Consequences

Direct and Indirect Effects Common to No Action

Succession would continue on untreated stands and improve their suitability for pileated habitat as tree size increases and snags continue to be produced. This alternative would not impact existing allocated old growth or mature stands (avg. d.b.h. >14”) potentially providing nesting habitat. The amount of higher quality habitat provided by old growth stands would persist in the project area.

Cumulative Effects of No Action

The No-Action Alternative would not reduce any suitable habitat, and the amount of higher quality nesting habitat provided by old growth stands would persist in the project area. Succession would continue on immature and mature sawtimber stands and improve their suitability for pileated habitat, as tree size increases and snags continue to be produced. The No-Action Alternative would have no effect on pileated woodpeckers.

Direct and Indirect Effects of Action Alternatives (B & C)

The seven stands included for broadcast burning with Alternative B that are not in Alternative C are not suitable nesting habitat for pileated woodpeckers. Therefore there is no difference between the alternatives with regard to pileated woodpeckers, and the effects can be analyzed together. No treatment of any mature timber stands that constitute suitable pileated woodpecker nesting habitat is proposed. All the proposed harvest units are commercial thins from below of immature sawtimber size class stands. These cuts would remove the smaller trees, some of which are a component of suitable feeding habitat. Canopy cover of at least 20% would remain, and snags would be retained within the units when safely possible. These stands could still function as feeding habitat, although at a lower quality, due to the reduction in canopy closure and the removal of some of the less healthy trees. Future snags would come from the residual stands, and existing snags would also persist in the riparian buffers. In addition the project area would retain snags at levels that have been shown to maintain viable populations of cavity dependent species (W-3).

The stands proposed for burning are largely shrub-dominated and are not suitable nesting or feeding habitat. Their treatment would have no effect on pileated woodpeckers. Some stands proposed to be burned have a timbered component that may be providing minimal feeding habitat. As there is to be no ignition within the timbered portions of these stands, and they are only 3% of the immature sawtimber size class present in the Avery analysis area, effects on feeding habitat would be inconsequential.

Cumulative Effects of Proposed Action

Allocated old growth would be maintained at existing levels, and untreated stands would continue to age and increase tree size. The trend for continuing endemic levels of tree mortality through insect and disease agents is expected to persist (Vegetation section). The amount and quality of suitable habitat would continue to increase as immature sawtimber stands succeed and increase in tree size and snag numbers. The project area's ability to support pileated woodpeckers would improve over time. Based on the lack of treatment of suitable nesting habitat, and the inconsequential level of feeding habitat treated; the action alternatives would not adversely impact pileated woodpecker populations. The amount of mature nesting and feeding habitat remaining, the design features (i.e. snag retention levels), and prescriptions (i.e. commercial thin designation) would maintain the suitability of the project area for pileated woodpeckers.

There would be no cumulative effects associated with this project or analysis areas that would jeopardize populations of pileated woodpeckers. This is based on the limited effects from this project, the maintenance of existing suitable habitat in the analysis area, the retention of existing immature sawtimber stands that would succeed to suitable habitat, and the abundance and distribution of nest site habitat and winter forage habitat across Region 1 and the IPNF (Samson 2005 pp. 65-67).

Samson (2005 p. 69) concluded that short-term viability of the pileated woodpecker in the Northern Region is not an issue for the following reasons:

- No scientific evidence exists that the pileated woodpecker is decreasing in numbers.
- Increases in the extent and connectivity of forested habitat have occurred since European settlement.
- Well-distributed and abundant pileated woodpecker habitat exists on today's landscape.
- The level of timber harvest ([in 2004] 0.0009% of the forested landscape in the Northern Region) is insignificant.

Consequently, none of the alternatives would likely result in appreciable adverse habitat modification or a perceptible change in populations of pileated woodpeckers.

Elk

Elk are an important big game species within the analysis area. Elk were identified in the Forest Plan as general forest seral species easily affected by management activities. Land management activities, particularly timber harvest and associated roads, affect elk habitat quality, potential elk use of habitat, and elk mortality from hunting.

Methodology

The two most important aspects for elk analysis are secure habitat and available forage. This project would not change parameters important for determining habitat security such as open road density and road management levels (see Disturbance/Access above). As a result there would be no change in post-project secure habitat with any alternative; and therefore, a detailed analysis of road-related effects is not warranted. There would be a difference in the amounts of forage habitat treated with this project by alternative. As these units are spread throughout the project area north of the river, and this area is larger than an average elk home range, the 11,866-acre Avery wildlife analysis area is used as the evaluation area (Leege 1984 p. 9). The difference in the amount of potential forage treated with each alternative is the basis for the analysis of this project's effect on elk.

Affected Environment

Past disturbances, forest succession, the existing road systems, and present management of roads combine to affect existing elk habitat quality. Forage habitat is distributed throughout the area and supplied mainly by persistent seral shrubfields created by the 1910 fire and subsequent reburns. Approximately 4,578 acres of shrubfields are present, which is 45% of the analysis area. These shrubfields are used by ungulates throughout the year, and can be especially important during severe winters (W-12). The majority of the shrubfields proposed for treatment consist mainly of shrubs that are old (the most recent burn in any shrubfield was 1987), and tall; and therefore, the palatable parts of the shrubs are out of reach. Roughly 5,500 acres or 43% of the project area is winter range. Timbered stands are important to provide cover for travel and supply thermal regulation in both winter and summer. 5,718 acres (48%) of the analysis area are timbered with pole-sized or larger trees. Areas that typically are used by wildlife (including elk) for travel include ridges, riparian areas, and saddles. Areas in the project area that provide suitable conditions for travel were mapped and were considered (W-15) in the development and design of the proposed action. The mix of timber and shrubfields as well as the distribution of shrubfields throughout winter and summer range helps to make this an area of high use and importance to elk.

Environmental Consequences

Direct and Indirect Effects of No Action

The No-Action Alternative would not change the existing conditions in the Avery wildlife analysis area. Forage levels and conditions would not be enhanced through burning. Shrubfield stands would continue to age and grow, becoming more decadent, less available and less palatable for ungulates. There would be no commercial thinning in the Roundhouse Gulch area, and no change to the existing low-quality habitat conditions for elk in these timber stands. There would be no new road construction with this alternative and no change in secure habitat or access to the project area.

Cumulative Effects of No Action

There are no present or reasonably foreseeable actions that would measurably affect elk habitat in the project area. Over time, without the occurrence of wildfires, the forage habitat quality for elk would continue to slowly decline. This would result in a gradual reduction in the project area's ability to support elk. The existing open road densities and resultant amount of secure habitat would continue unchanged under this alternative.

Direct and Indirect Effects of Action Alternatives (B & C)

Post-implementation, the open road density and amount of secure habitat in the project area would not change from existing conditions. Forage conditions for elk would be improved with the implementation of this project. The proposed shrubfield burning and off-site ponderosa pine (OSPP) slashing and burning would increase the amount and availability of browse by replacing decadent and out of reach brush with new growth that is more palatable and accessible. In Alternative B 1,564 (37%) acres of winter range and 1,089 (25%) acres of transitional range (used in late fall and early spring) would be treated. Another 1,635

(38%) acres of summer range shrubfields would also be treated. The enhancement of forage conditions that are dispersed across the area in elevation and location would increase habitat quality for elk. A total of 4,288 stand acres distributed throughout the project area would be treated over an approximately five-year period. At 36% of the Avery analysis area, this is expected to be a significant improvement in forage conditions for big game. Alternative C would treat 475 acres less than Alternative B in transitional and summer range. This would also be a significant improvement over existing forage conditions, although it would treat about 12% less than Alternative B.

The timbered stands proposed for commercial thinning with both alternatives are not presently important habitat for big game. The thinning of these stands is expected to allow an increase in underbrush, while retaining roughly 20 - 30% overhead cover (W-10). This has the potential to provide slightly better habitat for elk, and therefore a small potential improvement in habitat quality on 112 acres in the Roundhouse area.

Cumulative Effects of Proposed Action Alternatives

There would be no new roads constructed with this project and no change to the open road density. There would be no change in the management status of the existing road system either within or adjacent to the project area. The amount of secure habitat (>1/2 mile from open roads and trails) would remain unchanged with the implementation of the project.

There would be a temporary increase in disturbance from the commercial thins and connected activity behind the gate on Road 3465. This is considered to be a small and inconsiderable effect as the surrounding stands along with uncut timber in Roundhouse Gulch provide an adequate area for elk to displace to during logging activity.

There are no known reasonably foreseeable activities that would have an effect on elk habitat conditions. The treatment of 3,778 acres (Alternative C) or 4,288 acres (Alternative B), (total forage stand acres) which is 32% to 36% of the analysis area, would improve forage conditions for elk for roughly the next twenty years. These alternatives would treat 63% (Alternative C) to 71% (Alternative B) of the existing forage habitat in the analysis area, which is expected to provide a considerable improvement in conditions for elk.

Regulatory Consistency

The alternatives are consistent with applicable goals, direction, standards, and guidelines from the Forest Plan for the management of wildlife habitat and species populations. The alternatives, to varying degrees comply with other direction and recommendations regarding management of the various components of wildlife habitat. The alternatives comply with applicable conservation strategies for wildlife species. The No-Action Alternative and both action alternatives are consistent with the ESA, NFMA and other laws providing direction and requirements for the management of wildlife species and habitat.

SENSITIVE SPECIES BIOLOGICAL EVALUATION
SUMMARY OF CONCLUSION OF EFFECTS**

Project Name: AVERY FUELS REDUCTION PROJECT

Species	Alternative A	Alternative B	Alternative C
Black-backed Woodpecker	NI	MIIH	MIIH
Black Swift	NI	NI	NI
Western Toad	NI	MIIH	MIIH
Coeur d'Alene Salamander	NI	NI	NI
Common Loon	NI	NI	NI
Fisher	NI	NI	NI
Flammulated Owl	NI	MIIH	MIIH
Fringed Myotis	NI	NI	NI
Harlequin Duck	NI	NI	NI
Northern Bog Lemming	NI	NI	NI
Northern Goshawk	NI	NI	NI
Peregrine Falcon	NI	NI	NI
Pygmy Nuthatch	NI	NI	NI
Townsend's Big-Eared Bat	NI	NI	NI
Wolverine	NI	NI	NI

Conditions: Include any actions or activities that are necessary to maintain the determination of effects.

Recommendations: Include any activities or opportunities that are optional.

Conditions: Gates will be locked closed daily after hauling. Roads used for the timber sale will be restored to their pre-sale use status.

Recommendations: The district biologist should be notified if any sensitive species are observed during pre-sale and sale activity.

NI = No Impact
MIIH = May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing Or Loss Of Viability To The Population Or Species
WIFV* = Will Impact Individuals Or Habitat With A Consequence That The Action May Contribute To A Trend Towards Federal Listing Or Cause A Loss Of Viability To The Population Or Species
BI = Beneficial Impact

***** Considered a trigger for a significant action in NEPA
****** Note: The rationale for the conclusion of effects is contained in the Wildlife Report (W-21).

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