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# Idaho Panhandle National Forests
# Coeur d'Alene River Ranger District

# Twomile Resource Area
# Environmental Assessment

***Copies of this EA are available on compact disk (CD) or in paper format from the Coeur d'Alene River Ranger District Office at the address above, and on the Idaho Panhandle National Forests' internet website:***

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# COEUR D'ALENE RIVER RANGER DISTRICT
# TWOMILE RESOURCE AREA
# ENVIRONMENTAL ASSESSMENT

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## ACRONYMS/GLOSSARY

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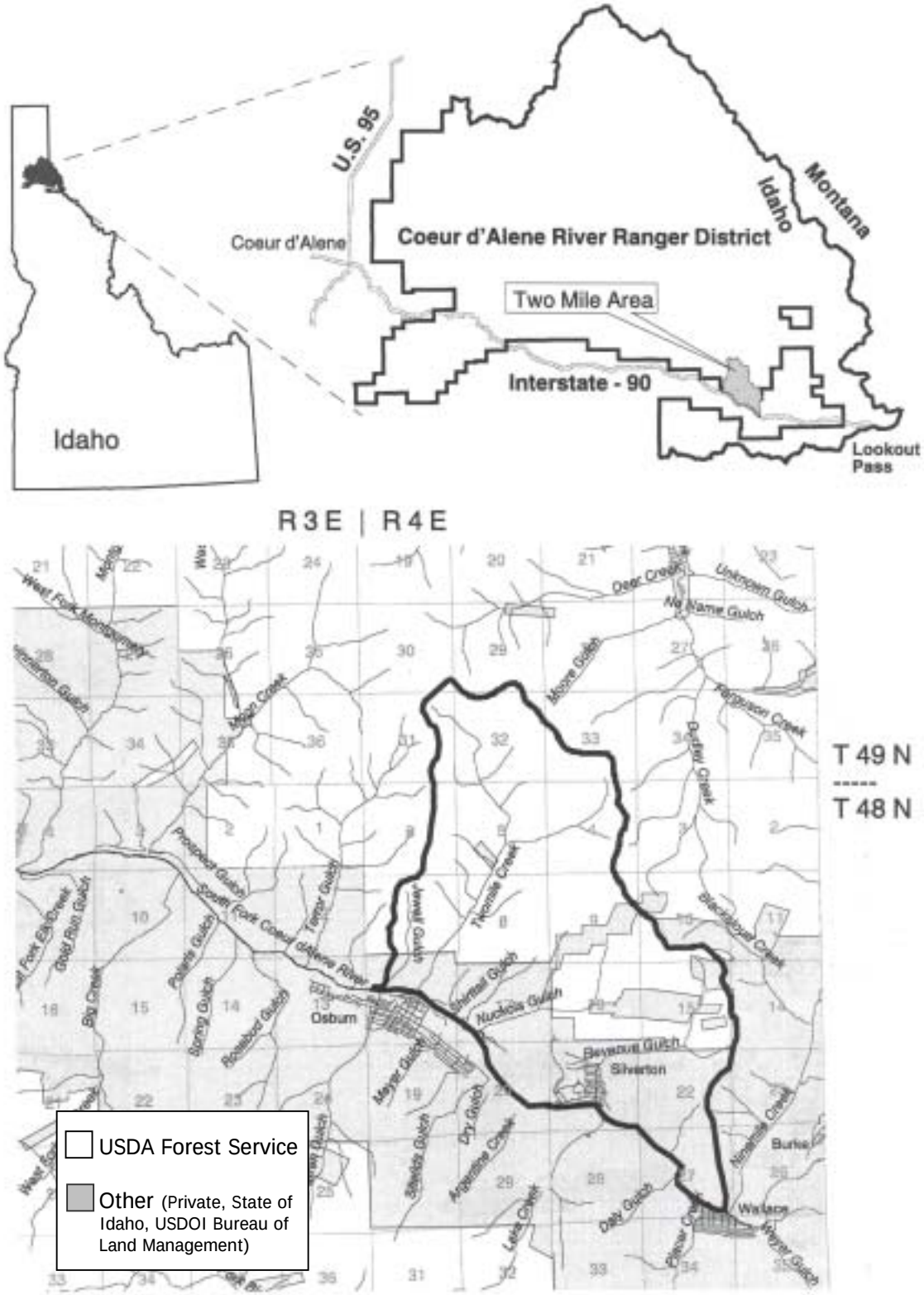

# CHAPTER 1
# PURPOSE AND NEED FOR ACTION

## 1.1 INTRODUCTION

***Figure 1-2. View from Revenue Gulch in the TwomileResource Area, overlooking the community of Silverton, Idaho.***

The 7,600-acre Twomile Resource Area is located north of Interstate 90 and the communities of Osburn and Silverton, Idaho, on public lands administered by the Coeur d'Alene River Ranger District (Figure 1-1). There are an estimated 4,650 acres (61%) of National Forest System lands within the Resource Area, with approximately 2,950 acres (39%) of privately owned lands. The Forest Service boundary is just over one-half mile from Osburn and less than 250 yards from the Silverton city limits. Most visitors to the Twomile Resource Area are local residents of the Silver Valley. There are no developed campgrounds, picnic areas or other structural recreation developments in the vicinity of the Twomile Resource Area. Two designated trails traverse the area. Roads are used for sight seeing, hunting access, gathering berries, mushrooms and Christmas trees. The Twomile Resource Area is partially visible from Osburn, Silverton, and parts of Interstate 90 (Figure 1-2).

Elevations in the Twomile Resource Area range from 2,600 feet at the lower end of Twomile Creek to 5,300 feet at the summit of Capitol Hill. The majority of the area burned in large fires during the late 1880's and early 1900's. The current stands are composed primarily of Douglas-fir, with ponderosa pine and lesser amounts of white pine and grand fir, in the 90 to 110-year age range. Commercial harvest on National Forest System lands in the Resource Area have been limited due to terrain, access, and close proximity to local communities. Timber harvest has occurred on private ownership within the area.

There are few wildlife species for which the Resource Area provides quality habitat, primarily due to low elevations; proximity to communities; and tree species composition, age and size. However, the ponderosa pine and Douglas-fir stands in the Resource Area appear to provide some of the District's best habitat for flammulated owls. White-tailed deer, moose and elk also inhabit the area. Nearly all of the Twomile Resource Area provides big-game winter range habitat.

The Twomile Resource Area is located within three major subwatersheds (Twomile, Nuckols, and Revenue Gulch) and one small face drainage (Silverton). None of the streams within the Resource Area are identified as water quality limited (303d), nor are any listed for any pollutant. Beneficial uses include spawning and rearing habitat, cold-water biota, primary and secondary contact recreation, drinking water, and agriculture water supply. All of the streams in the area flow through lands under other ownership (private or Bureau of Land Management) in their lower reaches before flowing into the

***In Chapter 1 you will find:***

- *An introduction to the Twomile Resource Area*
- *Why we are proposing actions (the purpose and need for action)*
- *A description of our proposed action*
- *The scope of our proposal*
- *Criteria for making a decision*
- *Organization of this document*

South Fork Coeur d'Alene River. The river itself is identified as water quality limited due to both metals and sediment. These subwatersheds (and the entire South Fork Coeur d'Alene River drainage) are identified as "functioning, at risk" under the Geographic Assessment of the Coeur d'Alene River Basin (referred to in this document simply as the "Geographic Assessment"). A watershed system that is functioning at risk is one that is essentially still properly functioning, but may have known risks or exhibit trends that are likely to compromise its ability to fully support beneficial uses in the future. Such systems are the first priority for watershed system restoration and improvement programs.

The Land Management Plan for the Idaho Panhandle National Forests (referred to throughout this EA simply as the "Forest Plan") identified the following management area (MA) designations for National Forest System lands within the Twomile Resource Area (USDA 1987, PF Doc. REF-1):

- ***MA 1*** *lands are suitable for timber production, to be managed for the long-term growth and production of commercially valuable wood products*
- ***MA 4*** *lands are to be managed for big-game winter range and to produce wood products*
- ***MA 9*** *lands are unsuitable and/or non-forest*
- ***MA 16*** *are streamside areas for managing riparian-dependent resources (fish, water quality, vegetation and wildlife communities) while producing other resource outputs at levels compatible with the objectives for dependent resources*

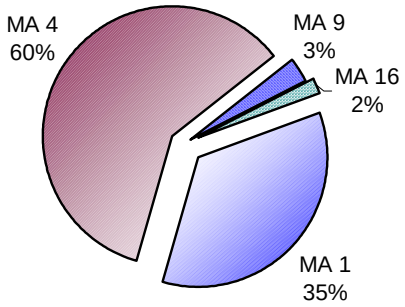


***Figure 1-3. IPNF Management Area (MA) distribution within the Twomile Resource Area.***

The Twomile Resource Area does not include any designated wilderness or inventoried roadless areas. There are no grazing allotments within the Resource Area, and it is unlikely that grazing will occur in the area in the future, due to the steepness of terrain and limited access to the area. The Twomile Resource Area includes all or portions of T48N, R4E, sections 3-11, 15, 16, and 29-33, Boise Meridian (Figure 1-1).

## 1.2 PURPOSE AND NEED FOR ACTION

Activities are proposed in the Twomile Resource Area at this time to respond to goals and objectives of the National Fire Plan and Shoshone County Fire Mitigation Plan, and to help move the resource area towards desired future conditions described in the Forest Plan. The proposed activities are also responsive to recommendations made under the Interior Columbia Basin Ecosystem Management Project and the Geographic Assessment for the Coeur d'Alene River Basin. All four of these are discussed below.

### 1.2.1 National Fire Plan and Shoshone County Fire Mitigation Plan

Hazardous fuels reduction activities are proposed in the Twomile Resource Area to reduce fire intensities and restore fire-adapted ecosystems in the wildland urban interface. The purpose and need for these activities in the Twomile Resource Area are in accordance with the National Fire Plan, which represents a strategy to reduce wildland fire threats and restore forest ecosystem health in the interior West. The strategy builds on the premise that reducing fuel levels and using fire at appropriate intensities, frequencies, and time of year within fire-adapted ecosystems is key to restoring healthy, resilient conditions; sustaining natural resources; and protecting life and property. Under the National Fire Plan (PF Doc. FF-20), activities focus on wildland urban interface areas to reduce risk to people and property. There is a high priority to treat areas where human communities, watersheds, or species are at risk from severe wildfire.

***Wildland Urban Interface***

***The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels***

***(USDI and USDA 2002, PF Doc. REF-2)***

A comparison of *existing* conditions in the resource area and *desired* conditions described in the Forest Plan indicates a need for:

- *Reduced forest fuels loadings;*
- *Reduced ladder fuels;*
- *Reduced risk of uncharacteristically intense fire;*
- *Reduced risk to life, property, and natural resources;*
- *Increased safety to fire suppression crews;*
- *Development of sustainable forest conditions;*
- *Restoration of natural ecological systems.*

***Figure 1-4. Accumulation of dense fir trees amongst mature ponderosa pine trees in the Twomile Resource Area.***

Shoshone County developed a Wildland Urban Interface Fire Mitigation Plan (PF Doc. FF-36) to aid in the protection of the communities within the county. The Fire Mitigation Plan describes the entire perimeter of the community of Silverton (adjacent to the Twomile Resource Area) as being at high risk to wildfire loss, and recommends, "Federal land managers responsible for the management of adjoining lands should consider forest management activities on the surrounding hillsides targeted at improving forest health and reducing fire risks to the community." The plan has the following objectives:

- *Identify high risk areas for fire ignition*
- *Locate landscape features with a high risk for rapid fire spread*
- *Search out significant concentrations of home sites and other buildings*
- *Determine areas where initial efforts should be concentrated*
- *Develop risk reduction activities*

### 1.2.2 Forest Plan

The Forest Plan identifies the desired condition as a sustainable forest system that has the ability to maintain diversity, productivity, resilience to stress, health, and yields of desired values, resource uses, products, or services over time in an ecosystem while maintaining its integrity (USDA 1987, PF Doc. REF-1). In terms of fire management, the desired condition is one where both wildland and prescribed fires are of low intensity and leave sufficient levels of large woody debris to promote soil productivity (Figure 1-5). This would increase safety for the public as well as for neighboring private lands and property. The Forest Plan provides guidance regarding efficient fire protection and the use of prescribed fire to help accomplish management activities.

***Figure 1-5. Example of a dry-site ponderosa pine stand on the IPNF, managed to resist low intensity fire disturbance.***

Large fire disturbance has been excluded from the Twomile Resource Area for nearly a century. This has provided an avenue for shade-tolerant vegetation to continue to grow and create pathways that fire can now travel to the top of the canopy. Fire exclusion has contributed to the accumulation of dead and down woody debris. The combination of dead and down fuels and dense multi-layered stands increase the risk that a fire will transition from fire behavior that burns on the forest floor to fire behavior that consumes tree crowns.

The accumulation of vegetation is the setting for a potentially intense and severe stand-replacing fire. The forested stands adjacent to the community of Silverton, Osburn, and rural residents of Twomile and Revenue Gulch, are now composed of dense uniform Douglas-fir and grand-fir trees amongst long lived ponderosa pine. When a fire is initiated in the analysis area, given extreme environmental conditions, the fire behavior and flame lengths associated with it would be catastrophic. Extreme fire behavior is a threat to life, property, and key ecosystem components. Area residents have expressed concerns about this potential. Area resident Charles Kishbaugh commented, "If a wildfire were to start or spread in these hillside areas, many homes would undoubtedly be lost."

Comparison of the existing condition of the resource area and the desired conditions from the Forest Plan indicates a need to reduce forest fuel loadings and ladder fuels, which would help to reduce risk of uncharacteristically intense fire and associated risks to life, property, and natural resources; and reduce the danger to fire suppression crews.

### 1.2.3 Interior Columbia Ecosystem Management Project

The Interior Columbia Basin Ecosystem Management Project (ICBEMP, 1996, PF Doc. REF-3) was guided by Congressional direction to develop a scientifically sound and ecosystem-based strategy for forest management. At the Interior Columbia Basin scale, the findings show that river basins in the IPNF have a low composite ecological integrity, primarily due to past alterations. Further findings reported mixed low to moderate aquatic integrity, and mixed low, moderate and high integrity hydrologic conditions on the IPNF.

The Twomile Resource Area is located in Forest Cluster #4, which emphasizes reducing risk to ecological integrity and species viability. The primary risks to ecological integrity within this Forest Cluster are risks to hydrologic and aquatic systems from fire potential, risks to late and old forest structures in managed areas, and risks in forest compositions that are susceptible to insect, disease and fire (Quigley et al. 1996, p. 113; PF Doc. FF-16).

### 1.2.4 Assessment of the Coeur d'Alene Basin

An assessment of current and historical conditions in the Coeur d'Alene River basin was conducted to gain a better understanding of large-scale resource conditions across the Forest in relation to those at the Upper Columbia River Basin scale (Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin, USDA 1998, PF Doc. PROC-2). For clarity, that document is referred to as the **Geographic Assessment**. The findings of the Geographic Assessment complement those found in the Interior Columbia River Basin report (USDA 1998, PF Doc. PROC-3):

- *Ponderosa pine, white pine and western larch have declined in range throughout the Forest and individual stands are dense compared to historical conditions.*
- *Dry, south facing slopes once containing mixed, open stands of ponderosa pine, western larch and Douglas-fir having a sparse understory, now have more dense tree cover with a higher component of Douglas-fir, grand fir, and dense understories of shrubs and shade tolerant reproduction.*
- *Shade tolerant vegetation that historically suffered mortality from low intensity underburns is now actively competing with the more disease resistant seral species. This trend creates a change in forest species that are susceptible root diseases and insect outbreaks.*

The Geographic Assessment classifies the Twomile Resource Area as a "Condition 2" landscape (not to be confused with the condition classes established by the National Fire Plan). "Condition 2" landscapes have high road densities and undesirable terrestrial conditions (such as high-graded stands of medium sized trees of poor quality). Condition 2 landscapes are the highest priority for aggressive vegetation restoration. The Geographic Assessment further classifies the watershed as functioning, but at risk, and directs that these areas will be among the highest priority for

***These assessments provide guidance for project level planning. A consistent theme throughout all of the documents indicates that the current state of forested ecosystems is dense with species that have not adapted to frequent fire disturbances, resulting in attributes supporting catastrophic fire behavior. Site-specific information indicates that these conditions exist in the Twomile Resource Area.***

watershed and aquatic restoration. On drier habitat type Condition 2 landscapes, the Geographic Assessment recommends thinning from below and using shelterwoods with reserves and group selection regeneration harvests to restore open stand structures dominated by large fire-resistant early seral tree species (ponderosa pine and western larch).

## 1.3 PROPOSED ACTION

Alternative 2 represents the proposed action. This alternative would include fuel reduction treatments on a total of approximately 1,103 acres (less than 15% of the Twomile Resource Area). Treatments would be accomplished by means of precommercial and commercial thinning, regeneration harvests, underburning, slashing, and chipping activities. Logging systems would predominately include the use of a helicopter, but ground-based systems would be used where applicable based on road access and terrain features. The proposed action includes treatments on both moist and dry sites. The proposed action implements a strategy that focuses on connectivity of treatments throughout the wildland urban interface to meet the purpose and need of the project. The proposed action would create large enough openings to provide the opportunity for successful restoration of long-lived seral species (ponderosa pine and western larch).

Individual treatments were identified based on their ability to meet the purpose and need of the project. The fuel treatments are focused on the effectiveness of supporting desired fire behavior, rather than the quantity of products removed from the area. In some circumstances where the purpose and need dictates, there would be no removal of forest products, but slashing of unmerchantable material and underburning would occur.

As recommended by The Lands Council/Ecology Center, a Roads Analysis Process (RAPs) has been completed for the resource area and the recommendations incorporated in the proposed action (PF Doc. TRAN-1). RAPs helped identify and prioritize prospective changes to access in the Twomile Resource Area. Specific recommendations include approximately 1.9 miles of new road construction (to access treatment units), decommissioning 3.4 miles of roads that are encroaching on stream channels (to improve aquatic resources), trail repairs (for resource protection), adding approximately 0.4 miles to the single-track trail system (with blocks established to prevent ATV's from accessing single-track trails), and expansion of the ATV trail system by utilizing approximately 9.5 miles of old logging roads (to accommodate ATV travel and link to trails outside the Resource Area). In addition, an existing parking site would be improved to provide trail access. These activities are included in the proposed action.

**For more specific information about proposed activities, please refer to the Alternative Descriptions in Chapter 2 and the enclosed Alternative maps.**

## 1.4 SCOPE OF THE PROPOSAL

The scope of this environmental assessment was determined through the need for hazardous fuel reduction as identified in the related publications and assessments cited throughout this document and by site-specific information (with supporting information in the project files). The scope was also defined through community, public, and agency scoping in accordance with the requirements of 40 CFR 1508.25. The scope of the actions to be addressed includes the specific activities proposed in the Twomile Resource Area as described in Chapter 2.

This environmental assessment does not include the potential future activities that would be necessary to maintain desired stand conditions. Because of the uncertainty of the timing and conditions of these future actions, it was decided that any future actions designed to create or maintain the desired stand conditions defined in this document would be analyzed separately, following applicable legal requirements.

## 1.5 DECISIONS TO BE MADE

This assessment discloses the environmental consequences of implementing the proposed action or an alternative to the proposed action. Based on the analysis in this NEPA document, the responsible official will decide whether to implement the No-Action Alternative or one of the action alternatives, including:

- *The method of fuel treatments used*
- *The extent of mechanical fuel treatments (acres treated)*
- *The extent of burning activities (acres burned)*
- *The amount of road construction and improvement*
- *Recreation trail system that would be maintained (trail miles and designation for use).*

These decisions will be made in response to issues and achievement of the stated purpose and need in addition to accordance with Forest Plan goals, objectives, and desired future conditions. Details will be documented in a Decision Notice and Finding of No Significant Impact that will be sent to other agencies and those who have indicated an interest in the project.

***Forest Supervisor Ranotta K. McNair is the responsible official for this proposal. For further information or to review project files, please contact District Ranger Joe Stringer or Ecosystems Staff Officer Sherri Lionberger at (208) 769-3022, or Project Team Leader Lonnie Newton at (208) 765-7494.***

## 1.6 ORGANIZATION OF THE DOCUMENT

This Environmental Assessment is prepared according to the format established by Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508). Chapter 1 explains the need for the proposed action. Chapter 2 presents the key resource issues within the area and describes the alternatives considered. Chapter 3 describes the existing conditions of specific resources and the changes that would occur to each resource under implementation of each alternative. Direct, indirect and cumulative impacts are discussed, followed by a list of references for those noted in each section of the document. An Acronyms/Glossary section is also provided for better understanding of the terms used specific to this analysis.

The appendices contain analytical reports and specific or supplemental information that further explains discussions in the main chapters. Many more reports and analyses have been referenced or developed during the course of this project, but were not included in this document either because they were technical in nature or were of excessive length. Those items are referred to as being part of the "project files." All project files for the Twomile Environmental Assessment are available for review upon request.

# CHAPTER 2
# ALTERNATIVES

## 2.1 INTRODUCTION

This chapter describes the potential management alternatives that would achieve the objectives identified for the Twomile Resource Area, as described under "Purpose and Need" and "Proposed Action" in Chapter 1. National Environmental Policy Act (NEPA) regulations require federal agencies to *identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment* (40 CFR 1500.2(e)). The project interdisciplinary team developed alternatives based on the cited reference materials, site-specific information, and comments from private individuals, organizations and state, local and federal agencies. Comparing a range of alternatives (from no change in management to intensive management) will help determine which activities, if any, should occur as part of the Twomile Project. The range of alternatives is reasonable given characteristics of the area, current conditions, the purpose and need for action, and the desired conditions.

*In Chapter 2 you will find:*

- *A description of our scoping efforts*
- *How we developed alternatives*
- *Activities that are either ongoing or can be reasonably expected to occur in the area*
- *Opportunities that could occur if funding becomes available*
- *A detailed description of the alternatives*
- *Features common to all alternatives to protect specific resources*
- *Mitigation measures to reduce effects of activities*
- *Monitoring that would occur under any action alternative*
- *A summary comparison of the effects under each alternative*

## 2.2 SCOPING AND ALTERNATIVE DEVELOPMENT

### *Scoping*

"Scoping" (40 CFR 1501.7) is designed to determine the potential issues associated with a proposed action and to identify those issues and concerns that may be significant to the decision. Scoping is used to develop and refine alternative management actions using a collaborative process. Scoping for this project was initiated with the *Quarterly Schedule of Proposed Actions* for the Idaho Panhandle National Forests beginning in January 2003, and continuing through the current issue.

On January 15, 2003, a letter was mailed to 180 members of the public, including those who had indicated an interest in the project, adjacent landowners, potentially affected organizations, and other public agencies. The letter provided a description of public involvement and analysis processes to be used. To ensure full consideration of all possible cumulative effects, adjacent landowners were asked to provide us with information concerning ongoing or planned activities on their lands. No responses were received identifying activities on private lands.

During scoping, letters were received from Rick Collignon (Idaho Parks and Recreation), Karen Lindholdt (The Lands Council) and Jeff Juel (Ecology Center), Mike Mihelich (Kootenai Environmental Alliance), Billy and Mary Simpson and Charley Kishbaugh (land owners). They provided comments that helped identify issues and define the analysis of effects and proposed treatments, as noted in the issue and alternative discussions in this Chapter and in Chapter 3. The project interdisciplinary team considered concerns identified through the scoping process and incorporated ideas presented by the public and other agencies into alternative design, as noted throughout Chapters 2 and 3, and in Appendix D.

## *Collaborative Framework*

Several strategic actions for the implementation of hazardous fuel reduction projects are identified in "A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan" (USDI and USDA 2002; PF Doc. FF-20). One of the action items addresses community collaboration and recommends coordinating with States, Tribes, and local communities for work in the urban interface to help in risk reduction and hazard mitigation. The National Fire Plan directs local level collaboration, involving participants with direct responsibility for management decisions affecting public and/or private land and resources, fire protection responsibilities, or good working knowledge and interest in local resources.

The Twomile Resource Area has stimulated interest among the professionals in land management. On October 2, 2003, Forest Service specialists from throughout the Idaho Panhandle National Forests (including fire and fuels specialists, fire management officers, ecologists, silviculturists, wildlife biologists, and Forest insect and disease staff) convened in the Twomile Resource Area to review treatments options and discuss the integration of multiple resource benefits. Collaboration for this project also included visits to the Twomile Resource Area by representatives from the offices of Senator Craig and Representative Otter, IPNF District Rangers, and the IPNF Forest Supervisor. In addition, foresters visiting from the Forest Service's Regional Office in Missoula have previewed the existing conditions and helped suggest and develop treatment options.

The Twomile Resource Area project involves several interagency cooperators, including participants from the Bureau of Land Management, State of Idaho, Shoshone County Fire Chiefs, and Shoshone County Commissioners (referred to as the Shoshone County Interagency Fire Planners). This wildland urban interface hazardous fuel reduction project is the first of its kind proposed in Shoshone County. The goal of the working group is to implement "seamless" fire mitigation activities, those where treatments are not bound by property boundaries, rather hazardous fuel reduction treatments span ownerships collaboratively based on the effectiveness of the activities. The Shoshone County Interagency Fire Planners convene monthly to discuss the planning issues associated with hazardous fuels, including the proposed activities in the Twomile Resource Area. This collaborative approach has facilitated a pooling of data, research, and support for fuel reduction projects throughout Shoshone County. The Twomile proposal emphasizes a collaborative community-based approach to wildland fire and hazardous fuel reduction issues.

Collaboration efforts have also provided opportunities for the public to participate in the project. On November 13, 2003 a public meeting was held at the grade school in Osburn to provide information and answer questions regarding proposed activities in the Twomile Resource Area. In addition to members of the public, representatives from the Idaho Panhandle National Forests and Shoshone County Interagency Fire Planners attended. Following the meeting, letters were received from George and Carol Reynolds (PF Doc. PI-24), North Idaho Trail Riders Organization (PF Doc. PI-25), and the Northwest Access Alliance (PF Doc. PI-26).

## *Ongoing And Reasonably Foreseeable Activities*

In addition to direct and indirect effects, NEPA requires analysis and disclosure of potential cumulative effects – the combined effect of past, present, and reasonably foreseeable actions. The effects of past activities are represented by and disclosed in the discussion of existing resource conditions. Information about specific past actions (such as timber harvest, fires, etc.) in the analysis area are provided in the Project Files (Forest Vegetation, Fire/Fuels, Aquatic Resources). Activities that are ongoing or have a reasonable chance of occurring within the cumulative effects analysis area are identified below and their effects disclosed in the Chapter 3 cumulative effects discussions for each applicable resource. Adjacent property owners were contacted by letter and asked to share information about activities on their property. No responses were received; however, to ensure a comprehensive view of activities, the Idaho Department of Lands was contacted for copies of the 2002-03 form notifications of forest practices by private landowners adjacent to the Resource Area; a summary of this information is provided in the table below. For more information, please refer to the Project Files (PF Doc. AD-11).

***Table 2-1. Summary of ongoing and reasonably foreseeable harvest activities on adjacent lands under other ownership, based on notifications filed with the Idaho Department of Lands (2002-03).***

| Activities | Watershed/Legal Location (T48N, R4E) |
|---|---|
| Timber harvest on 20 acres of private lands | Twomile (Sec. 18) |
| Clearcut timber harvest on 5 acres using helicopter yarding of private lands | Shirttail Gulch (Sec. 17) |
| Clearcut timber harvest on 15 acres using helicopter yarding of private lands | Shirttail Gulch (Sec. 17) |
| Timber harvest on 12 acres of private lands | Twomile (Sec. 18) |
| Installation of a 54-inch counter-sunk culvert on private lands | Revenue Gulch (Sec. 21) |
| Fuels reduction and timber harvest planned for 2004-05 on a total 140 acres (115 acres slash and burn, 15 acres shelterwood, and 10 acres partial cut/chip) of lands managed by BLM | Shirttail and Twomile (Sec. 17, 18, 20) |
| Precommercial thinning on lands managed by BLM | Revenue Gulch (Sec. 22) |

The following table displays information about projects that are ongoing or reasonably foreseeable to occur in the Twomile Resource Area and within the cumulative effects analysis area (please refer also to the enclosed map). All are on National Forest System lands related to the 1996 Montgomery Moon salvage sale, which approved harvest of dead or dying timber infected by root disease and blister rust. The effects analysis incorporated the influences of these activities as appropriate (please refer to the cumulative effects discussions for each resource in Chapter 3). Some of these activities may have been completed during the time it took to complete this analysis and documentation for this proposal; their impacts are reflected in the cumulative effects analysis.

***Table 2-2. Ongoing activities within the Twomile Resource Area (all under the Montgomery Moon project).***

| Stand # | Acres | Activity to be Accomplished (& Estimated Timing) |
|---|---|---|
| 11302016 | 44 | 2007 - Precommercial thinning |
| 11302039 | 7 | 2004 – Tree planting<br>2022 - Precommercial thinning, white pine pruning |
| 11302040 | 9 | 2003 – Underburning, fish habitat (cover) improvement<br>2004 - Bedload trap installation, tree planting |
| 11302041 | 9 | 2003 – Underburning, fish habitat (cover) improvement<br>2004 - Bedload trap installation, tree planting<br>2021 – Precommercial thinning, white pine pruning |
| 11302042 | 9 | 2003 – Underburning, fish habitat (cover) improvement<br>2004 - Bedload trap installation, tree planting<br>2021 – Precommercial thinning, white pine pruning |
| 11302043 | 9 | 2003 – Underburning<br>2004 - Tree planting<br>2021 – Precommercial thinning, white pine pruning |
| 11302044 | 7 | 2003 – Underburning<br>2004 - Tree planting<br>2021 – Precommercial thinning, white pine pruning |
| 11305003 | 50 | 2003 – Noxious weed control, wildlife tree signing, old growth signing, ecoburning, road recontouring, riparian and channel restoration |
| 11305011 | 75 | 2003 –Fish habitat (cover) improvement, gathering trees for fish habitat improvement work<br>2004 - Bedload trap installation, culvert replacement |
| 11305028 | 6 | 2004 - Tree planting<br>2022 – Precommercial thinning, white pine pruning |

Other ongoing activities include the District Travel Plan and the Noxious Weed Treatment Program:

**District Travel Plan**: An environmental assessment (EA) was used to document proposed changes to access management and the analyses of effects for the public to review. The assessment has been completed, and a new Travel Plan developed that identifies suitable routes for public access using an existing system of roads and trails. Changes in access will be implemented over a period of several years, through both administrative changes to transportation management (documented in an updated closure order signed by the Forest Supervisor) and through specific documentation in a written decision under the National Environmental Policy Act (PF Doc. TRAN-3).

**Noxious Weed Treatment Program**: A Noxious Weeds Environmental Impact Statement was prepared and a Record of Decision issued that provides guidance for the integrated treatment of noxious weeds (USDA Forest Service, 2000; PF Doc. NW-2, PF Doc. AQ-44). Weed infestation data for the Twomile Resource Area was collected during the course of road and rare plant inventories, and has been used in prioritizing weed treatments. Please refer to Appendix F and the Project Files (rare plant surveys; PF Doc. TES-16) for additional information.

***There are no commercial or preferred fuelwood areas or active minerals projects within the Twomile Resource Area. There are no special use permits issued for activities within the area.***

## *Identification of Issues*

A list of preliminary issues was developed by the interdisciplinary team using current knowledge of conditions and concerns, and based on public comments received during project development. After consideration, these issues were sorted into three categories: Key Issues, Analysis Issues, and Issues Not Addressed in Detail. The issues and issue indicators (used to measure changes) are described below, with public comments or concerns noted by author.

**Key** issues are those within the scope of the project and of sufficient concern to drive the development of alternatives to the Proposed Action. Key issues are used to develop the focus and specific activities of the action alternatives, sharply define effects of the proposed action and help define the scope of the environmental analyses and documentation. These issues are specific to this geographic area and proposal. Throughout Chapters 2 and 3, key issues are easily recognized by the "key" symbol that appears next to each discussion.

**Analysis** issues are not key to developing alternatives, but are important for their value in designing specific protective measures and to measure the effects of each alternative on different forest resources. Analysis issues are easily recognized by the "magnifying glass" symbol that appears next to the discussion.

The following information is provided for both key and analysis issues:

- *A brief description of the issue*
- *Public comments related to the issue*
- *Identification of the issue "indicators" – what is measured to determine effectiveness of the alternatives in addressing the issue and facilitate comparison of the alternatives*

## *A. Key Issues*

**Fire/Fuels Hazards:** Suppression of all wildfires in the Twomile Resource Area has been ongoing for nearly a century. Fire exclusion, along with other activities, has caused a substantial change in stand conditions and related fire behavior, especially in the dry habitat types of the resource area. Changes in surface, ladder, and crown fuels have resulted in the potential for an increase in fire intensity and severity when fires do start. The arrangement and amount of fuels can now carry a fire into the crowns of trees, resulting in fires of an intensity and severity outside of the historic fire regime of the resource area. These intense fires are difficult to suppress, threaten human life and property, and can result in the loss of key ecosystem components. This issue is addressed in the Fire/Fuels section of Chapter 3.

**Public Concerns Related to Fire/Fuels Hazards:** Landowners in the vicinity of Osburn (Billy and Mary Simpson) and Silverton (Charley Kishbaugh) expressed support of activities that would assess and address wildfire hazards in the Twomile Resource Area, with specific concerns related to hazardous undergrowth and trees in the immediate vicinity of structures. Environmental organizations (Kootenai Environmental Alliance, The Lands Council and Ecology Center) provided extensive comments regarding reduction of fuels in the wildland urban interface, and identified information they would like to have included in the analysis. They were especially concerned that the ignitability of structures on private lands is more significant than the fuel situation on adjacent National Forest lands, and questioned the effectiveness of fuels reduction activities.

The fuels reduction proposal for the Twomile Resource Area is just one of the efforts occurring in conjunction with the Shoshone County Fire Mitigation Plan. Local, county and state agencies are working with area residents to address the fuels hazards around their homes and property. Both of the landowners who commented were provided with contact sources for obtaining information about participating in the wildland urban interface fuels reduction effort. In response to the suggestions of the environmental organizations, we have included an alternative that would not include any commercial timber harvest (Alternative 4); identified specific design features of the alternatives; and provided additional information in the effects analysis. Their specific concerns and our response to each are provided in Appendix D.

**Issue Indicators for Fire/Fuels Hazards:** Indicators of these forest changes are:

- *potential flame lengths*
- *wind speed at which a stand could sustain an active crown fire (called crown index)*

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**Need for a Resilient Forest Ecosystem:** Douglas-fir and grand fir are the dominant species in the Twomile Resource Area. These species are more susceptible to root disease and fire than are ponderosa pine, white pine and western larch stands; therefore forest composition is an important indicator of ecosystem health and resiliency. Much of the forest stands near the communities of Osburn and Silverton are characterized by dense stands of Douglas-fir and grand-fir trees that are suffering from continually spreading root disease. In addition, the amount and position of dead trees, brush and branches around the ponderosa pines are such that a wildfire would likely burn at a higher intensity than the ponderosa pine can normally survive. Restoring open stand structures dominated by large fire-resistant ponderosa pine and western larch would result in a healthier forest that is more resistant to insects and diseases. This issue is addressed in the Forest Vegetation section of Chapter 3.

**Public Concerns Related To The Need For A Resilient Forest Ecosystem:** The Lands Council, Ecology Center, and Kootenai Environmental Alliance requested that specific stand composition and structure information be provided in this analysis. They also provided comments related to the overall effectiveness of proposed treatments in addressing wildfire intensity and hazards, especially in the wildland urban interface. They further asked that old growth character be well documented, using maps that also display past impacts to old growth, and recommended that the quality of old growth be evaluated by ground-truthing areas chosen from photo interpretation and database examination.

The Forest Vegetation discussion in Chapter 3 identifies the current composition and structure of stands in the Twomile Resource Area as well as in the Coeur d'Alene River Basin. The benefits of changing forest structure are addressed in the Forest Vegetation discussion of Chapter 3; effectiveness of treatments in addressing wildfire intensity and hazards is addressed in the Fire/Fuels discussion.

Old growth allocation in the Twomile Resource Area has been reviewed (PF Doc. VEG-17). Allocated old growth stands and proposed treatment activities in allocated old growth are discussed in Chapter 3 (Forest Vegetation, Table 3-VEG-5). Past impacts to old growth are not displayed - as stated earlier, historic information about forests in the Twomile Resource Area is based on historical archives (which are typically not stand specific).

**Issue Indicators For A Resilient Forest Ecosystem:** The effectiveness of the alternatives in addressing this issue is indicated through changes in:

- ***Forest Composition*** *(measured by the percent of the Twomile Resource Area in long-lived seral species (ponderosa pine, western larch, and white pine), and the predicted tree growth in stands over time)*
- ***Forest Structure*** *(measured by the percent of the Twomile Resource Area in each structural stage – shrub/seedling/sapling, small/medium timber, and mature/large timber; and the amount of canopy closure)*
- ***Landscape Arrangement*** *(measured through changes in the size and distribution of patches, and addressing openings greater than 40 acres)*

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**Water Yield, Peak Flow, And Sediment Yield:** Proposed shelterwood harvests, precommercial thinning and fire/fuels activities can affect water yield, peak flow, sediment yield and aquatic habitat in the Twomile Creek, Nuckols Gulch, and Revenue Gulch watersheds. The treatment methods identified under the action alternatives were designed to address this issue (please refer to the alternative descriptions in this chapter for additional details). This issue is addressed in the Aquatic Resources section of Chapter 3.

**Public Concerns Related To Water Yield, Peak Flow And Sediment Yield:** The Lands Council, Ecology Center and Kootenai Environmental Alliance identified a number of concerns related to aquatic resources, including the effect of roads and activities on water yield, peak flow and sediment yield.

**Issue Indicators For Water Yield, Peak Flow And Sediment Yield:** There are four issue indicators used to measure effectiveness of the alternatives in addressing this issue:

- *Percent change (from existing condition) in the magnitude, intensity and duration of water yield and peak flows in the Twomile Resource Area drainages;*
- *Percent change in magnitude, intensity, and duration of sediment delivery in the Twomile Resource Area drainages;*
- *Net change in the number of stream crossings associated with new, temporary, reconstructed or decommissioned roads;*
- *Overall changes in channel stability and aquatic habitat in the Twomile Resource Area watersheds.*

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**Sediment Delivery:** Proposed road construction, decommissioning, and maintenance activities can affect water quality and sediment delivery to streams in the Twomile Resource Area. Alternative 4 was designed to address this issue by featuring no new road construction. This issue is addressed in the Aquatic Resources section of Chapter 3.

**Public Concerns Related To Sediment Delivery:** The Lands Council, Ecology Center and Kootenai Environmental Alliance identified a number of concerns related to aquatic resources; the amount of sediment delivery related to roads and harvest activities was one of their concerns.

**Issue Indicators For Sediment Delivery:** There are two issue indicators used to measure effectiveness of the alternatives in addressing this issue:

- *Net associated risk of sediment delivery (in tons) from road drainage crossings*
- *Net change in miles of roads considering new, temporary and decommissioned roads*

**Flammulated Owl Habitat:** The ponderosa pine and Douglas-fir stands in the Twomile Resource Area appear to provide some of the best habitat for flammulated owls on the Coeur d'Alene River Ranger District. Flammulated owls are identified as a Sensitive wildlife species within the geographic area of the IPNF and within Region 1 of the Forest Service. Although this is a key issue, existing conditions of and environmental consequences to flammulated owl habitat are disclosed with the other Sensitive species in the Wildlife section of Chapter 3.

**Public Concerns Related to Flammulated Owl Habitat:** This issue was identified as key by the project interdisciplinary team. Although public comments did not address this issue in particular, all three environmental organizations expressed concerns related to protection of specific wildlife habitat components. Their concerns are addressed in the Wildlife discussion of Chapter 3.

**Issue Indicators for Flammulated Owl Habitat:** Effectiveness of the alternatives in providing flammulated owl habitat is measured by

- *Acres of suitable habitat reduced to potential habitat*
- *Blocks of habitat to facilitate nesting*

## *B. Analysis Issues*

**Fisheries:** The effects of proposed project activities and road management on fish populations and habitat related to sensitive and management indicator fish species. This issue is addressed in the Aquatic Resources section of Chapter 3.

**Public Concerns Related To Fisheries:** The Lands Council, Ecology Center and Kootenai Environmental Alliance identified a number of concerns related to aquatic resources, especially concerning the need for restoration of fish habitat.

**Issue Indicators For Fisheries:** The issue indicator used to measure change to fisheries under each alternative is:

- *The trend toward suitable habitat conditions and fish passage (i.e. culverts that act as barriers to fish passage at road crossings) for westslope cutthroat trout, torrent sculpin and rainbow trout*

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**Soil Productivity:** The Forest Service is required to ensure that management of the National Forests is accomplished without impairing the land's productivity. This issue is addressed in the Soils section of Chapter 3.

**Public Concerns Related To Soil Productivity:** The Lands Council, Ecology Center and Kootenai Environmental Alliance identified concerns related to protection of soil productivity, especially concerning the cumulative effect of activities on soil compaction and the amount of specific data available for the analysis.

**Issue Indicators For Soil Productivity:** Soil quality standards and guidelines are used to measure effects and design activities to avoid compromising soil productivity. Specific issue indicators include

- *Whether a minimum of 85% of the activity area (treatment unit) is maintained in a condition of acceptable productivity potential for trees and other managed vegetation*

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**Threatened/Endangered Wildlife (Gray Wolf):** Section 7 of the Endangered Species Act directs federal agencies to ensure that their activities are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification to their habitat. Gray wolves are the only species potentially affected by project activities. Detailed discussion of effects is provided in the Wildlife discussion of Chapter 3.

**Public Concerns Related To Threatened/Endangered Wildlife:** The Lands Council, Ecology Center and Kootenai Environmental Alliance identified several concerns related to Threatened and Endangered wildlife in general, including concerns about population viability and habitat fragmentation.

**Issue Indicators For Threatened/Endangered Wildlife:** Indicators used to measure effects to Threatened/Endangered wildlife (gray wolf) include:

- *Availability of prey base (forage, winter range)*

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**Sensitive Wildlife:** The National Forest Management Act (NFMA) directs federal agencies to manage for viable populations of existing Sensitive species. A number of species have been identified as sensitive within the geographic area of the Idaho Panhandle National Forests and within Region 1 of the Forest Service. A list of Sensitive wildlife species is provided in Table 3-WL-1. Existing conditions and environmental consequences to each species are disclosed in the Wildlife section of Chapter 3.

**Public Concerns Related To Sensitive Wildlife:** The Lands Council, Ecology Center and Kootenai Environmental Alliance identified several concerns related to wildlife, including concerns about population viability and protection of habitat such as snags.

**Issue Indicators For Sensitive Wildlife:** Issue indicators vary by species:

- *Northern goshawk: acres of nesting habitat, percent stand structure in goshawk foraging areas*
- *Flammulated owl and white-headed woodpecker: acres of suitable habitat reduced to potential habitat, and blocks of habitat to facilitate nesting*
- *Black-backed woodpecker: acres of habitat remaining after treatment*
- *Fisher: acres of late successional-stage forest*
- *Wolverine: travel habitat and areas of refugia in the Northern Rockies*
- *Coeur d'Alene salamander: changes in peak flow and effects to riparian habitat*
- *Townsend's big-eared bat: amount of loss or disturbance of habitat*

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**Old Growth Management Indicator Wildlife Species:** NFMA directs federal agencies to maintain and improve habitat of management indicator species (designated by the Forest Plan to represent important wildlife habitats). Management indicator species for old growth include northern goshawk, pileated woodpecker and pine marten. The status of old growth management indicator species represent the ability of forest structure to support wildlife populations that inhabit older forests and use large diameter trees, snags and down wood for nesting and/or foraging. Old growth is discussed in detail in the Vegetation section of Chapter 3, with the old growth management indicator species discussed in the Wildlife section of Chapter 3.

**Public Concerns Related To Old Growth Management Indicator Wildlife Species:** The Lands Council, Ecology Center and Kootenai Environmental Alliance identified several concerns related to wildlife, including concerns about protection of old-growth habitat.

**Issue Indicators For Old Growth Management Indicator Wildlife Species:** Northern goshawks are also identified by Region 1 of the Forest Service as a Sensitive species, and are therefore addressed under "Sensitive" species rather than under this issue; the analyses for fisher and pileated woodpecker (also under "Sensitive" species) addresses habitat components preferred by pine marten. The issue indicators for pileated woodpecker are:

- *acres of affected habitat in allocated old growth stands*
- *total acres of affected pileated woodpecker habitat*

**Big-Game Management Indicator Species:** As stated above, NFMA directs federal agencies to maintain and improve habitat of management indicator species. The Forest Plan identified elk and moose as management indicator species because they are a general forest species easily affected by management activities. Since elk are the primary big-game species using the Twomile Resource Area, this analysis focuses on elk rather than moose. Elk are a priority big-game species for Idaho Fish and Game; elk hunting is a significant economic factor in northern Idaho. This issue is addressed in the Wildlife section of Chapter 3.

**Public Concerns Related To Big-Game Management Indicator Species:** The Lands Council, Ecology Center and Kootenai Environmental Alliance identified several concerns related to wildlife, although they did not specifically identify concerns related to big-game management indicator species.

**Issue Indicators For Big-Game Management Indicator Species:** Effects to big game are reflected by effects to Rocky Mountain elk, specifically:

- *percent elk habitat potential during and after project activities*
- *acres of elk security provided*

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**Recreation:** Goals and objectives of the Forest Plan include providing for use of developed recreation areas (with development of new sites as budget becomes available), providing a variety of dispersed recreation opportunities (both motorized and non-motorized), pursuing opportunities to increase and improve the trail system, and continuing to increase cooperative trail programs with organizations, clubs and other public agencies. This issue is addressed in the Recreation section of Chapter 3.

**Public Concerns Related To Recreation:** The Lands Council, Ecology Center and Kootenai Environmental Alliance identified concerns related to the increasing numbers and technology of off-road vehicles, and cumulative effects of these uses. Rick Collignon, Director of Idaho Parks & Recreation, expressed concern about potential effects to trails, including groomed snowmobile routes.

**Issue Indicators For Recreation:** Effectiveness of the alternatives in providing recreation opportunities is measured through

- *changes to miles of road access*
- *changes to miles of trail access*

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**Scenic Resources:** It is important to maintain the scenic quality of the area because lands in the wildland urban interface serve as the foreground of the viewshed. In addition to seasonal visitors to the area, there are an estimated 3,000 people residing in the vicinity of the Twomile Resource Area. This issue is addressed in the Scenic Resources section of Chapter 3.

**Public Concerns Related To Visual Quality:** There were no public comments specific to visual concerns.

**Issue Indicators For Visual Quality:** Effectiveness of the alternatives in protecting scenic resources is measured by:

- *Compliance with visual quality objectives*

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**Finance:** There are costs associated with all of the proposed activities, while some activities have the potential to generate revenue. The financial aspect of an alternative would influence successful implementation of the alternative. This issue is addressed in the Finances section of Chapter 3.

**Public Concerns Related To Finance:** The Lands Council, Ecology Center and Kootenai Environmental Alliance raised concerns regarding the analysis of benefits and costs associated with proposed treatment, and monitoring associated with financial analyses.

**Issue Indicators For Finance:** Effectiveness of the alternatives are measured by whether activities would have sufficient Congressionally-appropriate funding or whether the activities would result in financially viable timber sales so that the local forest products industry is willing to purchase the timber. Specifically, alternatives are compared by:

- *stumpage value*
- *timber sale contractual costs*
- *predicted bid*
- *difference between predicted and minimum bid*

**TES Plants:** Federal legislation, Forest Service policy, and Forest Plan direction require protection of Threatened, Endangered, and other rare (Sensitive) plants. This issue is addressed in the TES Plants section of Chapter 3.

**Public Concerns Related To TES Plants:** The Lands Council, Ecology Center and Kootenai Environmental Alliance raised concerns regarding available data on plants and monitoring of population trends.

**Issue Indicators For TES Plants:** Effectiveness of the alternatives are measured by:

- *level of effects to plant species or their habitat (very low, low, moderate, or high)*

## *C. Issues Not Addressed in Detail*

Some issues are either already addressed through alternative design (such as air quality and heritage resources) or are outside the scope of this project. Based on the assessment of potential effects and of public and agency comments, it was determined that several issues could be adequately mitigated or addressed by project design features. In addition, the Roads Analysis Process (RAP) document includes other issues that differ from the analysis issues identified in this EA, specifically pertaining to the effects of road construction and decommissioning activities on area resources (Roads Analysis Process Report; (PF-Doc. TRAN-1). There is no detailed discussion of these issues in Chapter 3 because they are either not relevant to the project or its resources, they are beyond the scope of the project, or they have been addressed by virtually eliminating any potential effects through project design. The following is a brief description of issues not addressed in detail, and the rationale for not doing so.

**Effects of Road Closures on Fire Suppression** – The location of existing roads not scheduled for closure, in addition to the use of resources such as smokejumpers and helicopters, provides ample opportunity for fire suppression access. The roads proposed for decommissioning are currently closed to motorized use and predominately impassable to fire suppression vehicles. For these reasons, this issue was eliminated from further analysis.

**Effects of Proposed Activities on Heritage Resources** – Heritage resource surveys have been completed in the Twomile Resource Area. Measures to protect heritage resources discovered during project activities are described under "Features Designed to Protect Heritage Resources" in this Chapter. For these reasons, this issue was eliminated from further analysis.

**Effects of Proposed Activities on Roadless Areas -** The Lands Council/Ecology Center asked that the NEPA process be used to clarify any roadless boundary issues (Appendix D). Twomile Resource Area does not contain any areas that are of a size and configuration sufficient to protect the inherent characteristics of a roadless condition as defined by the Forest Plan (PF Doc. TRAN-5). There are no inventoried roadless areas in or adjacent to the Twomile Resource Area; therefore, this issue was eliminated from further analysis.

**Effects of Proposed Activities on Specific Species:** A number of fish and wildlife species were eliminated from further analysis, as documented in the table below.

***Table 2-3. Fish & Wildlife Species Not Addressed In Detail In This Analysis.***

| Species | Rationale for Elimination from Further Analysis |
|---|---|
| Bald eagles (threatened) | The Twomile Resource Area does not provide a water body large enough to support bald eagles. No sightings of bald eagles have ever been recorded in the area. Therefore, activities under any alternative would have no effect on bald eagles. Viability of the species would be maintained because recovery goals for the species have been met. Based on these considerations, this issue was eliminated from further analysis. |
| Canada lynx (threatened) | The Twomile Resource Area provides poor quality habitat for lynx due to low elevations, lack of spruce/fir habitats, and isolation from preferred habitat by distance and by lack of connected, preferred forest types. The Resource Area is not within or near a Lynx Analysis Unit (LAU) or designated travel corridor. Based on these considerations, there would be no effect to lynx or their populations under any alternative; therefore this issue was eliminated from further analysis. |
| Grizzly bear (threatened) | Grizzly bears are not likely to occur on the Coeur d'Alene River Ranger District. None of the District is within a designated grizzly bear recovery area (USFWS 2000; PF Doc. WL-R59). The only recorded grizzly sighting on the District occurred over 10 years ago; no sightings have been made in the Twomile Resource Area. The proposed activities would not result in the long-term degradation of grizzly bear habitat, nor would any expansion of human settlement occur as a result of the activities. Viability would be ensured because the Northern Continental Divide grizzly bear population has met recovery goals (PF Doc. WL-41). Based on these considerations, there would be no effect on grizzly bears or their populations under any alternative; therefore this issue was eliminated from further analysis. |
| Woodland caribou (threatened) | Although there is some evidence that caribou once ranged as far south as the Salmon River, currently this species in not known to occur outside of the Selkirk Mountains in Idaho. Because there is no use of the Twomile Resource Area by caribou, there would be no effect to caribou or their populations under any alternative; therefore, this issue was eliminated from further analysis. |
| Peregrine falcon (sensitive) | Peregrine falcons typically nest on cliffs higher than 100 feet with overhanging ledges and a vertical surface that provides protection from predators. There is no known or potential nesting habitat in the Twomile Resource Area. Based on the lack of suitable or potential habitat and because there are no known occurrences of the species in the area, no further analysis or documentation of this species is warranted. |
| Common loon (sensitive) | Loons are associated with large bodies of water. The species is not commonly known to breed in Idaho, but has been documented on Lake Coeur d'Alene and on Fernan Lake. Based on the lack of suitable or potential habitat and lack of documented occurrence, no further analysis or documentation of this species is warranted. |
| Harlequin duck (sensitive) | Harlequin ducks prefer larger high-gradient streams with dense shrub cover and riparian vegetation, a large amount of woody debris, with undercut banks and cobble-sized substrate. The species is most often found in areas with limited human activity and access, particularly at nest sites. Riparian buffers would protect this species were they present. Based on the lack of preferred habitat in the Twomile Resource Area and the lack of documented occurrence, no further analysis or documentation of this species is warranted. |
| Northern leopard frog (sensitive) | This species is found in or near water in nonforest habitats. They prefer densely vegetated areas, such as cattail marshes. All proposed treatment areas would be located on drier sites in the watershed, where these frogs are least likely to occur. Based on the lack of suitable or potential habitat and lack of documented occurrence, no further analysis or documentation of this species is warranted. |
| Northern bog lemming (sensitive) | There are no known observations of this species on the Coeur d'Alene River Ranger District. Their range is not thought to extend south of the Sandpoint Ranger District of the IPNF (Reichel and Beckstrom, 1993). Due to the absence of species from the District and from the Twomile Resource Area, no further analysis or documentation of this species is warranted. |
| Boreal toad (sensitive) | Breeding habitat includes shallow, quiet water in lakes, marshes, bogs, ponds, wet meadows, and other persistent water sources. All proposed treatment areas would be located on drier sites in the watershed, where these toads are least likely to occur. Based on the lack of suitable or potential habitat and lack of documented occurrence, no further analysis or documentation of this species is warranted. |
| Pine marten (old growth MIS) | Although pine marten may use some general habitats, the Twomile Resource Area does not have the higher-elevation spruce-fir habitats preferred by pine marten habitat. The analyses for fisher and pileated woodpecker addresses the habitat components preferred by pine marten, such as old forests, snags, down logs and trapping vulnerability. Due to the lack of preferred pine marten habitat, there would be no impact to pine marten or their habitat as a result of any of the proposed activities. Therefore, no further analysis of pine marten is warranted. Additional documentation is provided in the Project Files (PF Doc. WL-R33, R49, R50, R51, R53, R75, and R77). |
| Moose (big-game MIS) | Moose frequently use the bottomlands associated with the South Fork Coeur d'Alene River, but since elk are the primary big-game species using the area, the big-game management indicator species analysis focuses on elk. Therefore, no further analysis or documentation of moose is warranted. |
| Neotropical (migrant) or forest landbirds | Forest landbirds are best addressed at the programmatic level (on a large scale) and by ecosystem and habitat conditions rather than on a species by species basis. This is particularly true because the effects of an activity may be detrimental to one bird species while benefiting another. Landbirds are represented by the habitats and species included in the wildlife analyses in Chapter 3, including old growth/mature habitats (pileated woodpecker, fisher, northern goshawk), snag-dependent species (black-backed woodpecker, pileated woodpecker, flammulated owl), dry site species (flammulated owl and white-headed woodpecker), general forest species (elk), and wetland/riparian species (Coeur d'Alene salamander, fish). Therefore, no further analysis of these species is warranted. Additional documentation is provided in the Project Files (PF Doc. WL-R55, R79). |
| White sturgeon (threatened) | Fish species found only in the main Kootenai River, which is outside of the cumulative effects analysis area for this project. Therefore, no further analysis or documentation of this species is warranted. |
| Burbot (sensitive) | Fish species found only in the main Kootenai River, which is outside of the cumulative effects analysis area for this project. Therefore, no further analysis or documentation of this species is warranted. |
| Interior redband trout (sensitive) | Fish species found only in the main Kootenai River, which is outside of the cumulative effects analysis area for this project. Therefore, no further analysis or documentation of this species is warranted. |

## 2.3 ALTERNATIVE DESCRIPTIONS

### *Introduction*

Development of alternatives was based on the existing condition of resources, issues and concerns identified by the project team, other agencies and the public, and in response to the purpose and need identified for the project. The No-Action Alternative and three action alternatives are described in detail in this section, including activities designed to address key issues (identified by the key icon). Activities are compared by alternative in the summary table below, and displayed by treatment under each action alternative. Please refer to the enclosed alternative maps for location of the proposed activities.

***Table 2-4. Summary of activities related to vegetative treatment proposed in the Twomile Resource Area.***

| Activity | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Proposed Vegetative Treatment (acres) | | | | |
| *Precommercial Thinning* | 0 | 32 | 32 | 32 |
| *Commercial Thinning* | 0 | 79 | 104 | 0 |
| *Group Seedtree Harvest* | 0 | 78 | 78 | 0 |
| *Group Shelterwood Harvest* | 0 | 500 | 507 | 0 |
| *Shelterwood Harvest* | 0 | 141 | 183 | 0 |
| *Underburn/Slash/Rehab (no commercial harvest/yarding)* | 0 | 274 | 274 | 342 |
| Total acres treated | **0** | **1,104** | **1,178** | **374** |
| Yarding systems (acres) | | | | |
| *Skyline* | 0 | 193 | 97 | 0 |
| *Tractor* | 0 | 6 | 6 | 0 |
| *Helicopter* | 0 | 599 | 769 | 0 |
| Stream crossings repaired or replaced | 0 | 14 | 14 | 14 |
| Helispots constructed | 0 | 4 | 4 | 0 |
| Road decommissioning | 0 | 3.4 | 3.4 | 3.4 |
| Road reconditioning (miles) | 0 | 1.2 | 1.2 | 0 |
| Road reconstruction (miles) | 0 | 1.4 | 0.1 | 0 |
| System road construction (miles) | 0 | 1.9 | 1.0 | 0 |
| Estimated timber harvest volume (million board feet – MMBF) | 0 | 4.6 | 5.7 | 0 |
| Estimated cunits (CCF – one cunit is equal to one hundred cubic feet) | 0 | 10,700 | 13,400 | 0 |

***Table 2-5. Specific watershed restoration activities proposed in the Twomile Resource Area under the Action Alternatives (none of the watershed restoration activities would occur under Alternative 1).***

| Road # | Miles to be decom-missioned | crossings/ culverts to be removed | General road location information |
|---|---|---|---|
| 271UB | 0.34 | 2 | Twomile Spur UB, in the Lower East Fork of Twomile Creek, involving a segment of encroaching road, an abandoned mine, and 2 stream crossings. |
| 271UBA | 0.84 | 6 | East Fork and Twomile Spur UBA. This road follows the upper East Fork of upper Twomile Creek. Involves one abandoned mine and 1 failed culvert. |
| 271UF | 0.18 | 1 | A portion of Twomile Spur Road UF (on the east side of the creek), which connects to Trail 102, down to a stream crossing on upper Twomile Creek. |
| 271UF | 0.57 | 1 | A portion of Twomile Spur Road UF (on the west side of upper Twomile Creek), upstream of its confluence with the East Fork Twomile Creek. |
| 271UK | 0.39 | 1 | Twomile Spur Road UK. A short road in lower Twomile Creek draining, which leads to an abandoned mine adit. |
| 424UN | 0.33 | 3 | A portion of Twomile Saddle Spur Road UN, which connects to the main Road 271 near the upper East Fork of Twomile Creek. |
| 424UP | 0.69 | 0 | A portion of Twomile Saddle Spur Road UP, in the upper drainage of the East Fork of Twomile Creek, connecting Spur Roads 271-UBA to 424-UPA |

### *Alternative 1 (No Action)*

Implementation of this alternative would defer all *proposed* treatment and associated activities at this time. Ongoing and reasonably foreseeable activities identified earlier (Tables 2-1 and 2-2) would continue, and have been considered in the effects analysis. This alternative would not address the purpose and need of the

project, but is analyzed for comparison against the action alternatives and in response to public comments (from The Lands Council/Ecology Center) that recommend allowing natural processes to continue.

***How Alternative 1 addresses fire/fuels hazards:*** No silvicultural treatments, prescribed burning, or other mechanical treatments would be implemented to address hazardous fuel concerns. Stands would naturally thin themselves out as the competition for sunlight, water, and nutrients continue and natural fuels would continue to build up adding to the fire hazards. Given no action in the resource area, the vegetative condition would continue to be infested by forest insects and disease. Fire suppression strategies would continue in the resource area, leading to increased risk of stand replacing fire over time, threatening the loss of key ecosystem components.

***How Alternative 1 addresses the need for a resilient forest ecosystem:*** No silvicultural treatments, prescribed burning, or other mechanical treatments would be implemented to change the trend in vegetative composition or structure. Although this alternative would retain more mature habitat over the short term, the current trend of encroachment into dry site ponderosa pine stands by Douglas-fir and tall brush would continue.

***How Alternative 1 addresses flammulated owl habitat:*** No silvicultural treatments, prescribed burning, or other treatments would be implemented to improve flammulated owl habitat. Although this alternative would retain all suitable flammulated owl habitat over the short term, nothing would be done to interrupt the trend of decreased canopy closure that would cause the habitat to become unsuitable over time.

***How Alternative 1 addresses water yield, peak flow, sediment yield and sediment delivery:*** No proposed watershed restoration activities (road decommissioning, culvert removal or upgrades) would occur to affect these key issues. Existing fish barriers would remain, as would the potential for "at risk" road crossings to fail.

## *Alternative 2 (Proposed Action)*

This alternative was designed to reduce hazardous fuels, and improve forest health. The stands proposed for treatment in this alternative have significant variability in terms of landscape position, elevation, vegetative species present, and habitat types. Therefore the treatments prescribed in this alternative may differ from traditional regeneration harvests.

- *32 treatment units*
- *1,104 total treatment acres: 72% commercial harvest, 3% noncommercial harvest, 25% slash and burn*
- *Commercial harvest would include 75% helicopter yarding, 24% skyline yarding, less than 1% tractor yarding*
- *Canopy closure would range from 30 to 90% before treatment, and 10 to 60% following treatment*
- *Vegetation and fuels treatment activities would require construction of 4 helispots, 1.9 miles of new system road, reconstruction of 1.4 miles of road, and reconditioning of 1.2 miles of road.*
- *Aquatic restoration would include repair or replacement of 8 stream crossings and decommissioning of 3.4 miles of closed road.*
- *Trail access would be increased, including 0.4 miles of added single-track trail (rerouting and repairing); 9.5 miles of added ATV opportunities (by using old roads starting in the bottom of Twomile Creek canyon and stretching from Capital Hill to Dago Peak); and 6.4 miles of additional co-use as both road and trail (Roads 271, 424, 953 and 2322).*

***Table 2-6. Vegetation and fuels treatment under Alternative 2.***

| Unit | Acres | Vegetation Treatment | Logging System | Fuel Treatment | % canopy closure before treatment | % canopy closure after treatment |
|---|---|---|---|---|---|---|
| 1 | 17 | slash and burn | none | underburn | 70 | 60 |
| 2 | 40 | slash and burn | none | underburn | 70 | 60 |
| 3 | 17 | slash and burn | none | underburn | 70 | 60 |
| 5 | 20 | group seed tree | skyline | underburn | 50 | 15 |
| 6 | 31 | slash and burn | none | underburn | 60 | 50 |
| 7 | 90 | shelterwood | helicopter | underburn | 80 | 40 |
| 9 | 51 | shelterwood | helicopter | underburn | 70 | 30 |
| 10 | 24 | slash and burn | none | underburn | 60 | 50 |
| 11 | 24 | burn only | none | burn only | 30 | 25 |
| 12 | 29 | group shelterwood | helicopter | underburn | 80 | 20 |
| 13 | 22 | slash and burn | none | underburn | 50 | 40 |
| 20 | 13 | precommercial thin/ release | none | lop and scatter | 50 | 40 |
| 21 | 46 | group shelterwood | helicopter | underburn | 50 | 35 |
| 22 | 28 | slash and burn | none | wildlife burn | 30 | 20 |
| 23 | 94 | group shelterwood | helicopter | underburn | 80 | 20 |
| 25 | 19 | precommercial thin/ release | none | handpile | 40 | 35 |
| 27 | 78 | group shelterwood | helicopter | underburn | 80 | 40 |
| 28 | 45 | commercial thin | helicopter | underburn | 60 | 40 |
| 29 | 34 | commercial thin | 27 ac. helicopter, 7 ac. skyline | lop and scatter | 90 | 50 |
| 30 | 58 | group shelterwood | 11 ac. helicopter, 41 ac. skyline, 6 ac. tractor | underburn | 70 | 25 |
| 31 | 63 | group shelterwood | 50ac. helicopter/ 13ac. skyline | lop and scatter | 80 | 30 |
| 32 | 36 | slash and burn | none | underburn | 50 | 45 |
| 33 | 58 | group seed tree | helicopter | underburn | 80 | 10 |
| 34 | 25 | 300' slash | none | handpile | 60 | 60 |
| 35 | 9 | 100' slash | none | chip | 60 | 50 |
| 36a | 34 | group shelterwood | skyline | underburn | 70 | 20 |
| 36b | 20 | group shelterwood | helicopter | underburn | 70 | 20 |
| 37a | 10 | group shelterwood | skyline | underburn | 70 | 30 |
| 37b | 25 | group shelterwood | skyline | underburn | 70 | 40 |
| 37c | 17 | group shelterwood | skyline | underburn | 70 | 40 |
| 37d | 16 | group shelterwood | skyline | underburn | 70 | 40 |
| 37e | 10 | group shelterwood | skyline | underburn | 70 | 40 |

***How Alternative 2 addresses fire/fuels hazards:*** This alternative would focus on removal of tree species susceptible to insects and disease, to restore long-lived seral tree species that are better adapted to the mixed and low severity fire regimes of northern Idaho.

The proposed activity treatments would reduce the ladder fuels and dense stands that increase the risk of high intensity wildfire. The treatments are designed to affect potential fire behavior adjacent to the rural residences in the Resource Area. In the event of a wildland fire, expected fire intensities would be lower, providing the opportunity for fire suppression crews to better manage the fire.

***Figure 2-1. Example of low intensity fire behavior associated with slow rates of spread and small flame lengths.***

Slash generated from the activities would remain on site to over-winter providing a nutrient source. After that time, the slash would be subject to a prescribed burn, hand piling, or chipping to achieve desired fuels reduction objectives.

***How Alternative 2 addresses the need for a resilient forest ecosystem:*** The openings created by treatment activities would be planted with ponderosa pine, western larch, and on moist sites, white pine. The prescriptions incorporate existing conditions on the ground and provide for opportunities to promote the advantageous characteristics of the stand (fire resistant ponderosa pine and western larch trees) and reduce the adverse conditions (encroaching Douglas-fir and grand fir trees). For example, many of the units in this alternative vary from relatively dry sites to moist areas with small changes in aspect. The dry habitat types would include treatments that would be best to ensure the vigor and survival of the ponderosa pine trees, whereas the moist habitat types would transition into a combination of long-lived seral tree species including western larch and western white pine. Areas with severe root disease would be harvested and cleared of advanced Douglas-fir and grand fir regeneration so they could be planted with more desirable species that have higher resistance to low intensity fire and root disease. These variable land management techniques throughout the stand do not necessarily correspond with traditional silvicultural nomenclature. For this reason, the identified treatments in this alternative depict the most invasive treatment for analysis purposes, however, the implementation is going to be depicted by on-the-ground site characteristics that improve forest health and directly effect potential fire behavior.

Periodic underburns would be recommended every 10 to 30 years after treatment on most units, to maintain vegetation conditions. However, because of the uncertainty of the timing and conditions of such activities, any future actions designed to create or maintain the desired stand conditions defined in this document would be analyzed separately, following applicable legal requirements.

Alternative 2 prescribes approximately 75 acres of hazardous fuel reduction treatments in stands of allocated old growth. The treatments would involve non-commercial slashing and underburning activities, which would not change the old growth structure, and would therefore not affect the old growth allocation of these stands.

***How Alternative 2 addresses flammulated owl habitat:*** The dry-habitat types in the Twomile Resource Area provide some of the best habitat sites for flammulated owls on the Coeur d'Alene River Ranger District. Alternative 2 is designed based on a landscape plan to spatially define both capable and suitable flammulated owl habitat blocks of 300 acres or larger. Alternative 2 would define three large patches for management as flammulated owl habitat: one in the headwaters of Twomile Creek, one along the ridge below Dago Peak, and one in the headwaters of Revenue Gulch.

***How Alternative 2 addresses water yield, peak flow, sediment yield and sediment delivery:*** The Lands Council, Ecology Center and Kootenai Environmental Alliance expressed concerns related to roads in the Twomile Resource Area, and recommended reducing the road network on National Forest System lands. Alternative 2 proposes activities that would improve the aquatic resources of Twomile Creek by decommissioning 3.4 miles of road that are encroaching on the existing stream channels (which tends to change natural channel morphology and channel the water down the road), or those roads that have previously failed. Roads identified for decommissioning are currently closed to motorized travel under the District Travel Plan. In conjunction with the decommissioning, aquatic restoration would occur at a total of 14 stream crossings in the Twomile Resource Area.

The access necessary for this alternative was developed to provide the least amount of environmental disturbance to accomplish the treatments that meet the purpose and need of the project. Access is difficult in these stands because of the proximity of the units to private lands, old growth stands, steep hillsides, and erosive soils. Helicopter yarding would be the predominant method of tree removal, since it would have much less impact than road construction. Helispot construction would meet Office of Safety & Health Administration (OSHA) requirements. One of the four helispot locations is near an intermittent stream corridor in lower Twomile Creek watershed. The site is currently detrimentally disturbed, with compacted soil conditions and nonfunctioning culvert. If this alternative were selected for implementation, the helispot would be used during proposed activities, then fully reclaimed to restore hydrologic function and riparian

conditions in the intermittent stream corridor. All of the new road construction in this alternative would be located on hillslopes, avoiding riparian areas. The roadwork associated with this alternative would not involve construction across stream crossings.

## *Alternative 3*

This alternative was designed to treat focus treatment within the wildland urban interface (rather than throughout the Twomile Resource Area) to address the wildfire hazard issue and to satisfy the purpose and need of the project. Due to the variability throughout the project area, a variety of land management strategies would be implemented to improve forest health and prevent catastrophic fire behavior. The treatment methods and stands proposed are very similar to Alternative 2; however, Alternative 3 would prescribe restoration treatments on more acres (within the wildland urban interface and total) than would Alternative 2.

- *31 treatment units*
- *1,178 total treatment acres: 73% commercial harvest, 3% noncommercial harvest, 24% slash and burn*
- *Commercial harvest would include 89% helicopter yarding, 2% skyline yarding, less than 1% tractor yarding*
- *Canopy closure would range from 30 to 90% before treatment, and 10 to 60% following treatment.*
- *Vegetation and fuels treatment activities would require construction of 4 helispots, 1mile of new system road, reconstruction of one-tenth of a mile of road, and reconditioning of 1.2 miles of road.*
- *Aquatic restoration would include repair or replacement of 14 stream crossings and decommissioning of 3.4 miles of closed road.*
- *Trail access would be increased, including 0.4 miles of added single-track trail (rerouting and repairing); 9.5 miles of added ATV opportunities (by using old roads starting in the bottom of Twomile Creek canyon and stretching from Capital Hill to Dago Peak); and 6.4 miles of additional co-use as both road and trail (Roads 271, 424, 953 and 2322).*

***Table 2-7. Vegetation and fuels treatment under Alternative 3.***

| Unit | Acres | Vegetation Treatment | Logging System | Fuel Treatment | % Canopy Closure Before Treatment | % Canopy Closure After Treatment |
|---|---|---|---|---|---|---|
| 1 | 18 | slash and burn | none | underburn | 70 | 60 |
| 2 | 40 | slash and burn | none | underburn | 70 | 60 |
| 3 | 17 | slash and burn | none | underburn | 70 | 60 |
| 5 | 20 | group seed tree | skyline | underburn | 50 | 15 |
| 6 | 31 | slash and burn | none | underburn | 60 | 50 |
| 7 | 90 | shelterwood | helicopter | underburn | 80 | 40 |
| 9 | 51 | shelterwood | helicopter | underburn | 70 | 30 |
| 10 | 24 | slash and burn | none | underburn | 60 | 50 |
| 11 | 24 | burn only | none | underburn | 30 | 25 |
| 12 | 29 | group shelterwood | helicopter | underburn | 80 | 20 |
| 13 | 22 | slash and burn | none | underburn | 50 | 40 |
| 15 | 10 | shelterwood | helicopter | underburn | 80 | 40 |
| 16 | 32 | shelterwood | helicopter | underburn | 80 | 40 |
| 17 | 82 | group shelterwood | 66 ac. helicopter, 16 ac. skyline | underburn | 60 | 40 |
| 18 | 52 | group shelterwood | helicopter | underburn | 70 | 40 |
| 19 | 25 | commercial thin | helicopter | underburn | 80 | 55 |
| 20 | 13 | precommercial thin | none | lop and scatter | 50 | 40 |
| 21 | 46 | group shelterwood | helicopter | underburn | 50 | 35 |
| 22 | 28 | slash and burn | none | wildlife burn | 30 | 20 |
| 23 | 94 | group shelterwood | helicopter | pile/ lop and scatter | 80 | 20 |
| 24 | 22 | group shelterwood | helicopter | underburn | 70 | 40 |
| 25 | 19 | precommercial thin | none | handpile | 40 | 35 |
| 27 | 61 | group shelterwood | helicopter | underburn | 80 | 40 |
| 28 | 45 | commercial thin | helicopter | underburn | 60 | 40 |
| 29 | 34 | commercial thin | 27 ac. helicopter, 7 ac. skyline | underburn | 90 | 50 |
| 30 | 58 | group shelterwood | 11 ac. helicopter, 41 ac. skyline, 6 ac. tractor | lop and scatter | 70 | 25 |
| 31 | 63 | group shelterwood | 50 ac. helicopter, 13 ac. skyline | underburn | 80 | 30 |
| 32 | 36 | slash and burn | none | underburn | 50 | 45 |
| 33 | 58 | group seed tree | helicopter | underburn | 80 | 10 |
| 34 | 25 | 300' slash | none | handpile | 60 | 50 |
| 35 | 9 | 100' slash | none | chip | 60 | 50 |

***How Alternative 3 addresses fire/fuels hazards:*** This alternative proposes to restore long-lived seral tree species that historically existed and adapted to the mixed and low severity fire regimes of northern Idaho. Treatment would focus on removal of the smallest, least healthy, most fire-susceptible trees and those with low-lying crowns. The treatments would decrease the *canopy bulk density* and reduce the trees-per-acre sufficiently enough to reduce flame lengths and make crown fire unlikely. This alternative would involve the mechanical treatment of fuels adjacent to the urban residences in the project area involving shelterwood, group shelterwood, and group seed tree regeneration harvests in addition to commercial and pre-commercial thinning, slashing, pruning, piling, chipping, and prescribed burning. The openings created would be planted with ponderosa pine and western larch. In the event of a wildland fire, expected fire intensities would be lower, providing the opportunity for fire suppression crews to better manage the fire.

**Canopy bulk density:** the mass of available canopy fuel per unit of canopy volume. It is a bulk property of the stand, not an individual tree (Scott and Reinhardt, 2001. PF Doc. FF-8).

***How Alternative 3 addresses the need for a resilient forest ecosystem:*** Among all of the treatment units the favored residuals, if present, would be the long-lived seral species, such as ponderosa pine, white pine, and western larch. Areas that have severe root disease and/or infected with bark beetles would be cleared, providing the opportunity to establish more desirable species such as ponderosa pine, western larch,

and western white pine. Slash generated from the hazardous fuel reduction activities would be left to over-winter, then burned in the spring. On most units, periodic underburns would be recommended every 10 to 30 years after treatment, to maintain vegetation conditions. However, because of the uncertainty of the timing and conditions of these future activities, any future actions designed to create or maintain the desired stand conditions defined in this document would be analyzed separately, following applicable legal requirements.

Alternative 3 proposes a total of approximately 180 acres of fuels reduction activities in allocated old growth (including 155 acres of shelterwood harvests and 25 acres of commercial thinning). In addition, the same 75 acres of non-commercial slashing and underburning activities described in Alternative 2 would be implemented. Alternative 3 would reduce the amount of allocated old growth in OGMU 121 from 7% to 6% (still exceeding the Forest Plan's desired level of 5%).

***How Alternative 3 addresses flammulated owl habitat:*** Alternative 3 was not designed with the objective of providing blocks of old growth and flammulated owl habitat for nesting.

***How Alternative 3 addresses water yield, peak flow, sediment yield, and sediment delivery:*** Alternative 3 proposes the same aquatic restoration activities as Alternatives 2 and 4 (please refer to the description under Alternative 2).

## *Alternative 4 (No commercial harvest activities)*

This alternative was proposed to at least partially meet the purpose and need of the project, but to also respond to a suggestion by The Lands Council and Ecology Center to re-introduce fire to forested ecosystems without commercial timber harvest.

- *15 treatment units*
- *374 total treatment acres: 0% commercial harvest, 9% noncommercial harvest, 91% non-harvest treatments*
- *Canopy closure would range from 30 to 70% before treatment, and 20 to 60% following treatment*
- *No helispot or road construction, road reconstruction, or road reconditioning would be needed.*
- *Aquatic restoration would include repair or replacement of 14 stream crossings and decommissioning 3.4 miles of closed road.*

***Table 2-8. Vegetation and fuels treatment under Alternative 4.***

| Unit | Acres | Vegetation Treatment | Logging System | Fuel Treatment | % Canopy Closure Before Treatment | % Canopy Closure After Treatment |
|---|---|---|---|---|---|---|
| 1 | 18 | slash and burn | none | underburn | 70 | 60 |
| 2 | 40 | slash and burn | none | underburn | 70 | 60 |
| 3 | 17 | slash and burn | none | underburn | 70 | 60 |
| 6 | 31 | slash and burn | none | underburn | 60 | 50 |
| 10 | 24 | slash and burn | none | underburn | 60 | 50 |
| 11 | 24 | burn only | none | burn only | 30 | 25 |
| 13 | 22 | slash and burn | none | underburn | 50 | 40 |
| 20 | 13 | precommercial thin | none | lop and scatter | 50 | 40 |
| 21 | 46 | slash and burn | none | underburn | 50 | 35 |
| 22 | 28 | slash | none | wildlife burn | 30 | 20 |
| 24 | 22 | slash and burn | none | underburn | 70 | 60 |
| 25 | 19 | precommercial thin | none | lop and scatter | 40 | 35 |
| 32 | 36 | slash and burn | none | underburn | 50 | 45 |
| 34 | 25 | none | none | 300-foot slash | 60 | 50 |
| 35 | 9 | none | none | 100-foot slash | 60 | 50 |

***How Alternative 4 addresses fire/fuels hazards:*** Precommercial treatments of surface and ladder fuels such as thinning, slashing, pruning, piling, and leave tree protection would occur to reduce the intensity of prescribed fire and potential mortality to the existing overstory. This would be done without removal of commercial-sized trees (trees larger than 7 inches in diameter at breast height). Canopy density would remain nearly the same as existing conditions, while surface and ladder fuels would be decreased as a result of the non-commercial fuels reduction treatments.

It is usually necessary to begin restoration treatment in dense stands with a "low thinning" to remove excess understory and weaker overstory trees that cannot be killed in an underburn without risking the mortality of desirable trees, or risking uncontrollable fire behavior (Arno et al. 1996). Due to the constraints of treating only non-commercial sized fuels prior to the reintroduction of fire, Alternative 4 would include only those stands where non-commercial treatment of surface and ladder fuels would be sufficient to allow the re-introduction of fire without excessive mortality to the existing overstory. With this constraint, many stands in the project area would not be candidates for treatment; consequently this alternative would result in treatment of the fewest acres compared to the other action alternatives proposed in this assessment.

Under Alternative 4, approximately 32 acres would be pre-commercially thinned using hand-held equipment only. Alternative 4 would include fuel treatments on 374 acres, of which activities such as underburning, chipping, hand piling, and slashing would be accomplished. Areas where prescribed fire can be initiated without any mechanical modification of the existing fuels will occur.

***How Alternative 4 addresses the need for a resilient forest ecosystem:*** This alternative does not address forest composition and structure. The proposed activities would not be enough to substantially increase ponderosa pine, western larch or white pine in the Twomile Resource Area, and future stands would continue to be susceptible to the same insects and disease pests. Under Alternative 4, noncommercial slashing and underburning would occur on 97 acres of allocated old growth (OGMU 121). This treatment would not change the old growth structure, and therefore it would not change the amount of allocated old growth.

***How Alternative 4 addresses flammulated owl habitat:*** Under Alternative 4, burning activities would stimulate growth of brush species that are host to moths, which make up much of the flammulated owl's prey base. This alternative was designed to accomplish fuels reduction activities without the use of commercial timber harvest; therefore this alternative would continue to provide flammulated owl habitat over both the short and long term.

***How Alternative 4 addresses water yield, peak flow, sediment yield, and sediment delivery:*** Alternative 4 would address these key issues the same as Alternatives 2 and 3, because all three alternatives propose the same aquatic restoration activities (please refer to the description under Alternative 2).

## 2.4 FEATURES COMMON TO ALL ACTION ALTERNATIVES

The following is a more detailed discussion of specific features of the action alternatives designed to protect resources in the Twomile Resource Area, and would occur with implementation of proposed activities as applicable to each action alternative.

### *Features Related to Fuels Management*

All action alternatives would include at a minimum surface or understory fuels treatment using prescribed fire. Site conditions may dictate the use of other fuel treatment methods prior to implementation of the burn in order to prepare for this prescribed fire. In units without proposed thinning or shelterwood harvest, these methods could include slash piling, leave tree protection, slashing, or pruning. Because post-harvest fuel conditions cannot be completely predicted, assessments would need to be made by a fire/fuels specialist and a silviculturist after completion of harvest activities. A determination would then be made as to whether the burn could be implemented safely and effectively without further fuels treatment, or if some modification of the fuels using the above methods is required to meet the objectives of the silvicultural prescription.

### *Features Designed to Protect Air Quality*

The Idaho Panhandle National Forests is a party to the North Idaho Smoke Management Memorandum of Agreement, which established procedures regulating the amount of smoke produced from prescribed fire. The North Idaho group currently uses the services and procedures of the Montana State Airshed Group. The procedures used by the Montana Group are considered to be the "best available control technology" (BACT) by the Montana Air Quality Bureau for major open burning in Montana. A Missoula-based monitoring unit is responsible for coordinating prescribed burning in North Idaho during the months of April through November. This unit monitors meteorological data, air quality data, and planned prescribed burning and decides daily on whether or not restrictions on burning are necessary the following day.

Each year, a list of all prescribed burning planned for the burning season on the Coeur d'Alene River Ranger District is forwarded to the monitoring unit through the Coeur d'Alene Interagency Dispatch Center before March 1. Daily, by 8:30 a.m., the Coeur d'Alene River Ranger District informs the Dispatch Center of all burning planned for the next day and they forward this information to the monitoring unit. By 3:00 p.m. the same day the monitoring unit informs the Forest whether any restrictions are to be in effect the following day, and the Dispatch Center informs the District. These procedures limit smoke accumulations to legal, acceptable limits. The District strictly complies with these procedures, and has had no air quality violations.

Historically, prescribed burning on the Coeur d'Alene River Ranger District occurs in the spring and fall seasons over a total time span of 45 to 60 days during each season. All burning complies with federal, state and local regulations. Management practices include, but are not limited to, burning under spring-like conditions (high moisture content in fuels, soil and duff) to reduce emissions, provide for retention of large woody debris, and to protect the soil. Prescribed burning during spring or fall will generate less smoke than a much hotter stand replacing summertime wildfire.

### *Features Related to Vegetation Management*

Under all alternatives, fire-resistant, seral species such as ponderosa pine and western larch will be the highest priority for protection. Removal of these species would only occur when retaining them would conflict with the goals of the project. For example, smaller seral species would be removed when they create ladder fuels that may endanger a larger, older seral tree during the implementation of a prescribed fire. In addition, selected ponderosa pine or western larch could be removed when they occur in a very dense stand that cannot be safely underburned without thinning.

All vegetative treatments would have silvicultural prescriptions approved by a certified silviculturist before treatment. Prescriptions would consider site-specific factors such as physical site, soils, climate, habitat type, current and future vegetative composition and conditions as well as interdisciplinary objectives, NEPA decisions, other regulatory guidance, and Forest Plan goals, objectives and standards. All regeneration areas would be regenerated with site-adapted species/seed source and resulting stands will be dominated by appropriate long-lived seral species. In treated areas, site preparation for regeneration, fuel treatment and planting would occur within 5 years of regeneration treatment. Site preparation and/or fuel treatment may include a combination of slashing, pruning, prescribed burning, grapple piling or hand piling, depending on post-harvest conditions that meet both site preparation and hazard reduction objectives.

> ***Slashing***
> ***is the use of chainsaws to treat noncommercial undesirable tree species in order to prepare a site for burning and reforestation with desired species.***

### *Features Designed to Protect Threatened, Endangered & Sensitive Plants*

No harvest activity would occur which would adversely affect any known rare plant population. All populations potentially adversely affected would be buffered from harvest and other project-related activities by a minimum of 100 feet. No commercial harvest activity would occur within riparian habitat. Site-specific surveys would be conducted as necessary for in-stream watershed work in highly suitable riparian habitat. All newly identified Threatened and Sensitive plant occurrences would be evaluated. Specific protection measures would be implemented to minimize impacts to that population occurrence and its habitat. Areas of

high potential habitat would be surveyed prior to implementation. The timber sale contract would include a provision allowing modification of the contract if protection measures prove inadequate, if new areas of plants are discovered, or if new species are added to the list of rare plants. Qualified botanists and other personnel that have had training in botany and sensitive plant identification would conduct the botanical surveys.

Under any action alternative, prescribed fire ignition would not occur within riparian habitats, although fire would be allowed to burn into riparian areas. Higher fuel moistures in riparian habitats during prescribed burning conditions would likely limit the spread of any prescribed fire. To limit ground disturbance, fire line would not be constructed in riparian areas unless needed to keep a burn from getting out of control.

### *Features Designed to Reduce the Spread of Noxious Weeds*

The Lands Council and Ecology Center expressed concern related to the possible spread of noxious weeds. All action alternatives would include an intensive noxious weed treatment program focused on limiting the spread of noxious weeds following timber harvest and prescribed burning activities. All roads used for implementation of harvest activities would be treated for noxious weeds both prior to and following use.

Noxious weed prevention strategies on the Coeur d'Alene River Ranger District are conducted based on the Noxious Weeds Final Environmental Impact Statement and Record of Decision (USDA Forest Service, 1998; PF Doc. NW-2). Known infestation sites and priorities for treatment were established in that document. Measures to protect Threatened, Endangered and Sensitive plant population viability and habitat capability during noxious weed treatment would be implemented following guidelines provided in that document. To help reduce the spread of noxious weeds and prevent the introduction of new invader species, a contract clause related to equipment washing would be used in all construction and timber sale contracts. For further information regarding noxious weeds, please refer to Appendix F.

### *Features Designed to Protect Aquatic Resources*

**Best Management Practices** (BMPs) –All activities would be designed to protect water quality and fisheries habitat. BMPs are the primary mechanism to enable the achievement of water quality standards. Forest Service Handbook 2509.22 (Soil and Water Conservation Handbook) outlines BMPs that meet the intent of the water quality protection elements of the Idaho Forest Practices Act. Site-specific best management practices that are part of the design criteria of the action alternatives are described more fully in Appendix A, including a description of each practice and an estimate of its effectiveness. Research has evaluated the effectiveness of BMPs (Seyedbagheri 1996, PF Doc. AQ-1; USDA Forest Service Monitoring Reports 1995 – 2000; PF Doc. AQ-2-7). Overall, the estimated effectiveness of BMPs is considered moderate to high, depending on the practice. These practices would be implemented as requirements tied to the timber sale contract. The Forest Service Timber Sale Administrator would frequently review the project for compliance with these and other sale requirements. The District aquatics staff would also do periodic monitoring to assess the effectiveness of these practices.

**Sediment Reduction Activities** - Spot gravelling with approximately 6 inches of gravel would be required at all stream crossings, rolling dips, and in any wet areas. This measure is highly (92%) effective in reducing the amount of sediment delivered to streams (Foltz and Truebe 1995; PF Doc. AQ-8).

**Inland Native Fish Strategy (INFS*)* –** In development of the action alternatives, standards and guidelines of the INFS (USDA Forest Service, 1995, pages A-6 through A-15; PF Doc. AQ-9) were used specifically to protect water and aquatic biota within the Resource Area. Riparian Management Objectives (RMOs) and road management standards and guidelines were applied as design criteria within the analysis area boundary on those roads used for harvesting or hauling of timber. Roads that are proposed for decommissioning to maintain big-game security goals and/or sediment and water yield reduction purposes would comply with the INFS (USDA Forest Service, 1995; PF Doc. AQ-9) prior to decommissioning.

### *Stream Channel Buffer Widths*

***(USDA FS, 1995; INFS, pp. A-5, A-6; PF Doc. AQ-9)***

***Category 1 - Fish-bearing Streams**: Interim RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.*

***Category 2 - Permanently flowing non-fish bearing streams:** Interim RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest.*

***Category 3 – Ponds, lakes, reservoirs, and wetlands greater than 1 acre:** Interim RHCAs consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonally saturated soil, or to the extent of moderately and highly unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest.*

***Category 4 - Seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides, and landslide-prone areas:** This category includes features with high variability in size and site-specific characteristics. At a minimum, the interim RHCAs must include:*

*(a) The extent of landslides and landslide-prone areas*

*(b) The intermittent stream channel and the area to the top of the inner gorge*

*(c) The intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation*

*(d) For Priority Watersheds, the area from the edges of the stream channel, wetland, landslide or landslide-prone area to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest*

*For watersheds not identified as Priority Watersheds, the area from the edges of the stream channel, wetland, landslide or landslide-prone area to a distance equal to the height of one-half site potential tree, or 50 feet slope distance, whichever is greatest.*

Streamside buffers would be applied along all harvest units. The intent of the buffers are to meet the riparian management objectives of maintaining slope stability in potentially sensitive areas, maintain stream temperatures and provide a long-term supply of large woody debris. To protect fish habitat, commercial timber cutting would be prohibited in Riparian Habitat Conservation Areas (RHCAs) using the guidelines established by the INFS (1995; PF Doc. AQ-9).

INFS allows silvicultural practices to be applied in RHCAs to acquire desired vegetation characteristics where needed to attain RMOs (see Appendix B, TM-1 (b.)) and to design prescribed burn projects that contribute to the attainment of RMOs (see Appendix B, FM-4). No overstory canopy would be removed within the RHCAs. Some slashing of shrubs, saplings and seedlings may occur in selected units to prepare sites for burning and reforestation activities. Planting in RHCAs could follow burning activities, to promote long-lived species such as cedar, larch and white pine.

Generally, effectiveness of these buffers is considered high. Timing guidelines are used to reduce impacts to fish eggs and fry. For example, instream work would be avoided prior to July 15 each year because it can cause increased sedimentation (fines) while the work is being conducted. A description of each applicable INFS standard and guideline and its estimated effectiveness can be found in Appendix B. These requirements are incorporated into project design.

**Protection Of Wetlands, Seeps, Bogs, Wallows and Springs** – All known or discovered wetlands, seeps, bogs, elk wallows and springs less than one acre in size would be protected with a "no activity" buffer approximately 100 feet in diameter or as prescribed by the District Botanist. Effectiveness of this practice is considered high. The no-activity buffer would be incorporated into project design and unit layout, and implemented by the sale administrator.

**Road Work to Improve Water Quality and Aquatic Habitat** – The main source of erosion and sediment delivery from roads is usually from the road surface. Road maintenance activities that focus on reducing sediment delivery include blading along the road prism; spot surfacing at stream crossings; installing relief culverts where ditch lengths are too long; cleaning and improving condition of ditches;

cleaning the inlet and outlets of culverts; and installing rolling dips and outlet ditches. These activities would help improve road surface drainage and decrease sediment delivery to stream channels. Road drainage crossings that pose a hazard and risk to aquatic species or their habitat as a result of sediment delivery have been evaluated throughout the resource area. Existing roads planned for use during activities would be improved to meet standards suitable for use by large trucks and equipment. Drainage structures on open roads planned for use during activities would be repaired, replaced, removed, or redesigned as needed. Estimated effectiveness of such roadwork is considered high.

Road decommissioning would occur on roads that are not needed for long-term use as identified in the Roads Analysis Process (RAPs). Road-stream crossings would be treated in a number of ways:

- *Culverts on system roads would be replaced with larger pipes so that 100-year flow events could be accommodated. Purchaser would finance the work if the road is a haul route.*
- *Culverts on roads to be decommissioned would be removed, fill would be pulled back, and stable channel geometries would be restored.*
- *Decommissioned roads would be recontoured at the entrance to prevent vehicle access and the rest of the road surface would be water barred at the appropriate spacing.*
- *Swales and draws with road fill across them and no culvert present would have fill material pulled back and channels restored to a stable slope.*
- *Undersized culverts would be removed and replaced with armored, drivable fords.*

The watershed restoration activities are designed to reduce the risk of sediment delivery to streams in the highest priority areas of the project area. Roads that are to be used by the timber sale purchaser to accomplish vegetation restoration activities would be decommissioned under the contract. If any of the existing roads proposed for decommissioning were not used for the project, they would be decommissioned using appropriated or other funding sources.

**Protection of Fish When Using Streams as Water Sources For Prescribed Burning Control** –To avoid adverse effects to fish and redds while using natural water sources, water removal may not exceed 90 gallons per minute and pumping sites would be located away from spawning gravels. The intake hose would be screened to prevent accidental intake of fish eggs, fry or small fish. An emergency spill clean up kit would be on site in the unlikely event of a fuel spill outside the containment system. This is consistent with INFS direction (USDA 1995; see Appendix B, RA-5). Effectiveness of these practices is considered moderate to high. A description of each applicable INFS standard and guideline and its estimated effectiveness can be found in Appendix B. These requirements would be incorporated into project design.

### *Features Designed to Protect Soils*

Fine organic matter and large woody debris would be retained on the ground in harvest units, which is necessary for sustained nutrient recycling (especially in areas of low potassium). In addition, only log-length yarding would be allowed in harvest alternatives (no whole-tree yarding). On units designated for tractor harvest, planned skid trails would be established at 150-foot spacing to reduce overall soil compaction and displacement. Scheduling harvest activities to occur when the soil profile is dry helps to reduce the effects from compaction (Poff, 1996, p. 482; PF Doc. SOIL-42). Under any action alternatives, tractor harvest and wood removal would be scheduled to occur when the soil profile is dry. Prescribed broadcast burning and underburning would be of low intensity and would occur when the soil's surface horizon has at least 25% moisture content in order to protect the site's surface organic component.

To minimize erosion and ensure compliance with State water quality standards, all proposed road construction and timber harvest activities associated with the Twomile Resource Area would be completed using Best Management Practices, as described under "Features Designed to Protect Aquatic Resources." Monitoring of Best Management Practices has determined that recent projects on the Idaho Panhandle National Forests have been implemented as designed and have generally achieved the desired objectives (USDA Forest Service, 2000, Idaho Panhandle National Forests Monitoring - 1999, pp. 34-41; PF Doc. SOIL-50). The results of the 1999 monitoring indicates that a good job is being done in meeting compaction,

displacement, and fine organic matter soil quality standards, but coarse woody debris did not meet recommended guidelines on the unit monitored on the Coeur d'Alene River Ranger District (USDA Forest Service, 2000, Idaho Panhandle National Forests Monitoring - 1999, p. 50-51; PF Doc. SOIL-50). Although there were some concerns related to skid trail construction on specific projects (none on the Coeur d'Alene River Ranger District), reviews indicated that most projects met BMP compliance for soil protection. Maps related to soil conditions in the Twomile Resource Area (such as sensitive landtypes and potassium deficient areas) are provided in the Project Files (PF Doc. SOIL-19, SOIL-22). All activities would be completed using Best Management Practices to minimize erosion and comply with State water quality standards (Appendix A).

In those areas where machine or hand piling of slash is proposed, the foliage and branches would be allowed to over winter on the site, allowing potassium to leach out from the slash material. Management of large coarse woody debris and other organic matter (limbs and tops) would follow the research guidelines in Graham et al (1994; PF Doc. SOIL-32).

### *Features Designed to Protect Wildlife Habitat*

All snags would remain following project activities unless removal is unavoidable or required for safety reasons. The Forest Service's Northern Region protocol for snag retention would be met or exceeded (USDA Forest Service 2000; PF Doc. WL-54). Long-lived, seral conifer species (ponderosa pine and western larch) of all sizes would be favored to remain on the site. Large long-lived seral species (18 inches diameter or greater) would receive special emphasis to remain on the site. These large diameter conifers would be retained unless removal is unavoidable due to safety reasons or special circumstances.

Every effort would be made to ensure there would be no net gain in roads that could increase access and therefore big-game vulnerability. All roads opened, constructed or reconstructed for the project would be closed with a gate or barrier during project activities. All of these roads would be effectively closed following project activities (not to exceed 3 years). If project activities were not completed within 3 years, a partial replacement of obliterations or other closure structures would occur. At the end of project activities, all partial obliterations and structures would be replaced in as good as or better condition than currently exists. These decommissioned sections would be replaced within 3 years. Timing restrictions on harvest would occur in elk calving areas from May 1 – June 15.

Prescribed burning would be implemented when bats are absent, or in a manner that would avoid disturbance of roosting bats. This could be achieved by preventing fire within 400 meters of the extent of a cave or mine when bats are present, unless a site-specific assessment indicates a more appropriate distance to avoid effects of heat and smoke on bats. Areas upslope of cave or mine openings would be protected to prevent erosion and disturbance. Mechanical fire lines would be more than 400 meters from the mines or caves used by bats, unless site plans indicate a more appropriate distance.

Incidental trees charred during prescribed burning operations would be retained on site for black-backed woodpecker habitat. Surveys would be conducted prior to harvest to ensure protection of pileated woodpeckers and goshawks.

### *Features Designed to Enhance Recreation Trail Facilities*

Rick Collignon (Idaho Parks & Recreation) expressed concern about the potential effects of project activities on trails (Appendix D). Under any alternative, the existing recreation trail system in the Twomile Resource Area would be maintained. In addition, plans would be made to manage and develop other recreation opportunities, especially trail-related facilities. These would be identified in accordance with the Forest Plan. To protect groomed snowmobile routes, log haul would not be allowed on Forest Roads 271 and 424 between December 15 and April 1 of each year.

### *Features Designed to Protect Heritage Resources*

Surveys to locate heritage resources within the Twomile Resource Area have been completed. All known heritage resource sites would be protected under any alternative, as directed by the Cultural Resources

Management Practices (Forest Plan, Appendix FF; PF Doc. HR-1). Any future discovery of heritage resource sites or caves would be inventoried and protected if found to be of cultural significance. A decision would be made to avoid, protect, or mitigate effects to these sites in accordance with the National Historic Preservation Act of 1966. In 1999, the Idaho Panhandle National Forests reported (and the State Historic Preservation Office reviewed) thirteen timber sale projects. It was determined that none of these projects would have an effect on heritage resources. The proposed activities in the Twomile Resource Area are designed in a manner consistent with those that were reviewed by the State Historic Preservation Office and found not to have an effect (Forest Plan Monitoring and Evaluation Report – 1999; p.17; PF Doc. HR-2).

### *Features Related to Long-term Transportation Access*

The Lands Council, Ecology Center and Kootenai Environmental Alliance expressed concerns related to roads in the Twomile Resource Area, and recommended reducing the road network on National Forest System lands. The transportation planning for the Twomile Resource Area proposal is tiered to the Forest Plan, but has a higher degree of specificity. The goals for transportation facilities in Chapter II of the Forest Plan state in part:

> *Construct the minimum number of roads necessary to permit the efficient removal of timber and mineral resources. Construct and reconstruct roads only to minimum standards necessary to prevent soil loss, maintain water quality, minimize safety hazards for a reasonable and prudent Forest user, and provide access for fire protection where needed to meet management area goals.*

Many of the roads providing for the use and administration of National Forest System lands are relatively permanent or long-lived facilities. As a result, there is a wide range of effects associated with the road system. Analysis of road systems must occur at varying levels of detail, from the programmatic (national, regional, and forest-wide) to the site-specific (on an area-by-area basis through the NEPA planning process).

The District completed an Access Management Environmental Assessment, using the NEPA planning process to ensure widespread public involvement in the review and modification of the District's Travel Plan (USDA Forest Service, 2000, Coeur d'Alene River Ranger District Access Management Environmental Assessment). The Travel Plan identifies those roads available to the public for motorized use across the Coeur d'Alene River Ranger District. The new Travel Plan is discussed under "Ongoing and Reasonably Foreseeable Activities" in this Chapter. Proposed changes to access management under the Twomile Resource Area project are consistent with access management under the District's new Travel Plan (Project Files, Transportation).

For each site-specific NEPA proposal, a long-term transportation plan is developed to identify the access needs for that area over the next several decades. The long-term plan would apply to all action alternatives, although it would be implemented to varying degrees under each alternative. The Roads Analysis Process (RAPs) was used to analyze the transportation system needs in the Twomile Resource Area (PF Doc. TRAN-1) and develop the long-term transportation plan. Key objectives of the transportation plan are to:

- *Maintain routes and/or loops through the analysis area for established snowmobile, motorcycle, and other vehicular recreation traffic*
- *Maintain access to private property*
- *Maintain access to the analysis area from the traditional access points*
- *Maintain vehicular access for attack and control of wildfire*
- *Establish which classified and unclassified roads are needed for the long-term management of the Twomile Resource Area and which road or road segments are not needed for the short or long term management of the area*
- *Install fords in place of culverts, where possible, to both lessen environmental impact risks and reduce road maintenance costs*

The long-term transportation plan also identifies those roads that are available for decommissioning in the future, should funding become available.

## 2.5 OPPORTUNITIES

The following are projects that could complement and improve resource conditions within the project area. These projects are not considered mandatory for project implementation, but they may be accomplished if funding becomes available. The anticipated effects of implementing these activities are discussed below and by resource in Chapter 3.

### *Opportunities to Improve Aquatic Resources*

All roads not identified as part of the long-term transportation plan would be available for road removal or improvement activities, with emphasis on the removal of headwater roads and their associated road channel crossings, and the removal of additional low-standard riparian roads. The analysis of effects to aquatic resources considered and disclosed the effects of these opportunities.

These activities would be implemented as additional monies become available through appropriated funding or grant monies. The order in which the work would be accomplished depends upon the condition and location of these residual roads. Damaging flood events, such as those experienced in 1996, may dictate future priorities. Additional information regarding the implementation and effects of this type of rehabilitation work is provided in Chapter 3 for each appropriate resource.

### *Opportunities to Improve Fisheries Habitat*

The opportunity exists to upgrade (replace) the two main crossings on Road 271, which would allow for improved fish passage and access to headwater habitat. Another site on Road 271, near the main channel crossing of Twomile Creek, provides the opportunity to improve fish habitat access. Surveys conducted by the Forest Service in 2002 identified several potential locations where channel work (specifically road related and/or upgrades) could be accomplished for the purpose of aquatic restoration. Other continuing opportunities include effectiveness monitoring, riparian road relocation or removal, native fish population genetic analysis, and removal/implementation plans for eastern brook trout.

### *Opportunities to Improve Wildlife Habitat*

Currently, there are road closures within the Twomile Resource Area that are being breached by off-road vehicles, which may be affecting wildlife security. Where it is possible to reinforce existing closures and further discourage use of closed roads, barriers would be modified or reconstructed. These activities would be targeted to those areas where wildlife security is a priority, and where reinforcement of the existing barrier would be effective. Motorized vehicles have pioneered trails within the Twomile Resource Area, creating travel routes that are not sanctioned or maintained by the Forest Service. These pioneered trails may threaten wildlife security, as well as facilitating the spread of noxious weeds throughout the resource area. These pioneered trails would be closed using various methods, including earth berms and the placement of boulders and logs.

### *Opportunities to Reduce the Spread of Noxious Weeds*

The Lands Council and Ecology Center expressed concern with potential spread of noxious weeds. Many areas affected by the proposed activities (especially road segments and landings) would likely be surveyed and monitored to assess the establishment and spread of noxious weeds, new invader species in particular. The full extent of surveying, monitoring and treatment and the availability of funding (KV or appropriated) is not known at this time; therefore, these activities are identified as opportunities that could be accomplished as funding became available. Treatment would be conducted under the guidelines of the Coeur d'Alene River Ranger District Noxious Weed Final Environmental Impact Statement and Record of Decision (USDA Forest Service, 2000; PF Doc. NW-2). Noxious weed treatments could occur on all roads and trails in the resource area, and treatment could include biological control methods as well as spot herbicide treatment in specific areas.

## 2.6 MITIGATION

After analyzing the potential effects of proposed activities, specific "mitigation" measures were identified to reduce impacts to natural resources. The following mitigation measures are an integral facet of all action alternatives and have been identified as necessary to reduce environmental effects to natural resources. These measures would be incorporated into the project design, timber sale contract, and other contracts and project plans.

***"Mitigation" measures are those identified for implementation to reduce the anticipated effects of a specific action on natural resources***

### *Mitigation to Reduce Effects to Aquatic Resources*

If any TES fish species are observed in streams of the resource area, the District fisheries biologist would determine any project modifications needed to protect the species and its habitat based on applicable laws, regulations and management recommendations for the species. Any instream work conducted for restoration, reconstruction or reconditioning would be scheduled to occur after July 15 to protect spring-spawned fish fry and/or eggs.

All previously unsurveyed areas identified as potential or highly suitable habitat that, as a result of the proposed activity, would have a high risk of adverse effects to Threatened and Sensitive fish populations or fish habitat must be surveyed by a fisheries biologist prior to project implementation. Some areas previously surveyed could be resurveyed based on the data and intensity of the most recent fish habitat or population surveys, and the risk to sensitive habitat from proposed activities. Should TES fish species be located during surveys, one or more of the following protective measures would be implemented:

- *Drop proposed units from activity;*
- *Modify the proposed unit or activity;*
- *Implement all applicable INFS standards and guidelines (see Appendix B)*
- *Noncommercial thinning would be conducted using non-mechanized thinning methods (that is, heavy equipment would not be used), with hand piling or lop and scatter prior to burning.*

These measures are considered by the project fisheries biologist to be highly effective. The requirement to survey, identify and protect populations from adverse effects, and to buffer habitat for TES fish species from all activities would be implemented prior to the award of the contract. The maintenance of buffers to protect populations would be administered under the contract.

### *Mitigation to Reduce Effects to TES Plants*

All previously unsurveyed areas identified as potential or highly suitable habitat that, as a result of the proposed activity, would have a high risk of adverse effects to Threatened and Sensitive plants or habitat and a likely reduction in population viability, must be surveyed by a botanist prior to project implementation. Some areas previously surveyed may be resurveyed, based on the date and intensity of the most recent sensitive plant survey and the risk to sensitive habitat from proposed activities. Should rare plants be located during surveys, one or more of the following protective measures would be implemented:

- *Drop proposed units from activity.*
- *Modify the proposed unit or activity.*
- *Implement a minimum of 100 feet slope distance buffers around sensitive plant occurrences as necessary to minimize effects and maintain population viability.*
- *Implement, if necessary, Timber Sale Contract provisions for Protection of Endangered Species, and Settlement for Environmental Cancellation.*

These measures are considered by the district botanist to be highly effective. The requirement to survey, identify and protect populations from adverse effects and to buffer habitat for threatened species from all activities would be implemented prior to the award of the contract. The maintenance of any buffers protecting populations would be administered in the contract.

### *Mitigation to Reduce Effects to Wildlife*

If any TES wildlife species are observed in the resource area, the District wildlife biologist will determine any project modifications necessary to protect the species and its habitat based on applicable laws, regulations and management recommendations for the species. If nesting by any species is found to be occurring in any area scheduled for prescribed fire or silvicultural manipulation, no activities would occur in the area until after July 15, or recommendations by the wildlife biologist for avoiding impacts to the species. Effectiveness is moderate rather than high, because not all TES wildlife in the resource area may be identified.

If previously unknown nesting goshawks are found, nesting and post-fledgling habitat would be maintained. Any activities within one-half mile of the nest would occur after August 15 and prior to March 1. The known nesting pair would be located prior to any activities in the Two-Forks foraging area to determine the exact location of the nest in that year (goshawk nesting pairs will use a series of several nests in the same general area and may move between these nests from year to year). If the nest location has changed, any stands being used for nesting post-fledgling habitat would be retained. Based on the results of past and ongoing surveys within the resource area for this species, effectiveness of these measures has been found to be moderate to high.

All roads opened, constructed or reconstructed for the project would be closed with a gate or barrier during project activities, and then effectively closed following project activities. All existing closure devices including gates, earthen barriers and partial road obliterations would be replaced. The road obliteration sections scheduled for reconstruction under Alternatives 2 and 3 would be replaced as soon as possible (not to exceed 3 years). After 3 years, barriers would be placed to further discourage unauthorized motorized use. These barriers may not have exactly the same placement or configuration as currently exists, but would be designed to discourage unauthorized motorized use while allowing residual project-related activities (such as planting) to be completed relatively efficiently. Every effort would be made to prevent unauthorized motorized use on reconstructed and constructed roads until obliterations and the various additional barriers can be replaced. Decommissioned roads that are reconstructed for this project would be returned to their "intermittent stored service" status (Travel Routes National Data Dictionary, Transportation Project Files). Refer to Appendix H (Transportation), for additional information. Effectiveness of these measures is considered moderate - closures would prevent disturbance, but there is a possibility of unauthorized motorized use of the closed routes.

The Lands Council and Ecology Center urged that scientifically sound snag retention requirements be used. They state that the IPNF snag guidelines are not sufficiently site-specific to the ecosystems of northwest Montana, since they are largely based on a research paper (Thomas 1979) concerning the Blue Mountains in Oregon. However, the Twomile Resource Area is located in *north Idaho*, not Montana. Region One protocol for snag retention (which allows an adaptive approach to local conditions based on a scientific understanding of the disturbance ecology involved) would be met or exceeded (USDA 2000, p. 3; PF Doc. WL-R54). Effectiveness of this is considered moderate, since snag loss could occur as a result of timber harvest and other proposed activities. Effectiveness of this measure is considered to be highly effective in preventing further loss of snags in the resource area.

Salvaging of fire-scorched trees following burning activities associated with this project could decrease habitat for black-backed woodpeckers. In the event incidental trees are fire scorched during site preparation activities, or as a result of any prescribed burning associated with the alternative management actions considered, all of the fire-scorched trees would be retained. Effectiveness is high, since retaining fire-scorched trees will create habitat.

If an alternative were selected that includes commercial timber harvest, the Forest Service's sale administrator would provide frequent direction to the timber sale purchaser regarding conditions of harvest, and would verify snag retention requirements. Effectiveness is considered moderate rather than high since some margin of error may occur and some snags or large trees may be removed for safety or other special circumstances.

Field personnel would avoid burning or cutting down snags with large cavities. Effectiveness is considered moderate to low; burning may not be prevented and cavities may not be identified.

## 2.7 MONITORING

The Lands Council and Ecology Center expressed concerns related to monitoring effects on resources and trends in the resource area. Applicable monitoring has occurred in the past, and is described in Chapter 3 as appropriate (with supporting information in the Project Files, where available by resource). The following describes future monitoring that would occur in the Twomile Resource Area.

### *Forest Plan Monitoring*

The Forest Plan documents a system to monitor and evaluate Forest activities. Monitoring and evaluation each have distinctly different purposes and scope. In general, monitoring is designed to gather the data necessary for project evaluation. During evaluation of project effectiveness, data provided through the monitoring effort are analyzed and interpreted. This process will provide periodic data necessary to determine if implementation is within the bounds of the project design (Forest Plan, page IV-7). For activities in the Twomile Resource Area, all alternatives would comply with specific monitoring requirements identified by the Forest Plan (Forest Plan, Chapter IV; and Project Files, "Monitoring"). The length of time monitoring is needed will be determined by the results and evaluation of what is being monitored. When it is certain that regulations and standards are being met, monitoring of a particular element will cease. If monitoring evaluations show that regulations or standards are not being achieved at the desired level, management intervention would occur.

### *Forest Corporate Monitoring*

In December 1999, the Ecosystem Team for the Idaho Panhandle National Forests facilitated development of a Corporate Monitoring System. The emphasis is on monitoring progress in restoring the ecosystems of the Idaho Panhandle and in being more consistent in the way we analyze effects to the ecosystems. Monitoring is tied closely to findings of the Interior Columbia Basin and Geographic Assessment. The types of data to be tracked for long-term monitoring are shown in the table below. Further information regarding corporate monitoring will be provided in the Twomile Resource Area Decision Notice (specifically related to the alternative selected for implementation).

***Table 2-9. Long-term monitoring of ecosystem core data.***

| Ecosystem condition core data monitoring element | Core data to be monitored |
|---|---|
| Hydrologic integrity | Road density (miles per square mile) |
| Water yield | Hydrologic openings (equivalent clearcut acres) |
| Sediment delivery | Crossing risk (tons of sediment) |
| Wildlife security and public access | Open road density |
| Changes in forest structure outside the historic range of variability | Forest structure by size and age-class groups |
| Changes in species composition outside historic range of variability | Forest composition by forest cover type group |
| Habitat loss and species decline | TES dry and moist/cold site habitat restoration |
| Changes in landscape pattern | Landscape pattern indicators (mean patch size and variability, edge density, etc.) |

### *Monitoring Specific to the Twomile Resource Area*

In addition to the monitoring described above, the following monitoring activities would occur specific to this project. Sale administrators and other contracting representatives monitor all timber sales to ensure that activities are conducted in accordance with contract specifications. For example, that activities occur where and when they should to protect resource such as soils and wildlife, that yarding is accomplished as planned and specified in the contract to protect soils, that seedlings are planted at the appropriate spacing, etc.

Monitoring of Best Management Practices (BMPs): BMPs would be incorporated into many different phases of the project. The district hydrologist would review the design of all proposed temporary roads and all road maintenance to assure compliance with BMPs. In addition, the engineering representative and the district hydrologist would monitor all temporary and reconditioned roads to ensure that they were built or restored to specifications. A sale administrator would visit each active cutting unit at a frequency necessary to assure compliance with the BMPs and the timber sale contract. Minor contract changes or contract modifications would be agreed upon and enacted, when necessary, to meet objectives and standards on the ground.

Monitoring of BMPs has determined that recent projects on the IPNF have been implemented as designed and have achieved the desired objectives (USDA Forest Service, 2000, IPNF Monitoring Report, p. 34-41). Additional information on monitoring for aquatic resources is provided in Appendix C.

Monitoring of Decommissioned Roads: Decommissioned roads would be checked periodically during the first year (and periodically thereafter if no problems are noted) to monitor effectiveness of erosion control, noxious weed control, and wildlife security.

Monitoring of Permanent Stream Channel Cross-sections: Cross-sectional profiles, fish presence, and dominant substrate have been measured in Twomile Creek. Measurements would continue to occur on an annual basis following completion of post-treatment activities, to determine whether any changes in stream channel morphology occur as a result of water or sediment yield increases.

## 2.8 ALTERNATIVES CONSIDERED BUT ELIMINATED

During project development, five other alternative concepts were considered but dismissed from further study primarily because they did not meet the purpose and need for the project.

***Focus on dry site stands***

The project interdisciplinary team considered an alternative that would have prescribed a combination of commercial and non-commercial treatments to remove ladder fuels and decrease stand density, focusing on dry site stands in the Twomile Resource Area. This alternative would have included maintenance activities to restore fire-adapted ecosystems in allocated old growth, with very detailed prescriptions to maintain trees per acre and basal area. Treating the stands in the upper reaches of the watershed on south and southwest facing slopes would also have been accomplished by non-commercial means (such as thinning and prescribed burning). This alternative would not have prescribe treatments in moist habitat types, so it would lack the connectivity and effectiveness to reduce fire intensities in the wildland urban interface, which would not meeting the purpose and need identified for the Twomile Resource Area.

***Focus on restoring fire-adapted ecosystems***

This alternative would have included treating stands in the Twomile Resource Area where ponderosa pine, western larch, and white pine stands are either at risk or already lost (where activities would be necessary to regenerate these species). This alternative would have included a variety of yarding methods, including helicopter, skyline, and tractor. A substantial portion of the resource area would have been treated, but this alternative would lack the connectivity of treatments in stands adjacent to the rural residences and communities, and would therefore not meet the purpose and need identified for the Twomile Resource Area.

***Focus on maintaining existing stand structure***

This alternative would prescribe treatment to reduce the risk of crown-replacing fire behavior threatening rural residences near the Twomile Resource Area and the communities of Silverton and Osburn. This approach would address connectivity of the moist habitat types to create essentially a buffer around National Forest System lands in the resource area. Treatments in the moist habitat types would reduce tree densities and remove ladder fuels, but keep enough mature residuals to maintain a forested landscape. Opportunities to regenerate historic composition and structure would in some cases be foregone with this alternative due to the lack of openings in the canopy, needed to allow establishment of shade-intolerant species. Modeling (using the Forest Vegetation Simulator model) indicated this alternative would not meet the purpose and need of reducing fire intensities, because growth in the existing structure would fall below Forest Plan expectations due to the onset of root diseases, adding to the fuel complex in the wildland urban interface. In addition, over 13 miles of new road construction would be needed to reach all of the units proposed for treatment using ground-based logging systems (skyline and tractor). This would include having to go through allocated old growth, dissecting the arrangement of the successional stage, which is inconsistent with direction from the Forest Plan.

***Focus on less than 40-acre openings***

This alternative was considered to address concerns by The Lands Council and Ecology Center with proposed units that would result in openings larger than 40 acres. While this alternative would reduce potential fire behavior in the wildland urban interface, it would not meet the purpose and need because treating just a few stands in large contiguous forested landscape would do little to modify fire behavior over the entire area. Protecting large landscapes requires land managers to develop large-scale fuel treatment patterns that more effectively reduce the potential for catastrophic fire and promote healthier forest conditions than would small treatment patterns (Graham, McCaffrey, USDA Forest Service, 2003; PF Doc. VEG-33). Therefore, this alternative was eliminated from further study.

**Focus on ground-based yarding systems**

This alternative looked at using a less expensive method of ground-based yarding systems in relation to harvest activities to reduce fire intensities in the wildland urban interface and restore fire-adapted ecosystems adjacent to rural communities near the Resource Area. This would have involved over 13 miles of new road construction to reach all of the proposed harvest units, with some of the construction on slopes exceeding 26%. This alternative would also have included roads through allocated old growth, dissecting the arrangement of this successional stage, which is inconsistent with Forest Plan direction. Therefore, this alternative was not considered in further detail.

## 2.9 COMPARISON OF ALTERNATIVES

The following briefly compares the effects of each alternative as they address issues and relate to the project objectives. It is important that the data in the tables be used as a simple comparison and not taken out of context. The decision to implement one alternative over another will mean weighing the trade-offs of benefits and effects. A detailed discussion of environmental consequences is provided in Chapter 3, by resource.

### *2.9.1 Fire/Fuels*

The following table provides a comparison of treatments and their average effects on fire behavior. The small flame lengths are indicators of reduced potential fire intensities, but cannot be used alone to determine the effectiveness of the proposed treatments. Canopy density and the associated crowning index is an issue indicator that is analyzed concurrently with potential flame lengths. The Crowning Index for the treatments is a more dramatic change, showing that on all habitat types the wind necessary to support a crown fire would increase. This change in the crowning index shows that the prescribed treatments reduce the probability of independent (crown fire burning through the crowns only) and active (ground, surface, and crown fuels all fully ignited) crown fire events.

***Table 2-10. Summary of treatments and their average effects on fire behavior.***

| | | | Average Flame Length (feet) | | | | Average Crown Index (mph) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Dry Habitat Types | | Moist Habitat Types | | Dry Habitat Types | | Moist Habitat Types | |
| | Treatment Areas | Acres | 2003 | 2015 | 2003 | 2015 | 2003 | 2015 | 2003 | 2015 |
| **Alt. 1** | no treatments | 0 | 1.8 | 2.1 | 3.3 | 3.5 | 17.8 | 18.6 | 19.5 | 25.5 |
| **Alt. 2** | thinning | 111 | 1.8 | 1.3 | 5.2 | 1.4 | 17.8 | 35.6 | 18.3 | 44.2 |
| | shelterwood harvests | 719 | 2.0 | 1.3 | 5.3 | 1.4 | 17.8 | 54.7 | 19.5 | 52.7 |
| | slash/underburn | 273 | 1.6 | 1.5 | NA[1] | NA[1] | 17.8 | 20.7 | NA[1] | NA[1] |
| **Alt. 3** | thinning | 136 | 1.8 | 1.3 | 5.2 | 1.4 | 17.8 | 35.6 | 18.3 | 44.2 |
| | shelterwood harvests | 768 | 2.0 | 1.3 | 5.3 | 1.4 | 17.8 | 54.7 | 19.5 | 52.7 |
| | slash/underburn | 274 | 1.6 | 1.5 | NA[1] | NA[1] | 17.8 | 20.7 | NA[1] | NA[1] |
| **Alt. 4** | slash/underburn | 374 | 1.6 | 1.5 | NA[1] | NA[1] | 17.8 | 20.7 | NA[1] | NA[1] |

[1] *NA: Not applicable to this project; there are not any slash/ underburn treatments prescribed in the moist habitat types, rather those treatments are in the dry habitat types where fire is able to be returned to those sites with non-commercial slashing work and slash disposal (underburning, piling, slashing).*

Essentially, the information displayed in the table above indicates that implementation of Alternative 1 (the No-Action Alternative) would continue the fire behavior trend away from historic conditions, escalating the intensity of a wildfire in the area. In contrast, the activities proposed under all three action alternatives would interrupt this trend to varying degrees. Alternatives 2 and 3 would have similar results, reducing fuel accumulations, providing opportunities for the re-introduction of fire resistant species, and reducing the potential intensity of a fire in the area. Alternative 4 would only slightly change conditions, without substantially meeting these objectives.

**Desired Flame Length: *Shorter***

Shorter flame lengths are indicators of reduced potential fire intensity

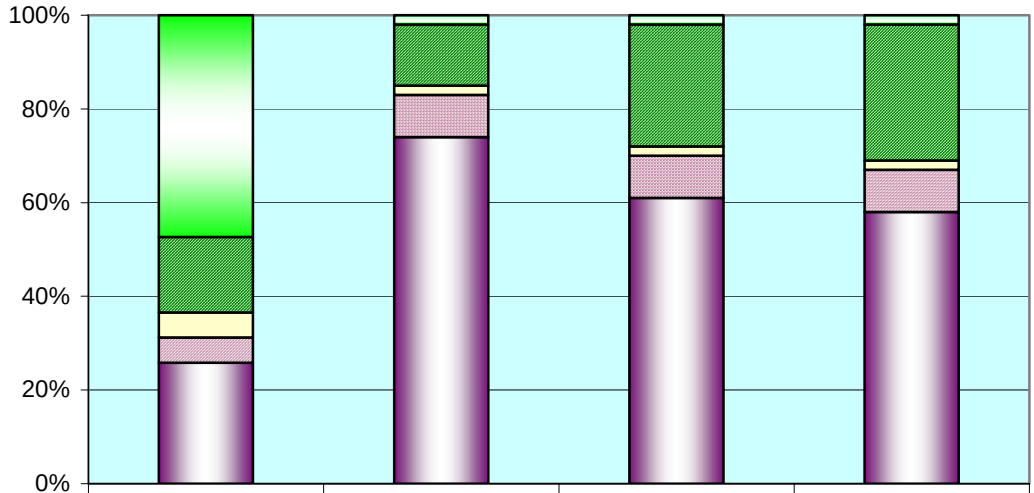
**Desired Crown Index: *Faster***

Higher speeds indicate that it would take windier conditions to result in a crown fire

## *2.9.2 Resilient Forest Ecosystem*

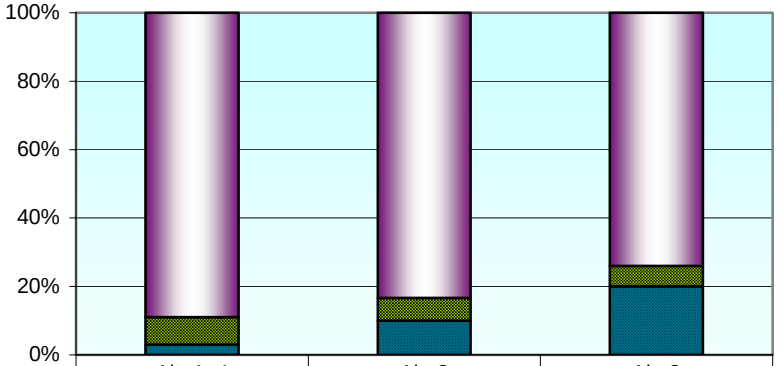
The following information compares the effectiveness of each alternative (based on issue indicators) to trend stands in the Twomile Resource Area to a more resilient condition over time as a result of proposed treatment activities. A comparison of the allocated old growth provided after implementation of activities under each alternative is displayed in the "Old Growth Management Indicator Species" discussion for pileated woodpecker in this chapter (section 2.9.9). Please refer to Chapter 3 (Forest Vegetation) for detailed discussion of each of these indicators.

***Figure 2-2. Composition (percent in each forest cover type) in the Twomile Resource Area, by alternative and historically in the Coeur d'Alene River Basin.***



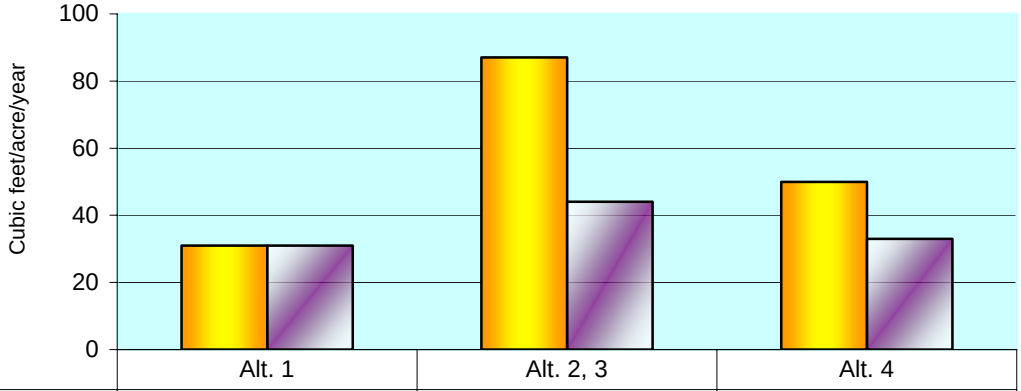

| | Historic | Alt. 1, 4 | Alt. 2 | Alt. 3 |
|---|---|---|---|---|
| White Pine | 44 | 2 | 2 | 2 |
| Ponderosa Pine/Larch | 15 | 13 | 26 | 29 |
| Lodgepole pine | 5 | 2 | 2 | 2 |
| Grand fir | 5 | 9 | 9 | 9 |
| Douglas-fir | 24 | 74 | 61 | 58 |

***Figure 2-3. Percent in each structural stage in the Twomile Resource Area, by alternative (with historical range of the Coeur d'Alene River Basin in parenthesis).***



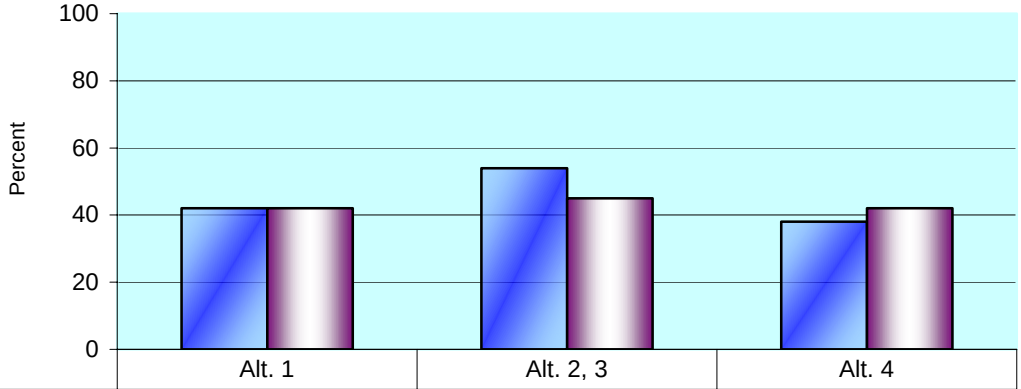

| | Alt. 1, 4 | Alt. 2 | Alt. 3 |
|---|---|---|---|
| mature/Lg (23-66%) | 89 | 75 | 74 |
| sm/med (18-50%) | 8 | 6 | 6 |
| shrub/seed/sap (15-50%) | 3 | 9 | 20 |

***Figure 2-4. Predicted growth in 100 years on treated sites and for the entire Twomile Resource Area.*** *Values for Alternative 1 represent conditions on the same sites where treatment is proposed under the action alternatives. For comparison purposes, the Forest Plan expectation is an average of approximately 74 cubic feet/acre/year under intensive management (Forest Plan, p. A-6).*



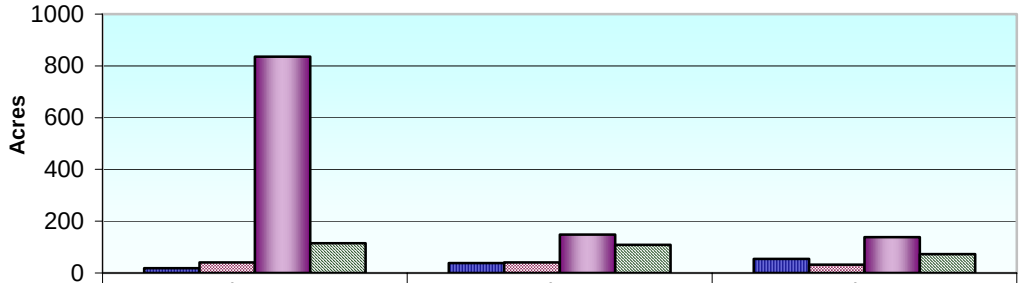

| | Alt. 1 | Alt. 2, 3 | Alt. 4 |
|---|---|---|---|
| Treated Sites | 31 | 87 | 50 |
| Twomile Resource Area | 31 | 44 | 33 |

***Figure 2-5. Percent canopy cover in 100 years on treated sites and for the entire Twomile Resource Area.*** *There is no Forest Plan expectation for percent canopy cover – it varies in the stand over time depending on age, species, etc. The values below are for alternative comparison only (Forest Plan, p. A-6). Values for Alternative 1 represent conditions given ongoing and reasonably foreseeable activities on the same sites where additional treatment is proposed under the action alternatives.*




| | Alt. 1 | Alt. 2, 3 | Alt. 4 |
|---|---|---|---|
| Treated Sites | 42 | 54 | 38 |
| Twomile Resource Area | 42 | 45 | 42 |

***Figure 2-6. Average patch size in each structural stage in the Twomile Resource Area immediately following treatment, by alternative.*** *Activities under Alternative 4 would not change structural stages.*



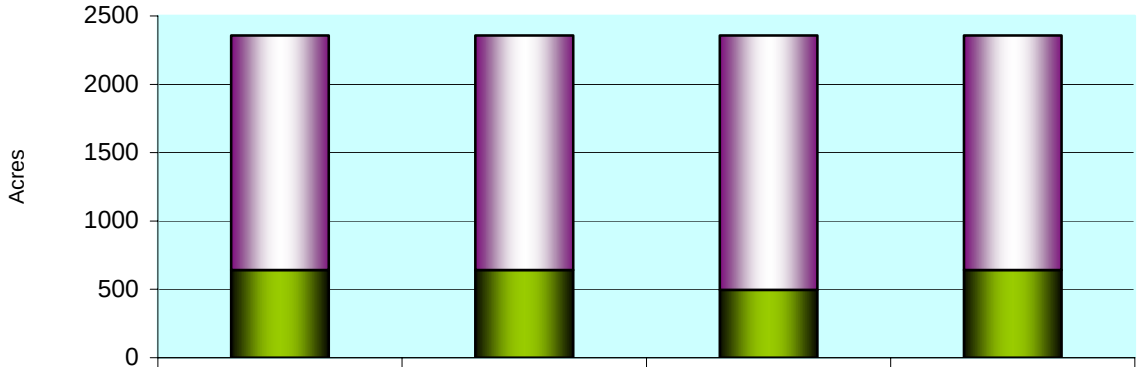

| | Alt. 1, 4 | Alt. 2 | Alt. 3 |
|---|---|---|---|
| shrub/seedling/sapling | 18 | 38 | 55 |
| small/medium | 41 | 41 | 32 |
| mature/large | 836 | 148 | 138 |
| allocated old growth | 115 | 109 | 73 |

Alternatives 1 and 4 would not substantially increase the ponderosa pine, western larch or white pine in the Twomile Resource Area, nor would these alternatives assist in the basin trend toward historic levels of these long-lived species. Alternatives 2 and 3, however, would increase canopy and growth, trending stands toward ponderosa pine, western larch and white pine. While both of these alternatives would decrease the average patch size of mature/large stands, considerably (more so under Alternative 3), the changes would be short term. Over time, the ponderosa pine, western larch and white pine would contribute to a more resilient overall structure and arrangement on the landscape.

### *2.9.3 Flammulated Owl Habitat*

The following figure compares the changes that would occur to flammulated owl habitat under each alternative. Please refer to Chapter 3 (Wildlife) for detailed discussion.

***Figure 2-7. Acres of flammulated owl habitat available in the Twomile Resource Area after implementation of activities under each alternative.***




| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Potential habitat | 1,716 | 1,716 | 1,861 | 1,716 |
| Suitable habitat | 642 | 642 | 497 | 642 |

Since there would be no reduction in suitable or potential habitat under Alternatives 1, 2 and 4, these alternatives could impact individual flammulated owls, but would not trend the species toward listing under the Endangered Species Act. However, Alternative 3 would reduce habitat, impacting the flammulated owl to the extent that the species would trend toward listing. Viability of flammulated owls could not be assured under Alternative 3.

## *2.9.4 Water Yield, Peak Flow and Sediment Yield*

**Water Yield and Peak flow:** The estimated annual water yield and peak flow is reported as the percent change above the estimated natural water yield and peak flow for the same area. Specific guidelines were applied when considering predicted changes to water yield and peak flow. For more information, please refer to the "Aquatic Resources" discussion in Chapter 3.

***Changes in Water Yield/Peak Flow***

**0 to 5%** = no measurable increase
**to 10%** = slight potential of a measurable increase
**10% or more** = definite increase

***Changes in Sediment Yield***

**0 to 10%** = no measurable increase
**10 to 20%** = slight potential of a measurable increase
**20% or more** = definite increase in measurable change

**Sediment Yield:** The estimated annual sediment loading is reported as the percent change above the estimated natural sediment yield for the same area. For more information, please refer to the "Aquatic Resources" discussion in Chapter 3.

***Table 2-11. Comparison of Changes to Peak Flow and Water Yield(% increase over existing) in the Twomile Resource Area, by alternative.***

| Indicator | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|
| **WATER YIELD** Effects of commercial harvest and resulting canopy openings on % increase in water yield. | With no loss of overstory canopy, there would be a **0% increase** in water yield in the Twomile Creek, Nuckols Gulch and Revenue Gulch waterseds. Only in the event of an uncharacteristically large wildfire would water yield increase. | Twomile **5%**<br>Nuckols **6%**<br>Revenue **2%**<br>**Range = 2 to 7%**<br>**Mean = 4.3%** | Twomile **4%**<br>Nuckols **7%**<br>Revenue **2%**<br>**Range = 2 to 7%**<br>**Mean = 4.3%** | With no loss of overstory canopy, there would be a **0% increase** in water yield in the Twomile Creek, Nuckols Gulch and Revenue Gulch watersheds. Thinning and understory removal would not cause measurable increases in water. |
| **PEAK FLOW** Effects of commercial harvest and resulting canopy openings on % increases in peak flows. | With no loss of overstory canopy, there would be a **0% increase** in peak flow in the Twomile Creek, Nuckols Gulch and Revenue Gulch watersheds. Only in the event of an uncharacteristically large fire would peak flow increase. | Twomile 7%<br>Nuckols 6%<br>Revenue 2%<br>**Range = 2 to 7%**<br>**Mean = 5.0%** | Twomile 7%<br>Nuckols 8%<br>Revenue 2%<br>**Range = 2 to 8%**<br>**Mean = 5.7%** | With no loss of overstory canopy, there would be a **0% increase** peak flow. Thinning and understory burning would not cause measurable increases in peak flows. |
| **SEDIMENT YIELD** Effects of commercial harvest and road activity on % increase in sediment yield. | With no ground disturbance associated with timber harvest, there would be a **0% increase** in sediment yield in the Twomile Creek, Nuckols Gulch and Revenue Gulch watersheds. | Twomile 4%<br>Nuckols 8%<br>Revenue 3%<br>**Range = 3 to 8%**<br>**Mean = 5.0%** | Twomile 4%<br>Nuckols 9%<br>Revenue 3%<br>**Range = 3 to 9%**<br>**Mean = 5.3%** | With no ground disturbance associated with timber harvest, there would be a **0% increase** in sediment yield in the Twomile Creek, Nuckols Gulch and Revenue Gulch watersheds. Thinning and burning in the understory would not cause a measurable increase in sediment yield. |

***Table 2-12. Comparison of Estimated Sediment Delivery/Reduction in the Twomile Resource Area, by alternative.***

| Indicator | No-Action Alternative | Action Alternatives |
|---|---|---|
| Estimated sediment **delivery** (tons) over the life of the project. All sediment sources based on from inventories data only in Twomile Creek. Modeling included timber harvesting, temporary road construction, road maintenance, road decommissioning, and post-harvest activities. | 36 | 36 |
| Estimated sediment **reduction** (tons) in the Twomile watershed, based on removal of road fill from crossings with culverts "at risk" to fail. Indirectly reflects aquatic restoration activities. | 0 | 30 |

### *2.9.5 Sediment Delivery*

**Reduction in sediment delivery risk:** The risk of sediment delivery is associated with failure at stream crossings and road construction (both temporary and permanent). The information in the following table was extracted from Chapter 3, Aquatics, Table 3-AQ-7 (Summary of estimated sediment delivery and reduction within the Twomile Resource Area). Values represent the potential reduction or addition of yearly sediment (measured in tons per year) that could be delivered at the mouth of the stream or the bottom of a reach from the inventoried transportation system, including both system and non-system roads. Risk reduction would result from the upgrading and/or removal of stream crossings.

**Changes in stream morphology and aquatic habitat:** The overall effect to channel morphology is associated with increases in water yield, sediment yield, and peak flows. As any of these dynamics of a stream change from disturbances such as those from road construction and timber harvest activities, especially in downstream cumulative effects reaches, there can be a potential response in the channel shape, bank stability, bedload deposition or channel scour. The result of those channel changes can cause reduction in pool depths, pool numbers, habitat complexity, and overall aquatic habitat quality. This issue indicator is assessed by the degree of change in channel morphology and/or aquatic habitat and the chance of whether the effects could be measured. For more information regarding these guidelines, please refer to the "Aquatic Resources" discussion and materials in Chapter 3, Appendix B, and the Project Files.

### *2.9.6 Soil Productivity*

The following compares the amount of soil disturbance that would occur under each alternative. Although no activities would occur under Alternative 1, the amount (acres) of past disturbance is displayed for each of the areas where activities would be proposed under the action alternatives. The amount of past disturbance is less under the action alternatives because none of the three would enter all of the same units.

Under Regional soil guidelines, a minimum of 85% of the activity area (in this case, harvest unit) must be maintained in an undisturbed condition. In other words, not more than 15% of the activity area can be disturbed.

***Table 2-13. Comparison of effects to soil productivity, by alternative.***

| Indicator of Effects | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Acres of past disturbance in proposed harvest unit areas | 13.3 | 8.1 | 5.9 | 4.9 |
| Acres of proposed additional disturbance in harvest units areas | 0 | 8.6 | 8.2 | 0.0 |
| Range of total percent cumulative disturbance per unit | 0.7 to 10.5 | 1.7 to 4.8 | 1.4 to 3.7 | 1.2 to 10.5 |
| Average total percent disturbance per unit | 0 | 2.4 | 1.7 | 1.3 |

No activities would occur under the No-Action Alternative, therefore there would be no new disturbance. Based on the methods, location, and amount of activities proposed under each alternative; even the greatest disturbance of an activity area would not approach the 15% Regional soil quality standard under Alternatives 2 or 3. There would be little to no effect on soil productivity under Alternative 4, since no commercial harvest or road construction would occur.

### *2.9.7 Threatened and Endangered Wildlife (Gray Wolf)*

The following table compares alternatives in terms of effects to habitat for gray wolves, the only potentially affected Threatened, Endangered or Candidate wildlife species in the Twomile Resource Area.

***Table 2-14. Comparison of effects to gray wolves, by alternative.***

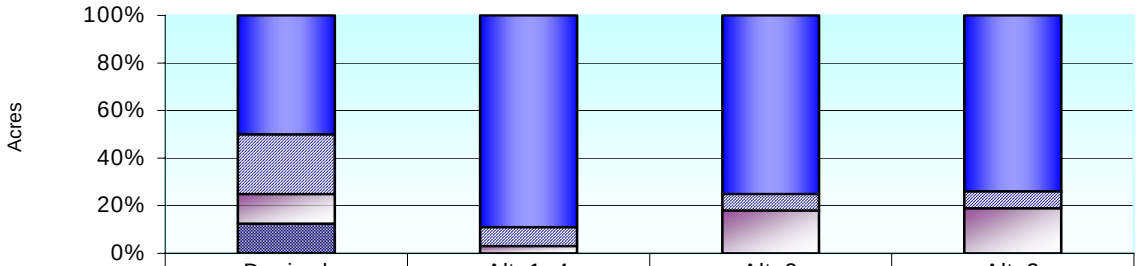
| Alternative 1 | Alternatives 2, 3 and 4 |
|---|---|
| Since none of the proposed activities would occur, there would be no effect (either beneficial or detrimental) to wolves under the No-Action Alternative. | Activities proposed under the action alternatives would benefit wolf prey species by improving forage palatability and nutrition on winter range. Therefore, activities may affect but would not likely adversely affect gray wolves or their population. Viability would be maintained, since the goal for breeding pairs has been met. |

## *2.9.8 Sensitive Wildlife*

The information below compares changes to habitat for sensitive wildlife species analyzed in detail (northern goshawk, black-backed woodpecker, fisher, wolverine, Coeur d'Alene salamander, and Townsend's big-eared bat), by alternative. Effects to flammulated owls and white-headed woodpeckers (both Sensitive species) were also analyzed in detail. Flammulated owls are addressed earlier as a key issue. Due to similar habitat requirements, effects to white-headed woodpeckers are addressed by the flammulated owl discussion as well.

***Northern Goshawk***

***Figure 2-8. Comparison of changes in stand structure for Northern Goshawk foraging in the Twomile Resource Area after implementation of activities under each alternative.***



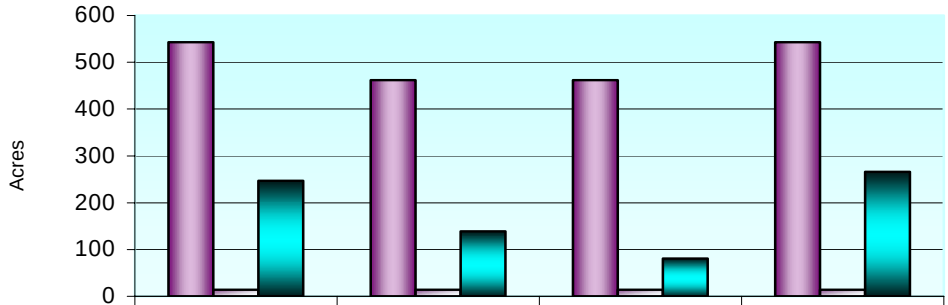

| | Desired | Alt. 1, 4 | Alt. 2 | Alt. 3 |
|---|---|---|---|---|
| Mature/old | 40 | 89 | 75 | 74 |
| Mid | 20 | 8 | 7 | 7 |
| Seedling/sapling | 10 | 3 | 18 | 19 |
| Grass/forb/shrub | 10 | 0 | 0 | 0 |

Under all alternatives, goshawk habitat in the Twomile Resource Area would continue to be low in both quantity and quality. The area would continue to provide some forage and nesting habitat in the future. Since no activities would affect suitable habitat (there is no suitable habitat in the Twomile Resource Area) and goshawks are not known to nest in the vicinity, all alternatives would impact individuals, but would not likely contribute to a trend toward listing under the Endangered Species Act. Region 1 viability criteria for goshawk would still be met under all alternatives, because Region 1 snag protocol (which exceed Forest Plan standards) would be met, dry site old growth would be maintained on the landscape, 10% of the Forest would be maintained as old growth, and the features designed to protect wildlife habitat and mitigation measures to reduce effects to wildlife would be implemented (both are described in this chapter).

***Black-backed Woodpecker***

Changes in habitat for black-backed woodpeckers are compared by alternative in the figure below. In addition to nesting and forage, burned areas are measured, since they provide foraging habitat over the short term (3 to 6 years).

***Figure 2-9. Comparison of changes in habitat acres for black-backed woodpeckers in the Twomile Resource Area after implementation of activities under each alternative.***



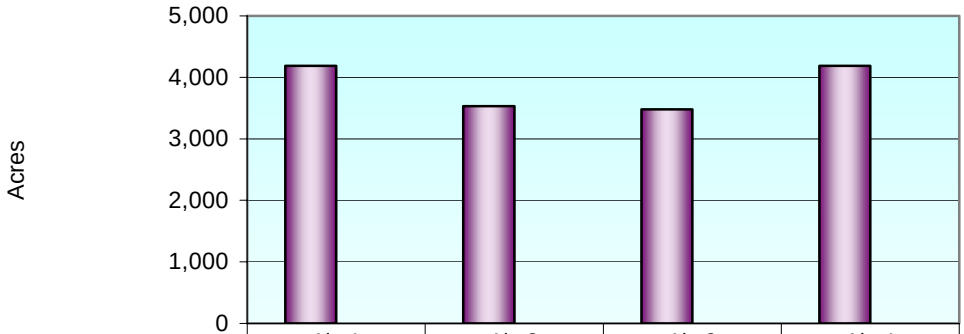

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Nesting | 543 | 462 | 462 | 543 |
| Forage | 14 | 14 | 14 | 14 |
| Burned Acres Providing Habitat | 247 | 139 | 81 | 266 |

Alternatives 1 and 4 would be very similar in effects, except that Alternative 4 would slightly increase the amount of burned area, providing additional short-term forage. The amount of nesting habitat would decrease equally under Alternatives 2 and 3 as a result of shelterwood and seedtree harvests. Both Alternatives 2 and 3 would provide fewer acres of short-term forage than Alternatives 1 and 4 (PF Doc. WL-3).

***Fisher***

Changes in habitat for fishers in the Twomile Resource Area are compared by alternative in the figure below.

***Figure 2-10. Comparison of changes to late successional habitat for fisher in the Twomile Resource Area after implementation of activities (over the short term) under each alternative.***




| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Acres | 4,188 | 3,530 | 3,482 | 4,188 |
| % of Resource Area | 89 | 75 | 74 | 89 |

Although the amount of late successional forest would not change over the short term under Alternatives 1 and 4, canopy closure in the area would continue to decline over the long term, which could decrease the value of late successional forests in the Twomile Resource Area. Alternatives 2 and 3 would both have a short-term decrease in late successional habitat, but forested habitat in the future should provide larger diameter trees due to reduced competition. There would be no impact to fisher under Alternative 1. Alternatives 2, 3, and 4 would impact individual fishers, but would not likely contribute to a trend toward listing under the Endangered Species Act, or cause a loss of viability to the population or species. The

potential impact under Alternative 4 is because activities could result in short-term displacement of fisher's prey species.

***Wolverine***

There are 3 concerns related to protecting wolverine habitat:

- ***Maintenance of large, remote areas of habitat (including denning habitat):*** *None of the Twomile Resource Area was identified as potential "refugia" (large remote areas of habitat) under the Habitat Conservation Assessment because the area lacks any designated wilderness or inventoried roadless areas. Patches of unroaded habitat in the upper Coeur d'Alene River drainage and along the St. Joe and Montana Divides would provide security and travel habitat for the species. These large patches would also help facilitate movement of wolverine between the Coeur d'Alene River Basin and Montana, where additional refugia is provided. Under all alternatives, the adjacent denning habitat and large patches (which are greater than 2,500 acres in size and more than a mile from the nearest road), would continue to provide habitat for the wolverine.*
- ***Prey populations:*** *The Twomile Resource Area provides some prey and travel habitat for the wolverine, but is not considered optimal habitat due to the lack of denning habitat and wilderness; recreational use by humans; and human settlement in the area. The most likely use of the Twomile Resource Area would be by non-denning wolverines in search of carrion. Since elk populations would be maintained under all alternatives, none of the alternatives would alter a potential carrion source for wolverine.*
- ***Incidental trapping and predator control mortality:*** *There is no trapping season for wolverine in Idaho; however, occasional trapping still occurs. This would not change under any alternative.*

Based on the above considerations, there would be no impact to wolverines under the No-Action Alternative. Alternatives 2, 3 and 4 may impact individuals or habitat as a result of proposed activities, but would not likely contribute to a trend toward listing under the Endangered Species Act, or cause a loss of viability to the population or species.

***Coeur d'Alene Salamander***

Under the No-Action Alternative, there would be no change to Coeur d'Alene salamander habitat. Under all action alternatives, stream restoration activities could alter currently unidentified habitat for the Coeur d'Alene salamander over the short term, but would improve habitat over the long term. There is a slight potential for prescribed fire to creep into a riparian buffer to benefit the vegetation there, but the possibility of this occurring in an area wet enough to support Coeur d'Alene salamanders is slim. Road decommissioning activities in the Twomile Creek drainage could impact salamander habitat over the short term, but would improve habitat over the long term by returning streamside habitat to more natural conditions, thereby maintaining or enhancing viability of Coeur d'Alene salamanders.

Based on these considerations, implementation of any alternative may impact individuals or habitat, but would not likely contribute to a trend toward listing under the Endangered Species Act, or cause a loss of viability to the population or species.

***Townsend's Big-eared Bat***

Several surveys for bats in the Twomile watershed have been conducted; the species has never been documented to occur in the watershed. Under all alternatives, mitigation measures would ensure protection of the Townsend's big-eared bat should it occur within the Twomile Resource Area.

### *2.9.9 Old Growth Management Indicator Wildlife Species*

Effects to pileated woodpecker habitat (snags and old growth) are displayed in the figures below. **Stands identified as snag habitat have an average tree diameter of 17 inches or greater, with western larch, ponderosa pine and Douglas-fir present in the stand.** Goshawks are both an old growth management indicator species and a Sensitive species; therefore effects to goshawks are disclosed under the Sensitive species discussion above.

***Figure 2-11. Comparison of snag habitat acres provided for pileated woodpeckers in the Twomile Resource Area after implementation of activities (over the short term) under each alternative.***

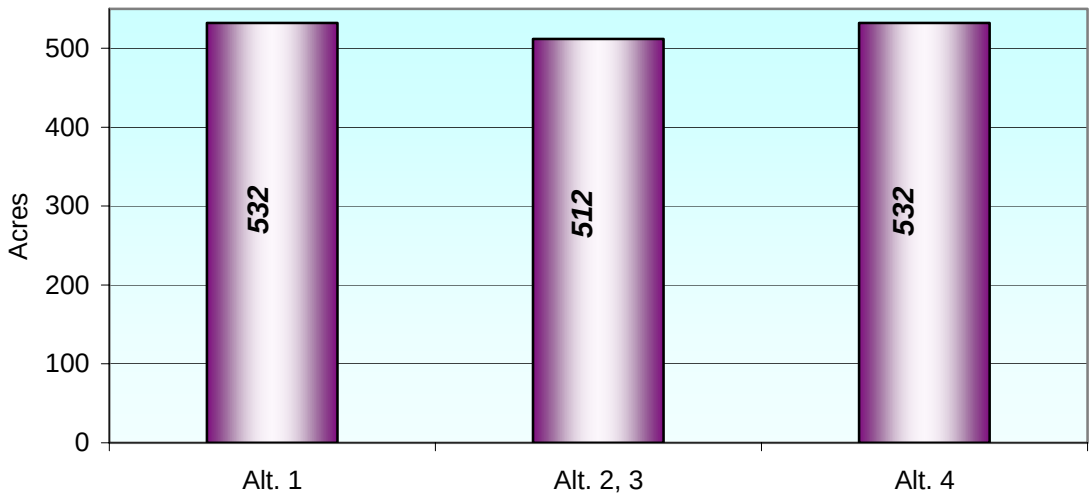
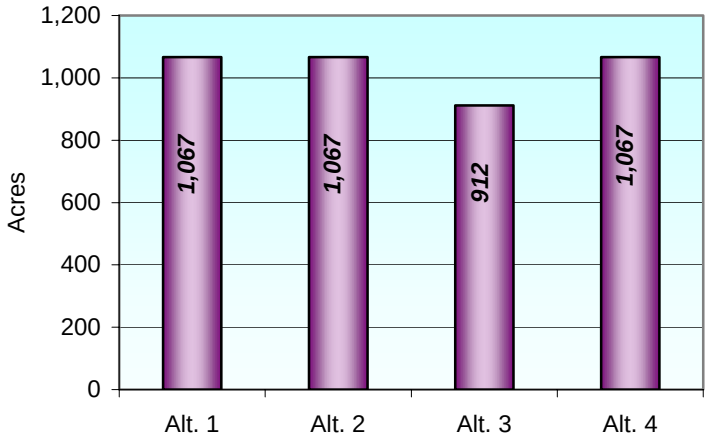



***Figure 2-12. Acres of allocated old growth (providing pileated woodpecker habitat) in OGMU 121 after implementation of activities in the Twomile Resource Area, by Alternative.***



## *2.9.10 Big Game Management Indicator Wildlife Species*

Elk habitat potential and security data are displayed in the figures below. For the action alternatives, the figures depict levels during project activities and when all activities are completed. Values for Alternative 1 represent existing levels.

***Figure 2-13. Comparison of changes to the percent elk habitat potential in Elk Habitat Unit 5 (goal is 55%).***

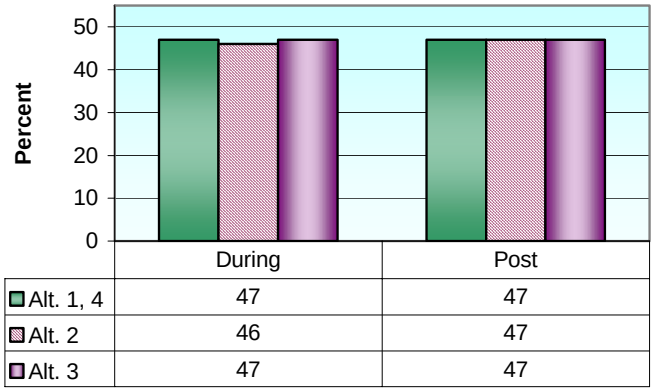



***Figure 2-14. Comparison of changes to the percent elk habitat potential in Compartment 113 (there is no set goal).***

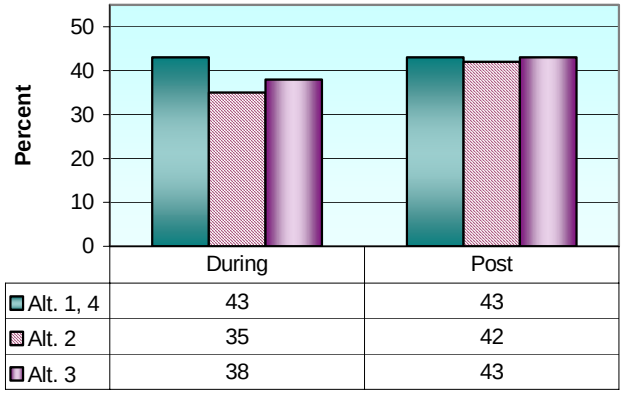
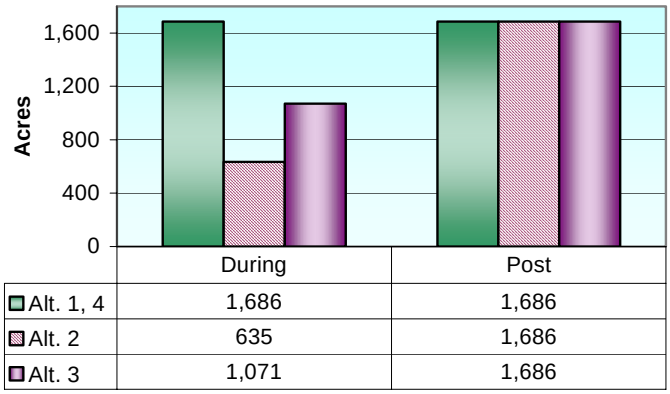



***Figure 2-15. Comparison of changes to the acres of elk security in Compartment 113.***




## *2.9.11 Recreation*

Under the No-Action Alternative, there would be no change to area trails, recreation developments or opportunities in the Twomile Resource Area. A large fire in the area might have short-term effects on trail access and maintenance due to falling timber and possible soil erosion. The primary long-term effect of a large fire would be on the scenic qualities of the area. Under Alternatives 2, 3, and 4, the proposed vegetative treatments could have short-term impacts. For example, some trails could be temporarily closed for public safety during implementation of activities. Log hauling on area roads would warrant additional caution from drivers in the area. All of the action alternatives would increase trail access to the same levels as described earlier in this chapter. The increase in additional single-track trail, ATV opportunities and co-use trails would provide safer, more enjoyable opportunities for trail users.

## *2.9.12 Scenic Resources*

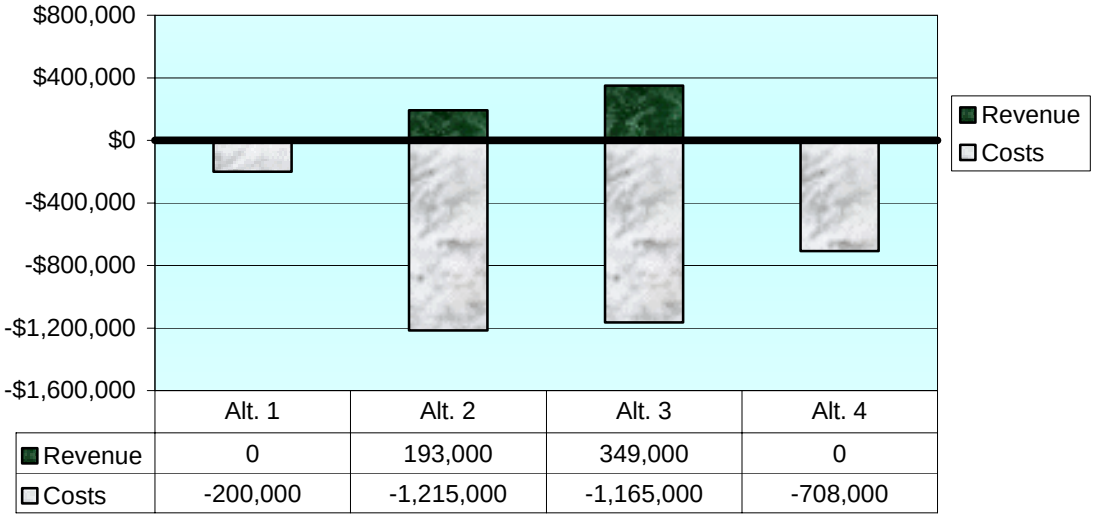
Since no activities would occur under Alternative 1, there would be no short-term effects to the scenic condition of the Twomile Resource Area. Over the long term, old harvest units would continue to recover tree growth and canopy, softening any unnatural-appearing effects of the past harvest areas. Without fuels reduction activities, the potential for more intense wildfire in the area could bring changes to the scenic

condition. Under the action alternatives, some harvest units and road construction would be visible from the community of Osburn. However, activities would be designed to meet the particular visual quality standard applicable to each area. Alternative 4 would have fewer visible areas, since no new road construction would occur, and proposed vegetation and fuels treatment would not include commercial harvest.

### *2.9.13 Finances*

The following provides a comparison of the revenue (anticipated income from the sale of timber) and costs (planning, sale preparation, activities, and sale administration) under each alternative.

***Figure 2-16. Comparison of costs and revenues associated with each alternative.***



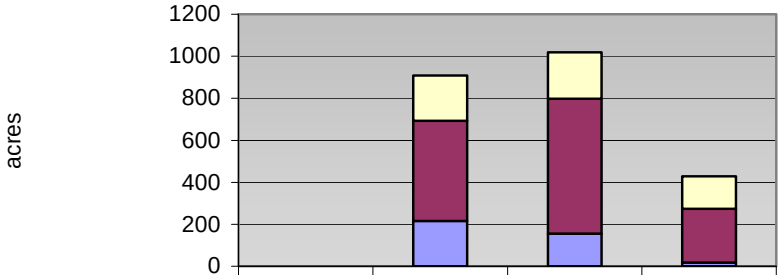

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Revenue | 0 | 193,000 | 349,000 | 0 |
| Costs | -200,000 | -1,215,000 | -1,165,000 | -708,000 |

Alternative 1 would incur $200,000 in planning and analyses costs, with no revenues generated from the sale of timber. Alternatives 2 and 3 would generate some revenue, but clearly not as much as it would cost to implement the activities. Alternative 4 would not generate any revenue, but would have more costs than Alternative 1 due to the costs of implementing the non-commercial harvest activities (such as burning and thinning). Any costs not covered by revenue would be covered by appropriated funding as it becomes available. As a result, implementation of any of the action alternatives would occur over multiple years. It is important to remember that the objective of this proposal is not to generate revenue, but to accomplish specific resource goals over the long term.

### *2.9.14 TES Plants*

This graph provides a comparison of the acres of suitable rare plant habitat potentially affected by proposed activities under each alternative.

***Figure 2-17. Acres of suitable rare plant habitat potentially affected (by guild).***




| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Grassland Guild | 0 | 215 | 221 | 154 |
| Dry Guild | 0 | 477 | 642 | 256 |
| Moist Guild | 0 | 216 | 156 | 18 |

# CHAPTER 3
# EXISTING CONDITIONS & ENVIRONMENTAL CONSEQUENCES

## 3.1 INTRODUCTION

Chapter 3 outlines the regulatory policies and guidance applicable to forest management. It also describes the methodology used for determining the current condition of the specific resources, and the changes (direct, indirect and cumulative effects) that would occur to each depending on the treatment alternative selected for implementation. The *key issues* identified in Chapter 2, and the *indicators* (used to measure change) associated with those issues will be tracked throughout the discussions on existing condition and environmental consequences.

- **Direct effects** are caused by the action and occur at the same time and place.
- **Indirect effects** are caused by the action, but occur later in time or are temporally removed from the action, but are still reasonably foreseeable (CEQ 1508.8).
- **Cumulative effects** result from the incremental impact of an action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such actions (CEQ 1508.7). Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

***In Chapter 3 you will find information related to the following resources or concerns:***

- *Forest Vegetation*
- *Fire and Fuels*
- *Aquatic Resources*
- *Soils*
- *Wildlife*
- *Recreation*
- *Scenery*
- *Finances*

*Additional information is provided in the Appendices, with supporting information in the Project Files.*

## 3.2 FOREST VEGETATION

### 3.2.1 Regulatory Framework for Forest Vegetation

The regulatory framework for the management of vegetative resources on the Idaho Panhandle National Forests includes the:

- *Idaho Forest Practices Act*
- *Multiple-Use Sustained Yield Act of 1960*
- *Endangered Species Act of 1971*
- *National Forest Management Act of 1976*
- *1987 Forest Plan*
- *Forest Service regulations and policies*
- *Forest and Rangeland Renewable Resources Planning Act of 1974*

Consistency with Forest Plan standards and legal requirements or other policies is provided at the end of the Forest Vegetation section.

### 3.2.2 Vegetation Analysis Methodology

#### A. Methodology Used to Assess the Existing Condition and Environmental Consequences

Information provided comes from a variety of sources. Information on National Forest System lands for habitat types, forest cover types, forest structural stage, origin, past harvest activity, etc. are based on existing data bases - Timber Stand Management Record System (TSMRS), R1Edit and Field Sampled Vegetation (FSVEG) - developed from stand exam information, historical records and aerial photo interpretation (PF

Doc. VEG-14). Field observations as well as silvicultural diagnosis information associated with the Twomile Resource Area are also found in the project file (PF Doc. VEG-1). The analysis area for existing vegetative conditions and to assess effects to forest vegetation follows the Twomile Resource Area boundary, except when discussing allocated old growth, for which the analysis follows the boundary of Old Growth Management Unit 121 (PF Doc. VEG-18). Information regarding existing vegetative conditions on private lands within the resource area is based on information provided by adjacent landowners, aerial photo interpretation, and observations made by project team specialists in the area.

Refer to the tables in Chapter 2 for unit-by-unit descriptions of harvest prescriptions, logging systems and fuels treatments proposed under each alternative. ArcView spatial computer software was used extensively to analyze existing conditions and compare/contrast the differences between alternatives (PF Doc. VEG-23).

***Habitat Types***

Habitat types and habitat type groups used in this analysis are from Cooper et al, 1991 (PF Doc. VEG-R4) and Biophysical Classification from USDA Forest Service, 1996 (PF Doc. VEG-2). Habitat types are part of a land classification system based on the potential climax natural vegetation that could occupy a site. Habitat types are named for the potential climax plant community or plant association, which is denoted by the climax tree species (usually the most shade tolerant tree adapted to the site) and the present or indicator undergrowth species of the plant association (Cooper et al, 1991; PF Doc. VEG-R4). The climax tree species denoted in a habitat type is not necessarily dominant, or most desired on the site. A climax plant community is rarely reached because a high percentage of forested landscapes reflect some degree of disturbance resulting in a prevalence of early seral stages. Forest Habitat Types of Northern Idaho: a Second Approximation (Cooper et al, 1991; PF Doc. VEG-R4) was the basis for determining stand habitat types in the Coeur d'Alene River sub-basin. Although every habitat type is unique in some way, they can be grouped based on similarities in natural disturbance regimes, successional patterns and structural characteristics of mature stands. This analysis uses a biophysical classification for Northern Idaho and Western Montana that was developed for sub-regional and landscape assessments analysis (PF Doc. VEG-2).

***Forest Cover Types***

Forest cover types (from the TSMRS database) describe the dominant tree species present in a stand (either by basal area dominance in stands older than seedlings or by trees per acre in seedling stands). While they are very descriptive in areas of single species forests, in multiple species forests, such as those found in north Idaho, they are less descriptive. For example, the white pine dominated forests of the Coeur d'Alene River Basin in the 1800's typically had components of grand fir, western hemlock and Douglas-fir present. These other species were either co-dominant with the white pine or more suppressed in the understory.

***Structural Stage Categories***

The structural stage categories used for this analysis are quite broad and are based on age and/or successional development of stands.

**shrub/seedling/sapling stage**

Forest stands less than 35 years old, most resulting from natural events (such as fire) or past regeneration harvests. Some stands may have a considerable number of overstory trees; others may have no large tree component. May also include stands that are non-tree cover such as shrubs and sod.

**small-to-medium stage**

Stands generally 36 to 100 years old. Quite often these stands may have resulted from fires or may represent natural regeneration left after selective removal of large overstory trees. Most can be expected to be quite dense, with high stocking levels.

**mature, large stage**

Stands over 100 years old, generally resulting from fires prior to 1900 and quite varied in appearance. Stand conditions differ in species composition, structure, and canopy closure as a result of insect mortality, root disease and other pathogens, fires, past harvest activity, or soil conditions. Stands unaffected by these disturbance events will be dense and have fairly closed canopies for the site. *A subset of the mature, large timber structural stage is allocated old growth (PF Doc. VEG-16).*

In addition, two management tools were used in the vegetation analysis. **Fragstats** is a forest vegetation model used to describe and compare landscape pattern, arrangement and patch size (PF Doc. VEG-9). **Forest Vegetation Simulator (FVS)** is a growth model used with the forest pest and fire/fuel extensions to predict forest stand dynamics through time, given variable management regimes. This model provides a variety of information including information on growth, canopy cover statistics, and fire/fuels (PF Doc. VEG-R7 and VEG-R9). FVS is a distance-independent model. Keywords, output, detailed tables of information and FVS references used in this analysis are found in the project file (PF Doc. VEG-5). FVS allows the systematic comparison across alternatives of various treatments on the landscape. Fiedler et al used a similar analysis in "A Strategic Assessment of Fire Hazard in Montana" (PF Doc. VEG-R22).

The Geographic Assessment was used in this analysis to provide information that was generated through an assessment of ecological conditions at the Coeur d'Alene River Basin scale. In characterizing the Twomile Resource Area and consequences of alternatives, a comparison can be made with the Geographic Assessment. The findings of the Geographic Assessment (pp. 28-31, 33, 36-37), are very similar to the more broad-scaled conclusions found at the Columbia Basin and Northern Region scales.

- *Disturbance and successional regimes have been altered since the Euro-settlement in north Idaho.*
- *There has been a substantial reduction in the percent of the landscape composed of long-lived early seral species such as western white pine, ponderosa pine and western larch. This is primarily the result of fire suppression, timber harvest and the introduction of white pine blister rust.*
- *There has been a major reduction in the old forest structure while intermediate aged forest has increase dramatically. This is primarily the result of fires that burned large areas in the early 1900's, timber harvest that removed older trees (with high economic value), fire suppression, and the introduction of white pine blister rust.*
- *Landscape patterns have been modified by timber harvest and exclusion of fire. Current landscape patterns are more uniform. Older structural stage patches are smaller in size. Approximately the same percentage of the landscape is in openings but the openings are more numerous, smaller in size and scattered across the watersheds.*

The purpose of the Geographic Assessment (Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin) (PF VEG-R10) was to develop a scientifically based understanding of the processes and interactions occurring in the Coeur d'Alene River Basin, so that activities can be developed to promote healthy and resilient ecosystems. In order to maintain healthy, sustainable ecosystems, it is important that species are well adapted to the environmental variability inherent in the ecosystem and to maintain forest structures necessary to support ecosystem diversity and productivity. This is consistent with the Columbia Basin Assessment (ICBEMP, 1997; PF Doc. VEG-R6), the Northern Region Overview (PF Doc. VEG-R5), 10-Year Comprehensive Strategy and Implementation Plan (PF Doc. FF-19). The Geographic Assessment identified the risks associated with conversion to shade tolerant, drought and fire intolerant species from shade intolerant, drought and fire tolerant species. Since a single resource risk cannot be considered in isolation, the Geographic Assessment identified the risks to hydrologic, aquatic, wildlife and recreation along with the interrelationships of these risks. The Geographic Assessment proposed a strategy for risk management that strove to be both integrated and adaptive. This approach is consistent with ICBEMP, the National Fire Plan and 10-Year Comprehensive Strategy. The project interdisciplinary team considered these recommendations as they developed the proposed alternatives.

The Geographic Assessment found that vegetative restoration and watershed restoration with wildlife as an additional issue are a priority for restoration. Species composition, stand structures, and their arrangement on the landscape have been altered. Species composition has changed dramatically from our understanding of historic conditions on dry and moist habitat types with increases in Douglas-fir and grand fir corresponding to

reductions in the amounts of white pine, western larch, and ponderosa pine. Dry sites found within the Twomile Resource area are not common on the Coeur d'Alene River Ranger District. Stands on drier sites are less open than historic conditions and may be more subject to lethal or stand replacement fires. Landscape patch sizes have been altered as well from historical patterns.

Based on analysis of existing conditions, the key issue related to forest vegetation in the Twomile Resource Area is the need for a healthy and resilient forest ecosystem. The effectiveness of the alternatives in addressing this issue is indicated through changes in:

1) ***Forest Composition*** *(measured by the percent of the Twomile Resource Area in long-lived seral species (ponderosa pine, western larch, and white pine), and the predicted tree growth in stands over time)*

2) ***Forest Structure*** *(measured by the percent of the Twomile Resource Area in each structural stage – shrub/seedling/sapling, small/medium timber, and mature/large timber; and the amount of canopy closure)*

3) ***Landscape Arrangement*** *(measured through changes in patterns patch sizes, and addressing openings greater than 40 acres)*

These indicators are used to assess fire resiliency and overall forest health at the stand and resource area scales. Species composition and structure are resilient when they reasonably repeat themselves given disturbance. Function of the ecosystem is connected with resiliency and is expressed best in terms of the workings of the ecosystem at various scales. A comparison of the consequences of treatment alternatives is provided, as well as compliance with Forest Plan standards and other policies (PF Doc. VEG-R3). Target stand descriptions are found in the Project Files (PF Doc. VEG-10).

## 3.2.3 Affected Forest Vegetation Environment

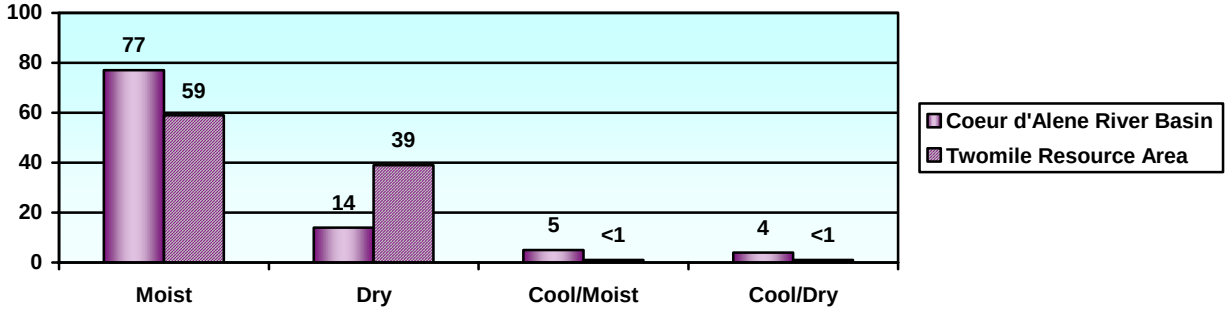
### A. Vegetative Overview

The vegetation in northern Idaho is a result of the productive ash cap soils and the prevailing climatic pattern. The climatic pattern is characterized by westerly winds that carry maritime air masses from the northern Pacific across the northern Rocky Mountains during winter and spring. Precipitation occurs mainly between November and February, with only 12 percent of the annual precipitation occurring between July and September (Geographic Assessment, page 12; PF Doc. VEG-R10). The inland maritime airflow provides northern Idaho with abundant moisture (25-55 inches per year) and moderate temperatures. Located on the western edge of the Coeur d'Alene Mountains, the Twomile Resource Area receives approximately 38 inches of moisture annually (PF. VEG-24, VEG-29). Vegetation is a fundamental part of terrestrial ecosystems. Vegetation is a basic element of wildlife habitat and is a critical factor regulating hydrologic regimes. The vegetation structures that exist in the ecosystem are a function of climate, the physical site, the plant species available in an area, the disturbance history and the successional processes that follow disturbance. Most landscapes are a mosaic reflecting the interaction between disturbance history and succession. This interaction is a keystone process shaping the landscape vegetation mosaic (Zack and Morgan, 1994; PF Doc. VEG-R11).

Habitat types are the basis of a land classification system based on the potential climax natural vegetation that could occupy a site. They serve as a land unit and classification to discuss successional patterns and development. This analysis uses a biophysical classification of habitat type groups developed for Northern Idaho and Western Montana, used for sub-regional and landscape assessments and analysis (PF Doc. VEG-2).

While moist habitat types of grand fir dominate the Twomile resource area, there is a higher proportion of dry habitats and an absence of subalpine habitats when compared to the rest of the Coeur d'Alene River Basin as a whole. This mixture of habitat types indicates that the resource area represents the dryer and warmer segment of the Coeur d'Alene River Basin.

***Figure 3-VEG-1. Percent Habitat Type Groups on National Forest System lands in the Coeur d'Alene River Basin and the Twomile Resource Area (PF Docs. VEG-6 and VEG-7).***




The interaction of successional development (as represented by habitat types) and disturbances such as fire, insects, diseases and man, are major determiners of the species composition, structure and landscape arrangement of the ecosystem. Successional development and fire are discussed below.

Moist Habitat Type Group: The habitat types of this group include the moistest of the grand fir series, and the majority of the western hemlock and cedar habitat types. This is the largest group represented in the Twomile Resource Area (59%) as well as within the Coeur d'Alene River Basin. Currently, this habitat group is dominated by the Douglas-fir cover type (74% of National Forest System lands within the Resource Area) and grand fir cover types (9%). Lodgepole and white pine cover types (each representing 2% of National Forest lands in the Resource Area) are also found on these moist habitat types. Historically, these habitat types were dominated in the Coeur d'Alene Basin by white pine stands. White pine and western larch are long-lived tree species typically established after stand replacement disturbance and have the potential to occupy a site for 200-300 years. Very high stocking and basal areas can be achieved on these types. Fire-free intervals within landscapes dominated by this habitat type group are 50-200 years or more with stand replacing fire intervals of about 200 years. Stand-replacement fires, while infrequent and displaying high fire severity variability are most common during times of drought.

Dry Habitat Type Group: These habitat types range from the driest occupied by ponderosa pine and Douglas-fir with bunch grass understories to the drier grand fir habitat types. Within the Twomile Resource Area the dry habitat type group represents 39% of the area. The most common types within this group in the Twomile Resource Area are the Douglas-fir/ninebark habitat types which are characterized in naturally functioning ecosystems by relatively open-grown stands to fully stocked stands of ponderosa pine and Douglas-fir with grass and brush understories. In the Twomile Resource Area, this group is dominated by Douglas-fir cover types (74% of the Resource Area), but also includes (among others) ponderosa pine cover types (13%). This habitat type group is usually found on south through southwest-facing slopes. Fire maintains ponderosa pine throughout its range at the lower elevations and kills ever-invading Douglas-fir and grand fir (Spurr and Barnes, 1980 PF Doc.VEGR-29). The fire-free interval for underburning was 5 to 50 years with high intensity/lethal fires likely occurring every 90-200 years.

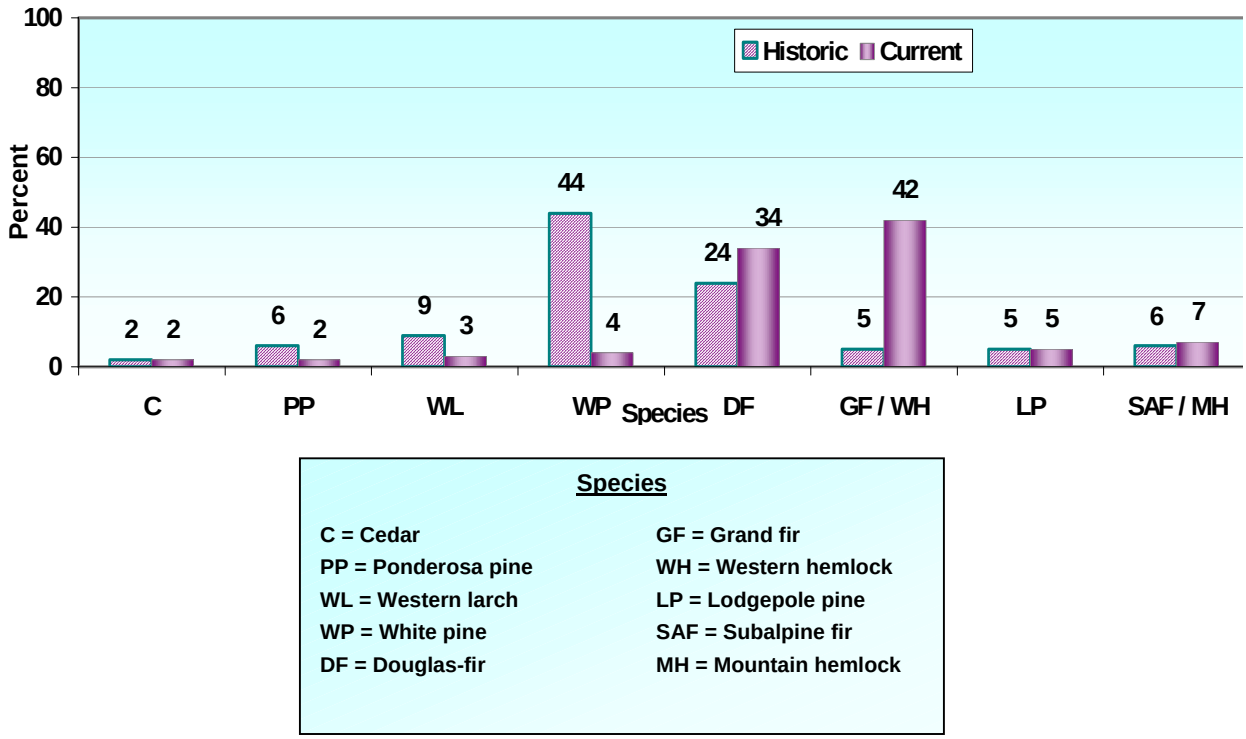
Cool /Moist and Cool /Dry Habitat Type Groups: The major forest type of this group is subalpine fir and may have cover types ranging from western larch, white pine and Douglas-fir, to subalpine fir, Engelmann spruce and lodgepole. Within the Twomile Resource Area 2% of the forested acres fall within this grouping, with the cover types for these groups consisting primarily of Douglas-fir and lodgepole pine. Because these habitat types cover such a small area within the resource area, it is difficult to reasonably determine the natural disturbance regimes in this type. Where they occupy a larger component of the landscape, fire free intervals of 50-130 years or more exist, and stand replacing fire intervals of 90 to 150 years are found.

### *Species Composition in the Coeur d'Alene River Basin*

The findings of the Geographic Assessment indicate that there has been a tremendous change in species composition within the Coeur d'Alene River Basin over the last 100 years (PF Doc. VEG-R10). This change is also consistent with the Upper Columbia River Basin (PF Doc. VEG-R6) and Northern Region Overview (PF Doc. VEG-R5). While the Forest Plan does not mandate management at the levels of historic species compositions and structures, these are helpful to understand what trends may be needed over the long term to create increased resiliency in the ecosystem. It should be recognized that it might not be desired or feasible to return to actual historical conditions.

Forest cover types describe the dominant species in the stand. Long-lived seral species (western white pine, ponderosa pine and western larch) have declined within the sub-basin as a result of fire, white pine blister rust, and harvesting that tended to remove these species while leaving species such as grand fir, hemlock and Douglas-fir. Harvest of white pine was accelerated in the late 1970's and early 1980's. Fire suppression has allowed the development of denser stands over larger areas and increases in the fuel arrangements that could lead to catastrophic fire. At the entire Coeur d'Alene River Basin scale (all ownerships), the white pine cover type has substantially declined in the past 100 years (Geographic Assessment, p. 37; PF Doc. VEG-R10), while grand fir and western hemlock cover types substantially increased (Geographic Assessment, pp. 31 and 37; PF Doc. VEG-R10). Larch forest types have also decreased, while the Douglas-fir type increased (Geographic Assessment, p. 37; PF Doc. VEG-R10).

***Figure 3-VEG-2. Current and Historic Forest Types on National Forest System lands in the Coeur d'Alene River Basin (PF Doc. VEG-6).***



### *Species Composition in the Twomile Resource Area*

Forest cover types in the Twomile Resource Area are displayed in the figure below. Given the fire history and loss of the white pine (on moist sites) and ponderosa pine (on drier sites) in this area in the last 120 years, the current forest cover types likely contain more Douglas-fir than those cover types of the early and pre-1900's. Currently, Douglas-fir dominates the dry habitat type landscapes, with a lesser amount of ponderosa pine. Douglas-fir and grand fir cover types also dominate the moist habitat types with larch, cedar and western hemlock also found on a small percentage of the moist sites. White pine and lodgepole combined represent only 4% of the forest cover types and are located on moist sites.

***Figure 3-VEG-3. Existing (%) Forest Cover Types in the Twomile Resource Area (PF Doc. VEG-7). There are no western hemlock/cedar or subalpine fir cover types in the Twomile Resource Area.***

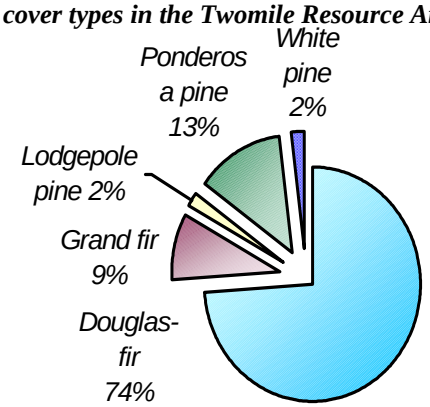
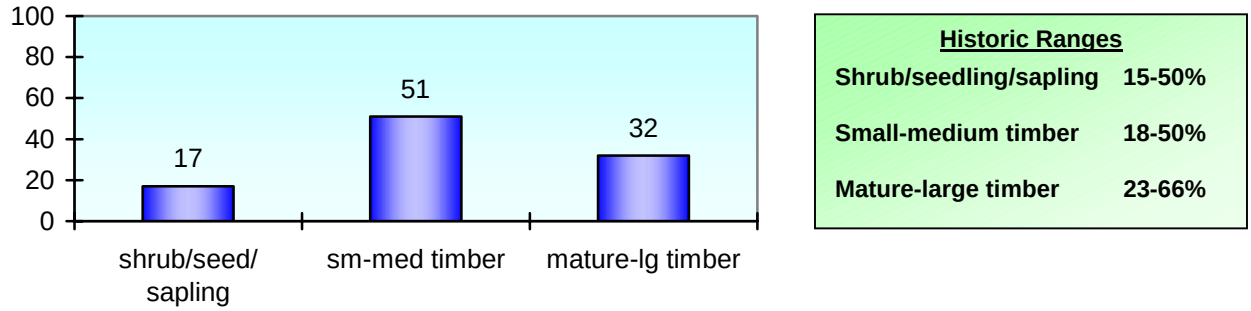


***Figure 3-VEG-4. Douglas-fir encroaching on large mature ponderosa pine in the Nuckols Gulch area.***

### *Structure in the Coeur d'Alene River Basin*

In terms of forest structure, the greatest differences in the Coeur d'Alene basin from historic range have been in the amount of small to medium sized timber and mature/large sized timber structure found on the landscape. Due to the fires early in the 1900's the small/medium sized timber structure component has increased and is now higher than the historic range. In turn, the amount of mature/large timber has declined over the last 100 years within the Coeur d'Alene Basin (although still within the historic range). This structure has trended away from landscapes dominated by closed canopies of white pine and western larch on the moist habitat types, or more open canopies of ponderosa pine mixed with western larch and some Douglas-fir on dry habitat types. Landscape conditions now tend to be dominated by varying canopy densities of grand fir, hemlock and Douglas-fir. These stands are unlikely to provide the same mature structures as stands containing large white pine, larch or ponderosa pine that was once a major component of the Coeur d'Alene River Basin. Although these stands may contain large trees and provide some old structural components, openings caused by root diseases and other pathogens and insects may be common. The mature/large timber structural stage may be more susceptible to disturbances ranging from fire to insects/diseases and windfall.

***Figure 3-VEG-5. Percent current structural stages in the Coeur d'Alene River Basin, with historical range in parenthesis (PF Doc. VEG-6).***




### *Structure in the Twomile Resource Area*

Large fires (primarily in 1889) and insect and disease mortality have helped to shape the structural stages found today. Current structural stage percentages in the resource area are displayed in the figure above. Past harvest has also had an influence, with 158 acres of harvest (3%) on National Forest System lands within the Resource Area. Twomile Resource Area has a higher percentage of mature-large timber in comparison to the overall Coeur d'Alene River Basin. This condition would be favorable if the structure was composed of resilient long-lived seral species (ponderosa pine, larch, and white pine); however, currently this is not the situation - much of the mature-large component in the Twomile Resource Area is not in a healthy or resilient condition due to the high percentage of Douglas-fir.

***Figure 3-VEG-6. Percent structural stages in the Twomile Resource Area (PF Doc. VEG-7).***

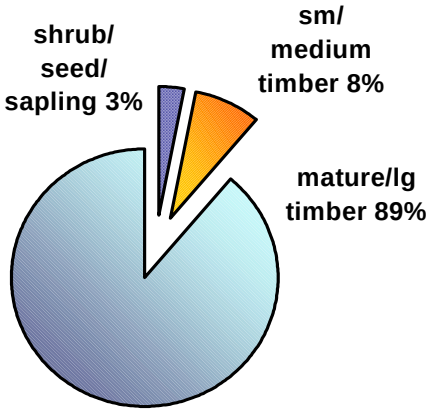


***Figure 3-VEG-7. Example of a stand in the "mature/ large" structure class, with scattered large ponderosa pine, with encroachment by small Douglas-fir regeneration.***

### *Old Growth*

Allocated old growth is a subset of the mature/large timber structural stage. Allocation of old growth within the resource area is based on Forest Plan old growth definitions, standards and direction. The entire area is within Old-Growth Management Unit (OGMU) 121, which is larger than the resource area. The current allocation for OGMU 121 contains 7.1% allocated old growth. An explanation of the methodology used for the allocated old growth analysis is found in PF Doc. VEG-16. Definitions for allocation of old growth are from the Forest Plan (page II-29), the Regional Task Force Report "Old Growth Forest Types of the Northern Region" (Green et al, 1992; PF Doc. VEG-R20) and Forest Supervisor letters of direction for implementing old growth standards (PF Doc. VEG-15).

Allocated old growth stands in the Twomile Resource Area were reviewed to validate whether they met old growth criteria necessary for allocation. The resource area was also screened for potential additional old growth stands. Stands meeting the old growth criteria were allocated and are listed in the table below. As discussed in the "Consistency With Forest Policy and Legal Mandates" at the end of Forest Vegetation in this chapter, the amount of allocated old growth exceeds the Forest Plan standard. This information, as well as screening for old growth characteristics of all proposed treatment units, is found in PF Doc. VEG-17. Location of patches is discussed in the Wildlife section of Chapter 3. The existing condition in the Twomile Resource Area allowed for allocation of some areas of dry habitat types for old growth management. These types have less allocated old growth than proportional to their distribution at the IPNF scale (PF Doc. VEG-19).

***Table 3-VEG-1. Old Growth Allocation in the Twomile Resource Area (as measured in the TSMRS database; Project Interdisciplinary Team, October 2003).***

| Stand ID | Acres |
|---|---|
| 11301013 | 44 |
| 11301014 | 57 |
| 11301015 | 64 |
| 11301007 | 17 |
| 11301004 | 7 |
| 11302031 | 26 |
| 11302030 | 30 |
| 11302029 | 36 |
| 11302028 | 44 |
| 11302023 | 86 |
| 11305014 | 68 |
| 11305022 | 45 |
| 11305021 | 79 |
| 11305023 | 82 |
| 11303028 | 63 |
| Total acres of allocated old growth within the Twomile Resource Area | **748** |
| Old growth outside of the Resource Area but still inside OGMU 121 | **319** |
| Total of allocated old growth in OGMU 121 | **1,067** |

### *Landscape Arrangement*

Of equal importance to structural stage and species composition is the arrangement of these structures on the landscape. There have been changes over the last 100 years in the size and distribution of patches across the landscape. The mean patch size has decreased since the early 1900's in the Coeur d'Alene Basin and patches have become more linear, with accompanying increases in edge and decreases in core/interior habitats (Geographic Assessment, p. 42; PF Doc. VEG-R10).

Previous to 1900, the arrangement of dry and moist habitat types likely generated more low- and mixed-severity fires in the Twomile Resource Area than was seen in the moister interior Coeur d'Alene River Basin. This disturbance pattern would have created large patch sizes (originating after more severe fires) that would

often be modified by the low and mixed severity fires. This likely led to stands on drier southern slopes having a mixture of ages and sizes, while stands on more moist aspects having the more even aged characteristics of the interior Coeur d'Alene River Basin. Regeneration harvests within the Coeur d'Alene River Basin during the 1970-1980's tended to dissect landscape patches. The Twomile Resource Area has had limited regeneration harvests on National Forest System land. The Fragstats model (PF Doc. VEG- R16) was used to determine landscape pattern. Mean patch size for each structural stage is displayed below; more complete findings and discussion of Fragstats are found in PF Doc. VEG-9.

***Table 3-VEG-2. Current Structural Conditions in the Twomile Resource Area Based on Fragstats Modeling (PF Doc. VEG-9).***

| Current Condition/Structural Stage | Mean Patch Size (acres) |
|---|---|
| Shrub/Seed /Sapling | 18 |
| Small/Medium | 41 |
| Mature / Large | 836 |
| (Allocated) Old Growth | 115 |

The mean patch size for allocated old growth meets the Forest Plan standard, as discussed in "Consistency With Forest Policy and Legal Mandates" at the end of Forest Vegetation in this chapter

**Ecosystem Disturbances**

Ecologist Aldo Leopold once referred to ecosystem health as the capacity of the land for self-renewal. It is a useful way to communicate about the current condition of the forest, especially with regard to resiliency, a part of forest health that describes the ability of the ecosystem to respond to disturbances. Resiliency is one of the properties that enable the system to persist in many different states or successional stages.

***Successional Development***

The interaction of successional development (as represented by habitat types) and disturbances such as fire, insects, diseases, and human influences are all deciding factors in the species composition, structure and landscape arrangement of an ecosystem.

***Fire in the Coeur d'Alene River Basin and the Twomile Resource Area:*** Prior to European settlement in the Coeur d'Alene River Basin, fire was the most important disturbance occurring across the landscape. Zack and Morgan (1994; PF Doc. VEG-R11) describe fire history within the sub-basin and indicated that fires covering greater than five percent of this forest occurred on an average of once every 20 years. Within the Twomile Resource Area, the majority of the acres burned in the large stand replacement and mixed severity fires of the late 1800's and early 1900's. While the 1910 fire likely had influence in the Twomile drainage, its effects are most clearly seen east of the Twomile Resource Area. The fire of 1889 spread throughout much of the Silver Valley, including the Twomile Resource Area. As a result, some new stands were initiated composed primarily of Douglas-fir with ponderosa pine and lesser amounts of white pine and grand fir that are now in the 90 – 110 year age range. Mixed severity fires produced stands with younger trees mixed with older and larger ponderosa pine and Douglas-fir trees that have survived multiple fires over the years. Zack and Morgan (1994) found there was great variation in fire frequencies, patterns, and the variation in fire severity on the landscape scale. This variation in fire severity was due to the different fuels types, burning conditions and terrain that allowed some large individual trees, patches of trees, and snags to survive even through the most severe fires. The Fire/Fuels section of Chapter 3 provides a detailed discussion of fire history in the Twomile Resource Area.

**In the absence of fire, forest insects and diseases can change forest succession by affecting tree species, size, and stand density. Insects and diseases outside of the historic disturbance range are considered signs that the functions of these disturbance agents are not resilient over the long term.**

**Approximately 46% of the Coeur d'Alene River Basin has a moderate to high probability of insect and disease agents affecting the timber vegetation (Geographic Assessment, page 29; PF Doc. VEG-R10).**

**Both insects and diseases continue to be a dynamic component of most forested acres within the Twomile Resource Area. Examination of many dead and dying trees within the Resource Area by district personnel as well as Forest Protection Staff entomologists and pathologists revealed the presence of several important diseases and bark beetles.**

***Diseases in the Coeur d'Alene River Basin and the Twomile Resource Area***

***Root diseases*** are the primary disease group found in the Twomile Resource Area. This group of diseases include: *Armillaria* and laminated root disease as well as *Annosus* and *Schweinitzii* root rot. In general, with all of these diseases, the roots are weakened to the point of eventually starving the tree of nutrients. As a result crown thinning, windthrow, breakage, beetle attacks and mortality generally follow. The combination of root diseases and Douglas-fir beetle creates the most substantial challenge to maintaining a healthy and resilient landscape species composition as well as structures of large-diameter Douglas-fir and ponderosa pine.

Historically, root diseases were a significant factor in reducing competition from Douglas-fir and grand fir to maintain western white pine, western larch, and on some sites, ponderosa pinje. Douglas-fir tended to regenerate readily in the early stages of stand development, but dropped out as a significant component due to high rates of mortality caused by root disease (Byler and Zimmer-Gorve, 1990; PF Doc. VEG-R12). At this stage of stand development, western white pine, ponderosa pine and larch have a higher level of resistance to root disease and were able to capitalize on the increased availability of growing space. Fire exclusion and the loss of these species through logging and blister rust have reduced the opportunity for early seral species to become established in root disease areas. Root disease is currently the most prominent landscape-altering process in the Coeur d'Alene River Basin (Geographic Assessment, p. 30; PF Doc. VEG-R10). Currently (in terms of forest succession), when Douglas-fir dies in moist stands, the result is an effective 50 to 150-year acceleration of succession to grand fir and hemlock. On dry sites, stands tend to cycle with continual Douglas-fir regeneration, because another seed source is not available. This condition of heavy root disease and ladder fuels promotes and increases the risk of stand-replacement fire (Northern Region Overview Detailed Report, p. 22; PF Doc. VEG-R5).

***White pine blister rust*** was introduced into this area in the early 1900's. Blister rust is a fungal disease that forms cankers on branches or stems of trees that eventually kill or weaken the tree. Eventually, white pine was infected over the entire Coeur d'Alene River Basin; trees were either killed and/or harvest was accelerated to recover their economic value. Loss of mature white pine and the continuing mortality of younger trees due to blister rust have led to the increase in Douglas-fir, grand fir and hemlock now seen across the basin. Efforts were made to control blister rust through eradication of the alternative hosts, currant and gooseberry. Although these methods had been somewhat successful in the eastern United States, topography and landscape scale in the west prevented success and the program was dropped in 1968 (Neuenschwander et al, 1999, pp. 5, 8, 10, and 12; PF Doc. VEG-R14). Emphasis has shifted to development of genetically rust-resistant trees that can be planted throughout the natural range of white pine. There have been successes, both regionally and on the district, in genetically improving tree resistance, planting those trees and then using cultural treatments like pruning to improve survival (Schwandt, Marsden and MacDonald, 1994; PF Doc. VEG-R28). These programs are continuing.

White pine blister rust is present in the Resource Area as well. Some of the blister rust mortality can be seen in the northeast facing aspects in the upper Twomile creek drainage. There are, however, some stands of thrifty white pine growing along the lower Twomile drainage on the west and northwest facing aspects. These stands will likely become a long-lived seral component in the Resource Area depending on continued resistance. Infection from blister rust has generally been low in this area of the Silver Valley, so if this trend continues, there is no reason to expect any unusual infection on any potential planted stock from the Coeur d'Alene nursery. (Schwandt,Kearns, Kegley, 2003 PF Doc. VEG-33).

***Dwarf mistletoes*** on western larch and Douglas-fir are present but generally not considered problems in the Coeur d'Alene River Basin. This is likely due to the number of mistletoe-infected trees that survived mixed severity fires. These mistletoe-infected trees then infected natural regeneration that resulted from the opening of growing space by fires. Mistletoe causes growth loss and sometimes mortality. Larch dwarf mistletoe is present in the Twomile Resource Area on some western larch, however it is a relatively small larch population overall. Since mortality from this small parasitic plant is slow in large trees the primary concern is avoiding infection in young larch, which can be killed much more rapidly. Removal of heavily infected overstory trees can help avoid infection of the understory.

***Insects in the Coeur d'Alene River Basin and the Twomile Resource Area***

***Bark beetles*** common to the Coeur d'Alene River Basin include mountain pine beetle, western pine beetle, Douglas-fir beetle, fir engravers. Short-term increases in fuel loading (due to bark beetle mortaility) may have led to increased crowning of moderate intensity fires and created small to large openings for the reintroduction of seral species. In some cases, these insect infestations may have contributed to large stand-replacing fires (Geographic Assessment, p. 30; PF Doc. VEG-R10). Historically, mountain pine beetle played a major role in mature white pine forests (Geographic Assessment, p. 29; PF Doc. VEG-R10). Outbreaks were recorded in the early 1900's that killed up to 50% of the mature white pine in some stands and spread over thousands of acres of the Coeur d'Alene River Basin. Many of the killed or infested trees were harvested or felled and burned (Geographic Assessment, p. 30; PF Doc. VEG-R10). With the decline of white pine due to blister rust and harvesting, the impact of mountain pine beetle has declined. Western pine beetles were common on drier portions of the upland forest in the Coeur d'Alene Basin, killing individual trees or small groups of ponderosa pine. In particularly dry years mortality could increase dramatically. While western pine beetles are no longer as prominent because ponderosa pine has been reduced in the overall ecosystem, areas with a high component of ponderosa pine, site-specific areas stressed by drought and/or dense stand conditions can lead to high mortality. Western pine beetle attacks both second growth and old growth ponderosa pine. Slower growing trees with poor crowns are most susceptible to beetle attack. Second-growth ponderosa pines in dense forests suffer the most mortality during outbreaks. Stands below 80-100 square feet of basal area are less susceptible to beetle attack. Currently in the Twomile Resource Area, these beetles appear to be scattered and impacting individual trees but not large groups of trees. The bark beetle conditions can change dramatically if weather events such as extreme drought, wind and or ice breakage create weakened trees and a bed of fuels conducive to beetle population build-up.

***Douglas-fir beetle and fir engravers*** have always been present throughout the Coeur d'Alene sub-basin. The substantial increase in grand fir and Douglas-fir across the landscape increased the effects these bark beetles have overall. Fir engraver beetles typically kill mature grand fir during periods of drought. The presence of root disease in many of the Douglas-fir forest types has resulted in higher endemic levels of the Douglas-fir beetle and the propensity for rapid beetle population buildups during favorable conditions (Lockman and Gibson, 1998; PF Doc. VEG-R13). Douglas-fir beetle outbreaks occur following disturbances such as windfall, snow breakage or fire. This was the case in portions of the Twomile Resource Area as well as throughout the Coeur d'Alene River Basin following the 1996 ice storm. The Douglas-fir beetle epidemic following the ice storm of 1996-97 has subsided, however some Douglas-fir mortality is still occurring in the Twomile Resource Area due to root diseases and surviving Douglas-fir beetles. The Douglas-fir beetle tends to kill the large diameter (>14" size) Douglas-fir that are 80 years of age or greater. It is important to note that the majority of the Resource Area forest trees fall within this highly susceptible species, age and diameter range. The current concentrations of mortality are located along the ridge areas and along established root disease pockets.

***Harvest in the Twomile Resource Area***

There has been minimal timber harvest on National Forest land within the Twomile Resource Area. While trees were likely cut to clear land for agricultural and mining uses. Past timber harvest has been limited due to the steep terrain, difficult access, and close proximity to communities. Commercial harvest occurred in the Brown's Ridge/Twomile Saddle area (along the northeastern boundary of the Resource Area) under the Montgomery Moon Timber Sale in 1998-99. Under this sale, regeneration harvest was accomplished on several small openings totaling 62 acres. These openings were then underburned and will be planted to long-lived seral species in the spring of 2004. In addition, 88 acres of predominantly ponderosa pine were commercially thinned and prescribe burned to maintain the ponderosa pine on the drier sites along the northern boundary of the resource area.

***Figure 3-VEG-8. One of the stands where timber harvest and prescribed burning occurred in 1998-99 under the Montgomery Moon Timber Sale, within the current Twomile Resource Area boundary.***

As shown in the table below, timber harvest occurred on a total of approximately 150 acres under the Montgomery Moon sale, removing primarily Douglas-fir, grand fir and lodgepole pine. Harvest on National Forest System land prior to this sale has been limited to scattered removal of timber in conjunction with mining work that occurred over the last century on several of the mining claims found throughout the Resource Area. Some of the very early logging (1890-1960) took place with horses.

The timber stand management resource system (TSMRS) database contains information concerning management and harvest in the Twomile Resource Area from about 1960 to present. Acre figures in the database represent harvest activity acres, not stand acres. While some scattered harvest did take place prior to 1960, harvest records previous to 1960 are not available and are not included here. Few stands may have had multiple harvests during the last 100 years. Clearly, however, existing conditions reflect past harvest.

Multiple entries into stands for stand tending, commercial thinning, salvage, etc. is considered silviculturally sound and should be expected in managed stands. While a few stands may have had multiple entries, it is not possible to track in the current database if the same acres were harvested on the re-entries because stands are often larger than recorded activity acres. The table below displays the database activity acres of harvest since about 1960.

***Table 3-VEG-3. Harvest Activities From 1960 to the Present in the Twomile Resource Area (based on TSMRS activity acres; PF Doc. VEG- 14).***

| Decade | Liberation Harvest Acres | Thinned Harvest Acres | Seedtree Harvest Acres | Shelterwood Harvest Acres | Total Harvest Acres |
|---|---|---|---|---|---|
| 1960-1970 | 8 | 0 | 0 | 0 | 8 |
| 1971-1980 | 0 | 0 | 0 | 0 | 0 |
| 1981-1990 | 0 | 0 | 0 | 0 | 0 |
| 1991-2000 | 0 | 88 | 6 | 56 | 150 |
| 2001-2010 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **8** | **88** | **6** | **56** | **158** |

***Table 3-VEG-4. Acres of additional non-harvest activities from 1960 to the present in the Twomile Resource Area (PF Doc. VEG-14).***

| Decade | Eco/Wildlife Burn | Planting | Total Non-Harvest Activity |
|---|---|---|---|
| 1960-1970 | | | 0 |
| 1971-1980 | | | 0 |
| 1981-1990 | 71 | 40 *(brushfield planting)* | 111 |
| 1991-2000 | 50 | | 50 |
| 2001-2010 | | | 0 |
| **Total acres** | **121** | **40** | **161** |

The table above displays acres of underburning accomplished within the past 20 years to enhance wildlife browse. Also some planting was completed to increase the long-lived seral species component in the Twomile drainage.

Suitability: An analysis of suitability for resource management was completed for the Twomile Resource Area (Forest Service Handbook 2409.13; PF Doc. VEG-3). This analysis found 6.5% of the resource area's National Forest land was not suitable for resource management because of regeneration concerns. These areas average less than 13 acres in each patch. The arrangement of the unsuitable areas is scattered across the resource area. Harvest unit layout would consider any suitability limitations on a site-by-site basis that may be found within any proposed treatment units. An analysis was completed in the resource area for suitability and regeneration success (PF Docs. VEG-3 and VEG-4). Suitability in this analysis refers to the suitability of lands for resource management, with focus given to reforestation potential and long-term impacts to the soil.

Artificial Regeneration Success: An analysis was completed as to the success of regeneration of harvests that have occurred since 1976 on the Coeur d'Alene River Ranger District (PF Doc. VEG-4). Overall success is 98%; success within 5 years is 83%. Regeneration success was also considered within Stand Compartments 112 and 113. Compartment 112 lies directly west and adjacent to the Twomile Resource Area, and Compartment 113 covers the Resource Area. A small sample of plantations were reviewed and confirmed as certified with adequate regeneration stocking (PF Doc. VEG-28).

***Forest Characteristics on Private Lands***

Private lands make up about 2927 acres of the resource area. Most of the southern third of the Resource Area is private land of mixed private ownership. The habitat types on private land are similar to those of the National Forest System lands, with a mixture of moist grand fir and the drier Douglas-fir and grand fir series. Forest cover types are generally Douglas-fir, grand fir and ponderosa pine. Structural stages are a combination of seedling/sapling, and mature timber sizes.

There has been harvest on private land particularly within sections 15 and 16 of the Resource Area as well. A large block (of approximately 250 acres) of private land north of Revenue Gulch has been thinned/shelterwood harvested in the last 25 years, and is currently an open stand of mixed mature Douglas-fir and ponderosa pine now dominating the site. Another large private block (of approximately 160 acres) in the Nuckols Gulch area has been harvested in the last 5 years with a clearcut type harvest, which will most likely regenerate naturally to grand fir and Douglas-fir. In addition, it is likely that some root disease and Douglas-fir beetle mortality will continue to occur on private lands within the Twomile Resource Area since they are present on National Forest System lands (ranging from very broad areas of single trees to pockets of trees killed).

## 3.2.4 Environmental Consequences to Forest Vegetation

As stated in the Methodology discussion, the key issue related to forest vegetation in the Twomile Resource Area is the need for a healthy and resilient forest ecosystem. The direct and indirect effects to Forest Vegetation are discussed in detail by alternative, and displayed in summary tables that track the changes to

the three ***issue indicators*** for Forest Vegetation. Following the summary tables, cumulative effects to forest vegetation in the Resource Area is described, concluding with the "Consistency with Forest Policy and Legal mandates" section. The effectiveness of the alternatives in addressing this issue is indicated through changes in:

- ***Forest Composition*** *(measured by the percent of the Twomile Resource Area in long-lived seral species (ponderosa pine, western larch, and white pine), and the predicted tree growth in stands over time)*
- ***Forest Structure*** *(measured by the percent of the Twomile Resource Area in each structural stage – shrub/seedling/sapling, small/medium timber, and mature/large timber; and the amount of canopy closure)*
- ***Landscape Arrangement*** *(measured through changes in patterns patch sizes, and addressing openings greater than 40 acres)*

## *A. Direct and Indirect Effects to Forest Vegetation Under Alternative 1 (No Action)*

Under the No-Action Alternative, there would be no activities to restore forest vegetation toward increased resiliency. Since the resource area has two relatively distinct habitat type groups (moist and dry), two general trends would be expected to occur:

***Direct and Indirect Effects to Structure and Species Composition Under Alternative 1***

***Moist sites*** represent approximately 59% of the National Forest lands within the Resource Area. The short-term effects of the Alternative 1 include continued losses of Douglas-fir, and grand fir as root diseases, decay and insects continue to cause deterioration of stands dominated by these species. Even if fire were to create sites for regeneration of early seral species (such as white pine and western larch), mortality due to insects and diseases as well as past harvest have limited seed sources in some areas. Over the long term, the limited component of western larch now present would likely decline since it is often dominated by other species in dense mature stands. The health of the white pine component will depend upon its genetic level of resistance to white pine blister rust in the future. Douglas-fir and grand fir would likely become increasingly dominant components in the Twomile Resource Area. Large diameter Douglas-fir would gradually become less prevalent due to root disease and Douglas-fir beetle mortality. This mortality would likely continue to increase as stands age, and as older stands trend toward more pure Douglas-fir, grand fir, and some hemlock. In the absence of natural disturbance such as fire, regeneration to fill gaps in the canopy would be limited to the same species as the overstory (Douglas-fir and grand fir).

The Forest Vegetation Simulation modeling – FVS (discussed under Vegetation Analysis Methodology 3.2.2) is used to help illustrate trends in canopy and growth over time with no management action on both moist and dry habitat types within the Twomile Resource Area (PF Doc. VEG-11, VEG-13). FVS indicates current canopy cover is at an average of 55% (please refer to the figures below). Without management, the canopy trend for the next 100 years would decrease to a level in the 47% range, which is below the canopy level that these sites are capable of supporting if given ponderosa pine, larch and white pine were on the site.

On ***dry sites*** (approximately 39% of the National Forest land within the resource area), root disease, decay and insects would also continue to cause deterioration of the stands dominated by Douglas-fir. Douglas-fir would not necessarily become less prevalent on the dry sites, as the lack of moisture limits regeneration to primarily Douglas-fir, ponderosa pine, and some grand fir. Growing space opened by the recent Douglas-fir beetle mortality would most likely regenerate to Douglas-fir as that is the main seed source, and growing conditions on site do not exist for a change in species. Large diameter Douglas-fir would gradually become less prevalent and less likely to achieve old forest structure.

If fire were to create sites for regeneration of long-lived seral species of ponderosa pine and in some cases western larch, the lack of seed source in some stands would limit this regeneration. Over the next 100 years,

canopy would decline from the present levels of 54% to approximately 34% (please refer to the figures below). Structure would be patchy with heavy regeneration of various sizes under a mostly open overstory canopy.

***Figure 3-VEG-9. Percent canopy cover on moist habitat types under the No-Action Alternative.***

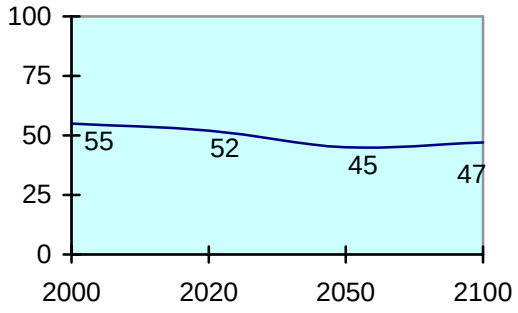
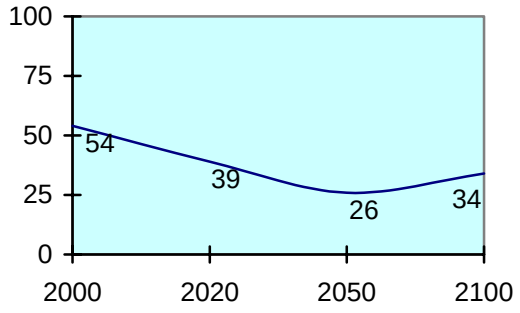



***Figure 3-VEG-10. Percent canopy cover on dry habitat types under the No-Action Alternative.***




Volume growth is also an indicator of forest health, particularly productivity, and is expressed in cubic foot volume per acre per year. Over the next one hundred years, growth on moist habitat types would fluctuate between the current level of 49 cubic feet per acre per year and approximately 9 cubic feet per acre per year and end in 33 cubic feet per acre per year in 2100. Currently growth is about half of Forest Plan projected expectation of approximately 90 cubic feet per acre per year under intensive management (Forest Plan, p. A-6). Growth on dry habitat types over the next one hundred years would fluctuate between the current average of 5 cubic feet per acre per year to approximately 27 cubic feet per acre per year. The Forest Plan growth expectation for these dry types is 50 cubic feet per acre per year under intensive management. (Forest Plan, p. A-8). The low growth rate on dry habitat types reflects the loss in overall growth due to mortality in the Douglas-fir.

***Figure 3-VEG 11. Growth (cubic feet per acre per year) on Moist Habitat Types Under the No-Action Alternative.***

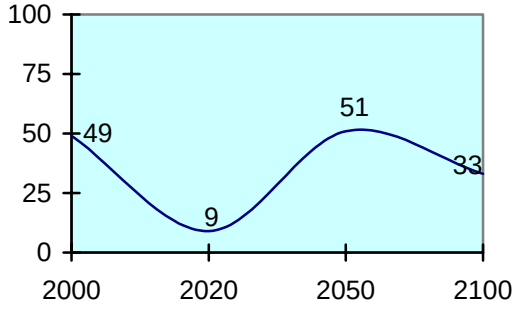
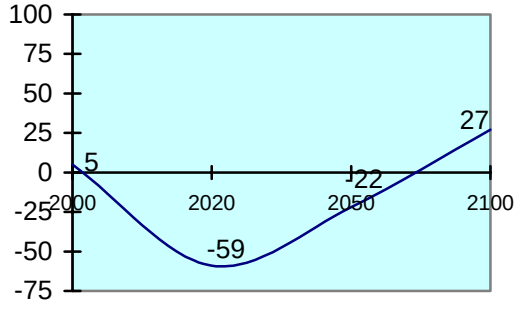



***Figure 3-VEG-12. Growth (cubic feet per acre per year) on Dry Habitat Types Under the No-Action Alternative.***




***<u>Direct and Indirect Effects to Landscape Arrangement Under Alternative 1</u>***

As described in the Affected Environment section, the existing patch size of the mature/large structural stage is quite large as a result of the 1889 and subsequent fires near the turn of the century. Without major disturbance, the existing patch sizes and landscape patterns would remain similar to the existing condition. Therefore, under the No-Action Alternative, some changes in structure within the patches/patterns can be expected, as illustrated in canopy changes in figures above. There would be more regeneration of various sizes mixed with fewer large overstory trees. Over time, these large patches would be less resilient to insect, disease and fire disturbance.

## *B. Direct and Indirect Effects to Forest Vegetation Under Alternatives 2 and 3*

The effects under Alternatives 2 and 3 would be similar since both alternatives propose similar numbers of acres of regeneration harvests (Alternative 2 would treat 1,104 acres, Alternative 3 would treat 1,178 acres). Both would use a combination of commercial thinning harvest and non-commercial activities to restore and trend forest vegetation toward increased health and resiliency.

***Direct and Indirect Effects to Structure and Species Composition under Alternatives 2 and 3***

These treatments would create more desirable fire-adapted structures and increase the long-lived seral species component in the Resource Area. Treatments such as pre-commercial thinning, pruning, slashing and underburning will be necessary in 20 years to maintain the desired forest structure. By removing dense smaller diameter trees, the large diameter trees left on site would be less threatened by potential fire or insect disturbance. Underburning would further reduce ladder fuels and prepare sites for underplanting where regeneration treatments are prescribed to re-establish long lived seral species. Variability would be substantial within treatment areas because the amount of tree retention would be based on available components. Wildlife, aquatic and visual concerns also play a part in maximizing tree retention on sites while trending the area overall toward restoration and reducing potential fire intensities. These alternatives would require re-entries over the next 10-50 years for precommercial thinning and slashing and burning of ladder fuels in the understories. Additional stands may need commercial thinning or regeneration treatments in the future depending on the disturbances and mortality they may experience.

All regeneration harvests would be planted with a combination of ponderosa pine, larch and white pine. This alternative would establish, grow and trend toward long-lived early seral species (ponderosa pine, western larch and white pine) in stands totaling approximately 900 acres of the Twomile Resource Area. This would result in about 19% of the National Forest lands within the resource area managed for these species in addition to the existing of 17%. Approximately 29 to 35% of the harvest in these alternatives would focus on the drier sites in the resource area. The ponderosa pine cover type would increase from the existing 13% to 26% under Alternative 2.

**Effects of Thinning Under Alternatives 2 and 3:** In general, a commercial thinning is an intermediate stand treatment that harvests lower crown classes with the objective of improving growth and vigor of the trees. The intent of the thinning treatments in the Twomile Resource Area is to maintain resilient amounts of the overstory canopy present on the site, particularly the long-lived seral species ponderosa pine and larch, and white pine while reducing the crown bulk density for fuels reduction. Within the thinned areas, approximately 75-130 overstory trees would be retained per acre. An estimated 40 to 60% total canopy cover would be retained at harvest. As displayed in the figures below, FVS modeling predicts an estimated canopy cover of 61% on dry sites and 55% on moist sites (PF Doc. VEG-21). Over the long term, canopy would be expected to be approximately 30 to 60% depending on whether it is a dry or moist habitat type. Following harvest, prescribed fire would occur throughout portions of these treatment units to reduce harvest related fuels as well as reintroduction of fire as a disturbance agent. A post-harvest site assessment previous to understory treatments would be made to assure successful use of the prescribed fire treatment. It is expected that about 60% of the commercially thinned acres would require treatment such as understory slashing, and hand piling before prescribed burning. Approximately 10-15% mortality of overstory trees would be anticipated as a result of prescribed burning.

***Figure 3-VEG-13. Percent canopy cover in thinning units on dry habitat types under Alternatives 2 and 3.***

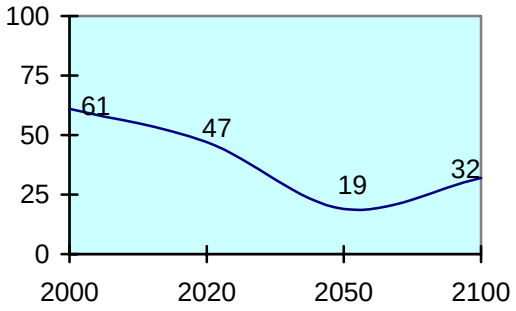



***Figure 3-VEG-14. Percent canopy cover in thinning units on moist habitat types under Alternatives 2 and 3.***

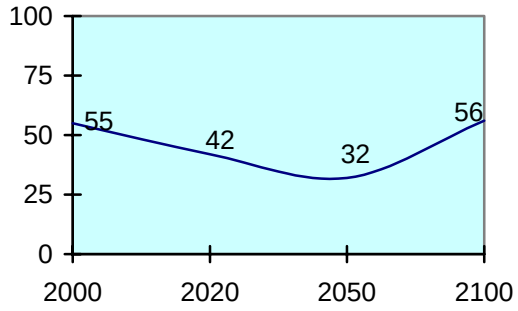



***Figure 3-VEG-15. Predicted growth (cubic feet per acre per year) in thinning units on dry habitat types under Alternatives 2 and 3.***

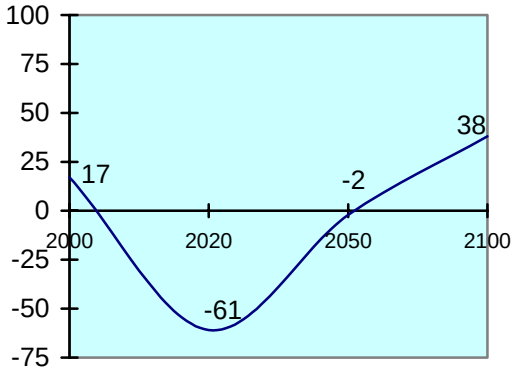
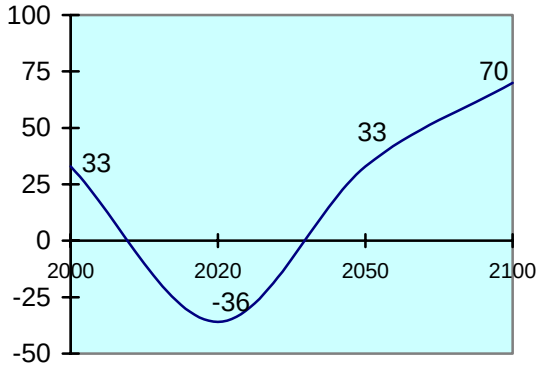



***Figure 3-VEG-16. Predicted growth (cubic feet per acre per year) in thinning units on moist habitat types under Alternatives 2 and 3.***




**<u>Direct & Indirect Effects of the Shelterwood, Group Shelterwood and Seed Tree Harvests Under Alternatives 2 and 3</u>:** Growth would be improved long-term over no management activity with a thinning treatment on both dry and moist sites (PF Doc. VEG-22). Growth however would still fall below Forest Plan expectation for these habitat types in year 2100. The drop in growth near year 2020 can be attributed to additional Douglas-fir mortality expected to follow the thinning of Douglas-fir. These treatments are regeneration type harvests in which the best ponderosa pine, Douglas-fir, larch and white pine trees remain following harvest to supply seed and shelter for the regenerating stand. These treatments allow for the removal of trees at risk of mortality due to root disease and bark beetle activity. They also allow for removal of small diameter, suppressed Douglas-fir and grand fir that cause the stand to be less resilient to fire. The treatments are intended to initiate stands with a species composition and structure that is conducive to regeneration of long-lived seral species (ponderosa pine, larch and white pine) and periodic underburning. These treatments (in addition to supplemental plantings where necessary) are appropriate to meet overall objectives given the highly variable arrangement of components on the ground.

Opening sizes would range from 10 to 225 acres (when combining new openings with existing openings on both National Forest land and private land within the Twomile Resource Area). Approximately 10-50 overstory trees would be retained per acre now and over the long term for structural diversity. In the group seed tree treatment areas approximately 5-10 trees per acre will be retained over the long term. Prescribed fire would be used to reduce post-harvest fuel loading and to reduce shrub competition sufficient to allow establishment of planted seedlings. Overstory removal would permit shrubs to develop a dense, long-persisting layer that competes with

establishing tree seedlings (Cooper, Neiman and Roberts, 1991; PF Doc. VEG-R4). Special attention would be made in every phase of reforestation on these brush-prone sites to assure success.

An estimated average 10 to 15% of overstory trees would likely be killed during prescribed burning but would still provide shade and shelter to harsher sites. Trees retained would not be removed unless they pose a hazard to forest workers.

Under Alternative 2 these treatments would result in a substantial improvement in species composition in treatment areas over what would occur with no management. As displayed in the figures below, canopy cover would increase long term with these treatments, surpassing what would occur under both Alternative 1 (No Action) and Alternative 4 (with non-commercial underburning). Within the shelterwood sites, species composition in 100 years would be dominated by maturing ponderosa pine and larch, with white pine and Douglas-fir as well. With tending treatments, these sites would display canopies in the 60-65% range of (more or less) single-story stands with shrub understories. Stand treatments focused on species compositions dominated by the long-lived serals (ponderosa pine, western larch and white pine) would put treated sites on a trend to attainment of desired characteristics for dry sites in this area.

Due to their fast initial growth, early seral species such as larch, white pine, ponderosa pine and lodgepole pine as well as Douglas-fir on some sites gain an advantage over their shade tolerant counterparts and could dominate sites for many years. Ponderosa pine often survived over the long term because it was more fire resistant (particularly to underburns) than other species on site. Lodgepole pine has a relatively short life span and was likely to fade from stands as their age reached 90-120 years (Zack and Morgan, 1994: PF Doc. VEG-R11). Douglas-fir, although potentially long lived, was also likely to fade from stands as the trees reached maturity due to root disease (Zack and Morgan, 1994; PF Doc. VEG-R11) and (Byler, 1990; PF Doc. VEG-R12). Some mortality (due to insects and diseases) could potentially change canopy and structure over this period if extreme weather events such as ice or windstorms occurred allowing beetle populations to build rapidly. Harsh sites or sites a long distance from seed sources may have remained shrub fields for very long periods of time.

***Figure 3-VEG-17. Percent canopy cover in shelterwood units on dry habitat types under Alternatives 2 and 3.***

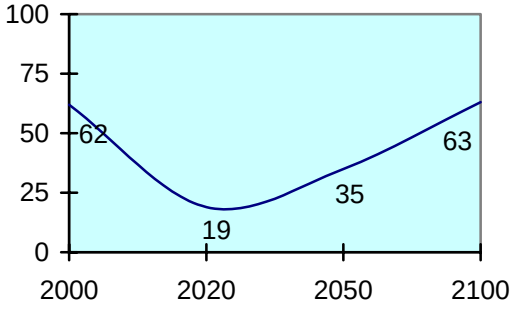



***Figure 3-VEG-18. Predicted growth (cubic foot/acre/year) in shelterwood units on dry habitat types under Alternatives 2 and 3.***

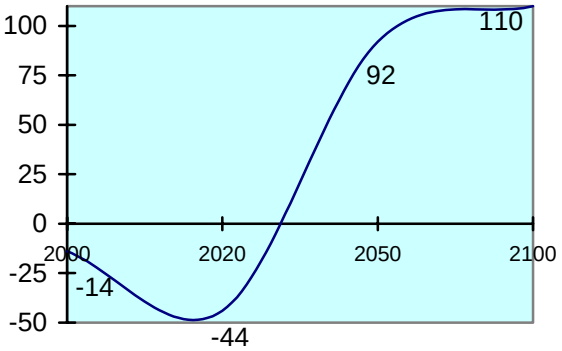


***Figure 3-VEG-19. Percent canopy cover in shelterwood units on moist habitat types under Alternatives 2 and 3.***

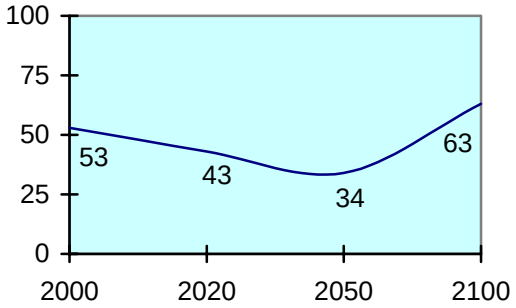
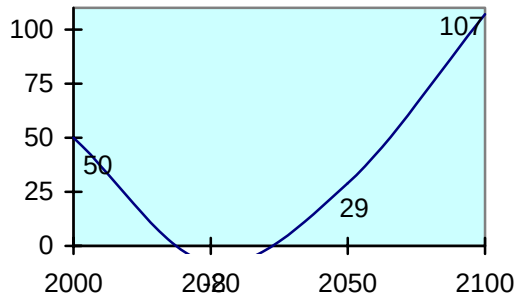



***Figure 3-VEG-20. Predicted growth (cubic feet per acre per year) in shelterwood units on moist habitat types under Alternatives 2 and 3.***




As shown in the figures above, growth would drop in the short term but clearly improve more long-term under Alternatives 2 and 3 than under Alternatives 1 and 4. Alternative 2 would bring the growth rate of the treated sites in the Twomile Resource Area to exceed the level of Forest Plan expectations of 50 and 90 cubic feet per acre per year on dry and moist sites respectively (Forest Plan Appendix A; PF Doc. VEG-R3). Growth would be over 100 cubic feet per acre per year, which exceeds the level of Forest Plan expectations for dry and moist habitat types combined (Forest Plan Appendix A; PF Docs. VEG-R3 and VEG-22). The proposed treatment would reintroduce fire and increase the likelihood that the vegetative components retained would be resilient into the future.

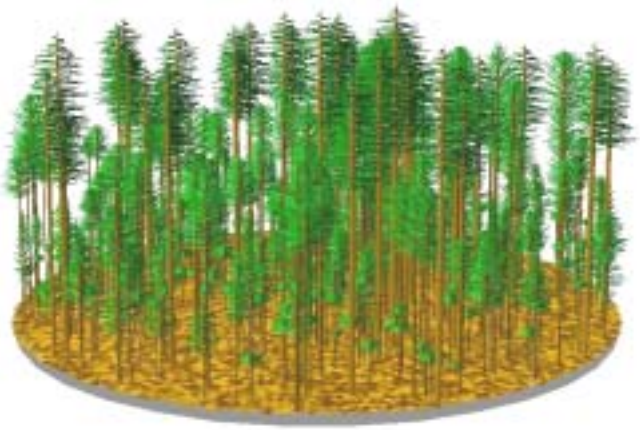
***Direct and Indirect Effects to Landscape Arrangement Under Alternatives 2 and 3***

The prescribed treatments trend the treatment patches toward the size and extent of our understanding of fire disturbances before the 1900's on these landscapes. No single thinning or management prescription will achieve multi-resource objectives across all stands within a landscape. Silvicultural systems using density and species management, along with the judicial use of prescribed fire, are key to managing western forests (Graham, et al, 1999; PF Doc. VEG-R27). Treatment areas are in connected blocks, many of which lie adjacent to private ownership.

Thinning and shelterwood type harvests are intended to simulate the extent and stand arrangement of fire disturbances that occurred historically in this area, and provides for the retention of individual trees and groups of trees that may have survived a fire. Harvest does not duplicate all aspects of fire disturbances because trees killed by fires prior to Euro-American settlement were not harvested. Generally with fire disturbances before the early 1900's the dead trees remained standing until decay progressed to a point where they fell over. Some snags may have stood for decades. Regeneration was dependent on surviving, scattered remnant trees (usually fire-resistant species), seeds that survived on dying trees, or seeds carried by wind and animals from adjacent unburned stands.

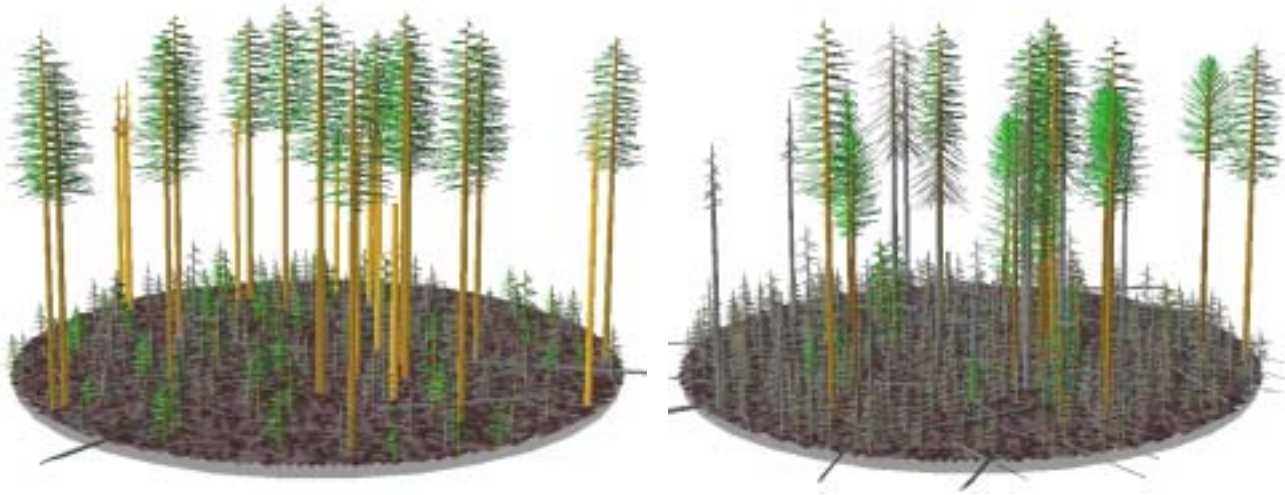
The figure below was generated through the Stand Visualization System or SVS (McGaughey 1997; PF Doc. VEG-30) which is a tool of FVS (discussed earlier under Forest Vegetation Analysis Methodology) depicting stand conditions based on individual stand components, such as trees, shrubs and down material. The images produced by SVS modeling, while somewhat abstract, provide an easily understood representation of stand conditions, silvicultural treatments and forest management alternatives.

***Figure 3-VEG-21. Visualization of stand conditions under each alternative (PF Doc. VEG-30).***



**Existing conditions** – Illustration of a typical dry habitat type stand in the Twomile Resource Area where large-diameter ponderosa pine exist with encroaching small-diameter Douglas-fir.

**Alternative 1** – Given no-action the stand structure in the Twomile Resource Area supports fire behavior with fire intensities that have effects on the long-lived seral species.



**Alternative 2, 3** – Harvesting the small-diameter Douglas-fir and retaining the larger ponderosa pine would substantially alter potential fire behavior, burning with small flame lengths on the surface of the ground.

## *C. Direct and Indirect Effects to Forest Vegetation Under Alternative 4*

Alternative 4 would treat 374 acres by reintroducing fire to dry habitat types through understory slashing followed by underburning (there would be no commercial timber harvest). Noncommercial treatments such as leave tree protection, slashing, pruning, and piling of surface and ladder fuels would occur to reduce prescribed fire intensity.

### ***Direct and Indirect Effects to Structure and Species Composition Under Alternative 4***

Currently, most of the treatment areas have approximately 50-200 overstory trees per acre (those over 5 inches in diameter). The arrangement of the understory tree stocking (trees under 5 inches in diameter) is highly variable. Species compositions are dominated by Douglas-fir with ponderosa pine components of variable amounts. Some stands also have grand fir and small amounts of western larch, white pine and

lodgepole present as well. Undesirable conifers in the understory, and tall brush would be slashed, establishing a fuel bed. Prescribed fire would be used to reduce this fuel loading and to reintroduce fire.

The density of the stands being burned would decrease slightly under Alternative 4 to achieve some reduction in fuels. The reduction in part would come from the mortality of the understory trees which are generally less than 20' in height and less than 5 inches in diameter. Natural regeneration may occur in some areas following underburning if sufficient growing space is created. Reintroducing fire alone without understory slashing would not restore most stands because of accumulations of duff and ladder fuels (Arno et al., 1995, p. 22; PF Doc. VEG-R25). Changes following decades of fire exclusion often mean that re-introduction of fire without thinning will be problematic (Brown 2000, p. 19 [from Agee and Huff 1986, Swezy and Agee, 1990]; PF Doc. VEG-R19). Large-scale prescribed burning is likely to be effective in stands that have moderate or low tree densities and little encroachment of ladder fuels while mechanical tree removal works best on forests that are too densely packed to burn (Pollet and Omi; PF Doc. VEG-R21).

Achievement of all the objectives of the prescribed underburning treatments would be very difficult logistically. The ability to achieve treatment objectives and limit mortality to the residual overstory trees is affected by several factors including the amount of fuel buildup already on site, slope topography (steepness), and weather conditions during burning "windows." Areas would be considered for underburning and/or regeneration treatments again in the next 20 years. This repeat treatment of the understory ladder fuels is important to maintain a structure that will allow the overstory trees to remain more resilient to potential wildfire effects.

In terms of meeting the purpose and need for this project, while this alternative does reduce some fire intensities, it may not trend a significant amount of the species composition toward increased resilience over time. FVS modeling of this treatment resulted in canopies and growth similar to what would occur under the No-Action Alternative (PF Doc. VEG-21, VEG-22). The predicted growth would reach Forest Plan levels of 50 cubic feet per acre per year (dry habitats) at the end of the 100-year projection. This resulting growth is slightly higher in Alternative 4 than under the No-Action Alternative, and at a level acceptable under the Forest Plan, whereas Alternative 1 would not increase growth substantially, and would remain at levels considerably below Forest Plan expectations.

***Figure 3-VEG-22. Percent canopy cover under Alternative 4 (with underburning).***

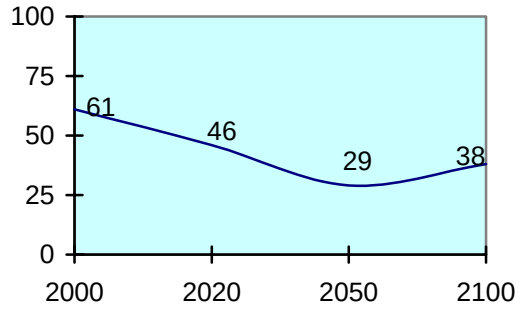
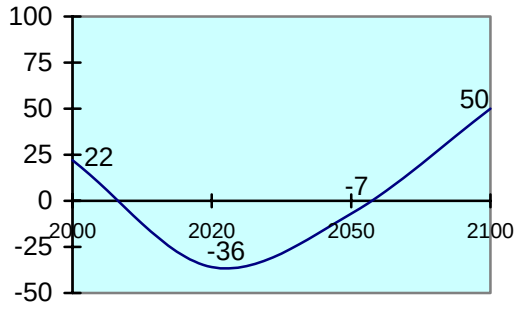



***Figure 3-VEG-23. Growth (cubic feet per acre per year) under Alternative 4 (with underburning).***




The arrangement and numbers of regeneration would vary over time based on survival, pre-commercial thinning and underburning treatments (commencing approximately 20 years after establishment). The expectation is that sites would be underburned every 20-30 years. Additional tending treatments may be needed to assure success of these prescribed burning treatments within the objectives of the target stand.

Alternatives 1 and 4 would not substantially increase ponderosa pine, western larch or white pine in the Twomile Resource Area, nor would these alternatives assist in the basin trend toward the historic levels of these long-lived species. Currently, only about 17% of the Resource Area is being managed for ponderosa pine, western larch, lodgepole pine and white pine. Less than 2% of the Resource Area has been or is in the

process of artificial regeneration with these species to date. Stands of Douglas-fir and grand fir are highly susceptible to root diseases, other insects and diseases, drought and fire. Since these species are dominant forest cover on 83% of the resource area, mortality and loss of canopy and wood fiber would be expected to continue. As stands increase in age, these losses tend to increase.

Under Alternatives 1 and 4, the size of openings would not change from the current condition. The structural arrangements of the mature and small to medium timber stages both in terms of within stand and across the landscape characteristics make them more susceptible to high levels of mortality from almost all intensities of wildfire. Since the species compositions would not change under Alternatives 1 and 4, future stands would continue to be susceptible to the same insects and disease pests as existing stands. Many of these future stands would be unlikely to provide the closed canopy, multi-storied mature or old growth structure containing large white pine and larch on moist sites, once a major component of the Coeur d'Alene River Basin. Nor would stands on dry sites provide the moderately open single-storied stands dominated by ponderosa pine with open understories, once a major component on dry sites in the Coeur d'Alene River Basin.

## *D. Summary Comparison of Changes to Species Composition & Structure*

The proposed changes in species composition from Douglas-fir and in some cases grand fir to more resilient ponderosa pine, western larch and white pine would occur at the time of planting in regeneration harvested stands. These long-lived seral species would be expected to be managed throughout the life of the stand and would therefore be more likely to provide the desired mature and old forest structural characteristics for long-term resiliency and forest health than would the Douglas-fir, hemlock and grand fir species.

The ponderosa pine cover type would include larch as a percentage of the stand. White pine would be present in some stands with more moist conditions but would not necessarily change the cover types.

***Figure 3-VEG-24. Changes in Acres of Each Forest Cover Type in the Twomile Resource Area (PF Doc. VEG-23).***

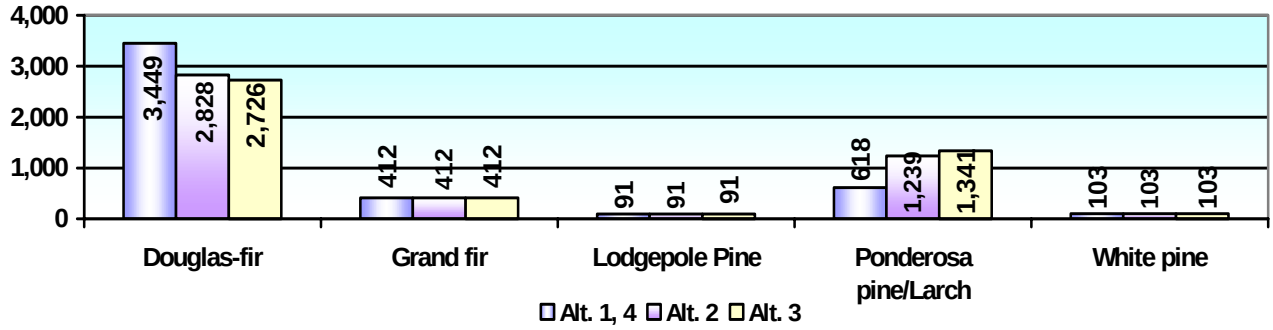



***Figure 3-VEG-25. Changes in Percent Forest Cover Type in the Twomile Resource Area, by Alternative (PF Doc. VEG-23).***

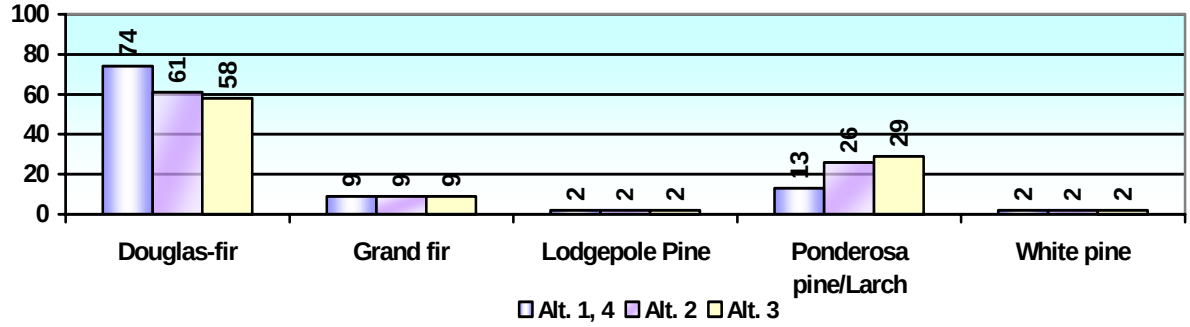
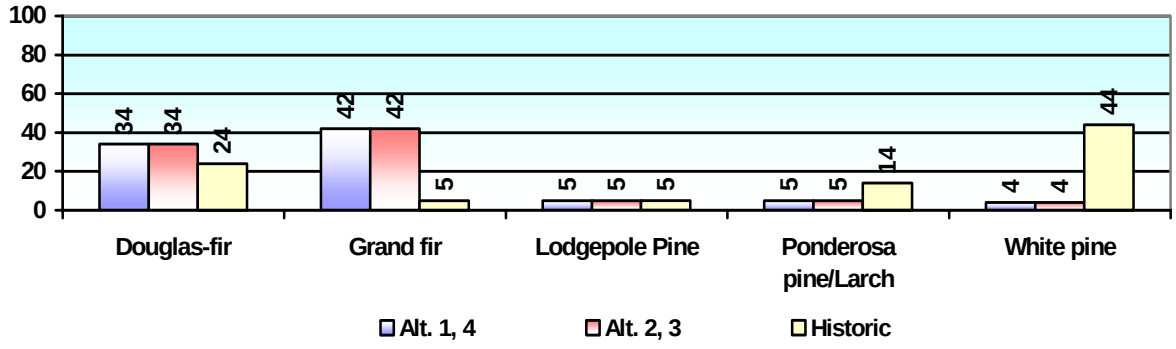


***Figure 3-VEG-26. Changes in Percent Forest Cover Type in the Coeur d'Alene River Basin, by Alternative (PF Doc. VEG-23).***




## *Structure*

***Figure 3-VEG-27. Comparison of Changes in Structural Stages (Acres) in the Twomile Resource Area (PF Doc. VEG-6).***

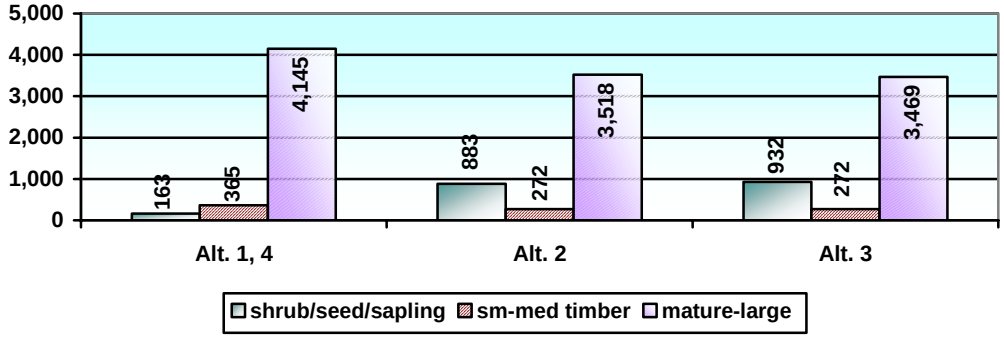



***Figure 3-VEG-28. Comparison of Changes in Percent Structural Stages of the Twomile Resource Area (PF Doc. VEG-6).***

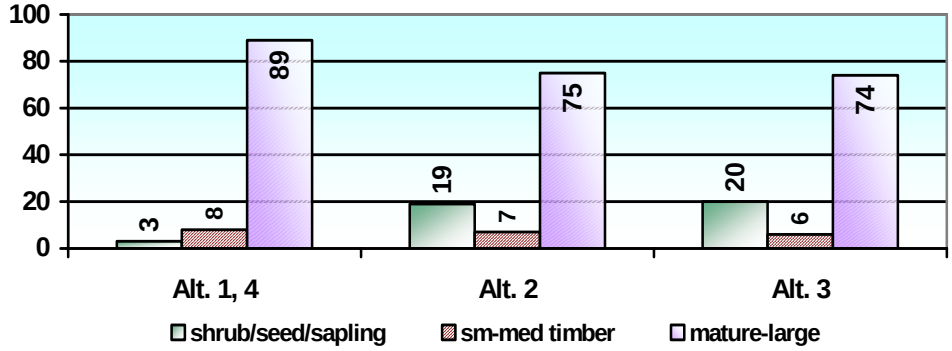
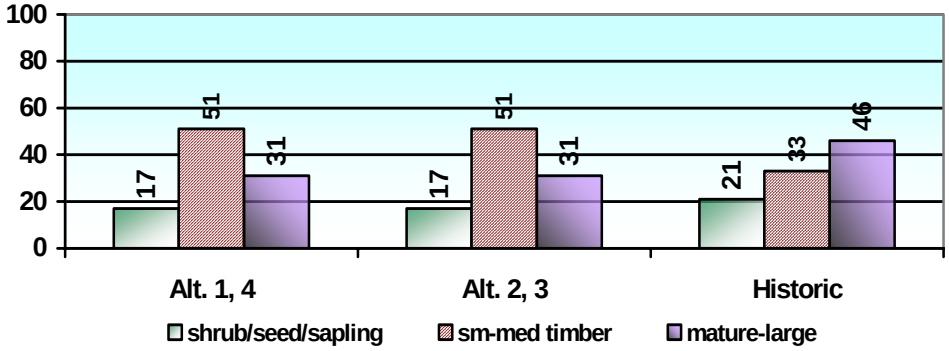


***Figure 3-VEG-29. Comparison of Changes in Percent Structural Stages of the Coeur d'Alene River Basin, by Alternative (PF Doc. VEG-23).***




Timber harvest under Alternatives 2 and 3 would reduce the mature/large size classes each by 14 to 15% respectively in the Twomile Resource Area. This size class is desirable to maintain in the Resource area since it provides the structure necessary to be resilient to fire. The small/medium timber would be slightly reduced from 8% to 6%. The seedling/sapling stage would be increased to between 19 and 20% respectively under Alternatives 2 and 3. The areas changed into the seedling/sapling stage are more likely to provide a long-term improvement in stand structure and increased resiliency to native change agents (such as insects, pathogens and fire) due to species conversion to long-lived seral. Alternative 3 would harvest in approximately 180 acres of allocated old growth. Alternative 2 would not harvest allocated old growth, however 75 acres of non-commercial treatment would occur in allocated old growth under Alternative 2, with no change in structural stage.. Target stand descriptions are found in the project file (PF Doc. VEG-10).

***Table 3-VEG-5. Comparison of allocated old growth acres affected (with Unit and stand [#]).***

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Acres of allocated old growth in OGMU 121 before treatment | 1,067 | 1,067 | 1,067 | 1,067 |
| Acres of harvest treatment proposed in allocated old growth | 0 | 0 | 180<br>Unit 17 (#11302023) 81 ac.<br>Unit 18 (#11302028) 52 ac.<br>Unit 24 (#11302031) 22 ac.<br>Unit 19 (#11302029) 25 ac. | 0 |
| Acres of noncommercial treatment (slashing/underburning) proposed in allocated old growth | 0 | 75<br>Unit 2 (# 11305022, 11305021) 40 ac.<br>Unit 32 (#11301013) 35 ac. | 75<br>Unit 2 (#11305022, 11305021) 40 ac.<br>Unit 32 (#11301013) 35 ac. | 97<br>Unit 2 (# 11305022, 11305021) 40 ac.<br>Unit 24 (#11302031) 22 ac.<br>Unit 32 (#11301013) 35 ac. |
| Changes in old growth allocation acres as a result of treatment | 0 | 0 | 155<br>Shelterwood treatments would change saw timber structure to seedling with shelterwood overstory. | 0 |
| Acres of allocated old growth in OGMU 121 after treatment | 1,067 | 1,067 | 912 | 1,067 |
| Percent of OGMU in allocated old growth | 7.1 | 7.1 | 6.0 | 7.1 |

## *E. Summary Comparison of Changes to Landscape Arrangement, by Alternative*

The Fragstats model (PF Doc. VEG- R16) was used to compare the landscape pattern of alternatives, including mean patch size (displayed in the table below). More complete findings and discussion of Fragstats are provided in PF Doc. VEG-9.

***Table 3-VEG-6. Changes in Mean Patch Size (acres) in the Twomile Resource Area (PF Doc. Veg-9 and Veg-R16).***

| Structural Stage | Alt 1 and 4 | Alt 2 | % change | Alt 3 | % change |
|---|---|---|---|---|---|
| Seedling/Sapling/Nonforest | 18 | 38 | +116% | 55 | +210% |
| Small/Medium | 41 | 41 | No change | 32 | -21% |
| Mature/Large | 836 | 148 | -82 | 138 | -83% |
| Old Growth | 115 | 109 | -5% | 73 | -37% |

Under Alternative 1 the existing patch size of the mature/large structural stage is quite large as a result of the 1889 and subsequent fires near the turn of the century. The limited amount of harvest on National Forest land has not contributed to the fragmentation in these mature structure patches. Alternative 4 would not change the patch sizes since no commercial harvest is proposed that would significantly change the structural stage of the treated stands. Alternatives 2 and 3 would both decrease the mature/large patch size considerably due to the placement of the treatment units. However, these treatments have been designed to trend stands and landscapes toward more resilient patterns and compositions in the face of future drought, fire, or wind events. The old growth patch size would be reduced most in Alternative 3 due to the treatment of several old growth stands, but forest plan standards will still be met. As patches of ponderosa pine, larch and white pine stands mature, they would contribute to a more resilient overall pattern on the landscape, and a more resilient structure.

***Figure 3-VEG-30. Percent Canopy Cover on Treated Sites only and average percent canopy cover for the entire resource area projected to year 2100 by alternative. These projections are then compared to the Existing 2003 canopy cover average for the resource area (PF Doc. VEG-21).***

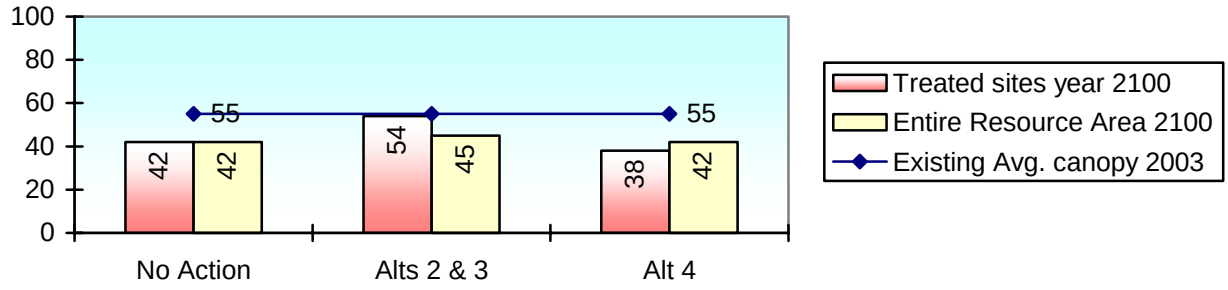
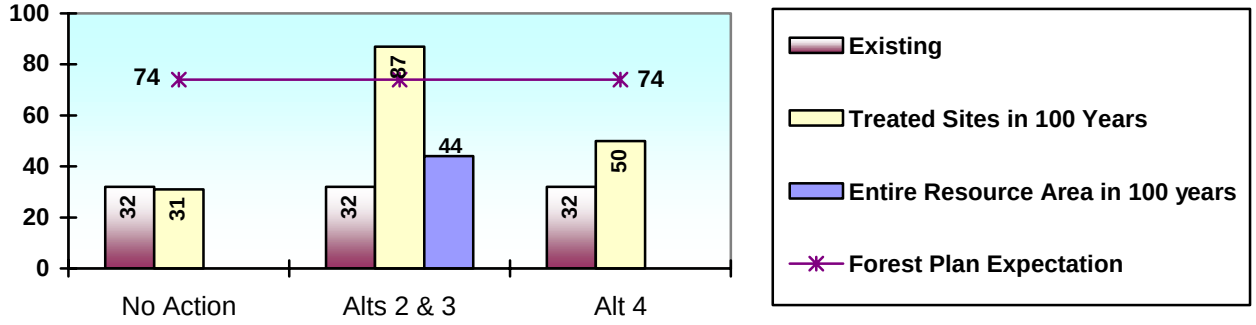



***Figure 3-VEG-31. Existing and Predicted Growth (in 100 years) on treated sites and in the entire Twomile Resource Area, compared to the Forest Plan Expectation (average growth for dry/moist habitat types) (PF Doc. VEG-22).***



Vegetative treatments would result in similar forest structure under Alternatives 2 and 3, since both alternatives would involve a similar number of regeneration type harvest acres allowing underburning to reduce fuels, duff and litter and to prepare the sites for reforestation of long-lived seral species ponderosa pine, larch and white pine. The key difference between these alternatives is the location of treatment unit acres and the resulting landscape arrangement. Alternative 3 treats slightly more acres on south-facing aspects bordering private property. Alternative 3 would treat many of the same stands as Alternative 2 but would include treatment of several old growth stands with encroaching ladder fuels (mainly Douglas-fir). By treating old growth stands now, the desired old structure within the stands may be maintained more effectively. This is important in terms of meeting the project's purpose and need of maintaining resilient fire-adapted ecosystems within the wildland urban interface. Alternative 2 treats stands that have forest health concerns as well as concern for proximity to the urban interface. Administrative access to accomplish regeneration and long term tending activities would be important to economically maintain desired stand conditions. Alternative 2 would require walk-in/ATV access to approximately 28% of the treatment acres for planting, stand tending, exams etc. Alternative 3 would require walk-in/ATV access to approximately 47% of the treatment acres, which increases costs. The cost of walk-in or ATV access is 20 to 50% greater than with road access.

## *F. Summary Comparison of Proposed Treatment Opening Sizes*

Forest Service policy FSM 2470.3 (USDA, 1990; PF Doc. VEG-R1) and the Northern Regional Guide (USDA, 1983; PF Doc. VEG-R2) direct land managers to normally limit the size of tree openings created by even-aged silvicultural methods to 40 acres or less. With some exceptions, creation of larger openings is allowable with Regional Forester approval. Under Alternatives 2 and 3, several units would exceed the 40-acre opening size when considered with adjacent openings, as displayed in the table below. In conjunction with the previously regenerated areas, the proposed openings would create openings of the scale and pattern more closely resembling the historic disturbance regimes for this Resource Area. The size and arrangement of these openings will assist in meeting the fuels reductions objectives as well as affecting the fire behavior and the overall resilience of the forest within the Resource Area and within the urban interface.

***Table 3-VEG-7. Proposed units with openings exceeding 40 acres under Alternatives 2 and 3 (PF VEG-25).***

| Unit # | Acres | Total Opening (Acres) | Additional Information |
|---|---|---|---|
| 7 | 93 | 93 | Shelterwood harvest unit. |
| 9 | 51 | 51 | Shelterwood harvest unit. |
| 11 | 24 | 225 | These are six adjacent units, located along a ridge running down from Dago Peak (proposed under Alternative 3 only). |
| 15 | 10 | | |
| 16 | 32 | | |
| 17 | 82 | | |
| 18 | 52 | | |
| 19 | 25 | | |
| 21 | 46 | 104 | These are two adjacent units; both would have a regeneration type prescription (primarily group shelterwood/group seedtree, respectively). |
| 33 | 58 | | |
| 23 | 93 | 115 | Units 23 and 24 are connected at the ridgeline and both would be treated with a group shelterwood harvest prescription. |
| 24 | 22 | | |
| 27 | 61 | 61 | Unit 27 lies adjacent to an opening on private land which extends beyond the Resource Area boundary. Estimated total opening size includes National Forest System lands only. |
| 30 | 58 | 121 | These are two adjacent units; would both be treated with group shelterwood harvest. |
| 31 | 63 | | |
| 36a, b | 54 | 54 | Shelterwood harvest unit. |

### *G. Cumulative Effects to Forest Vegetation Resulting From Activities on Private Lands*

Most of the direct harvest activities associated with previous timber sales on National Forest lands within the Twomile Resource Area have been completed. Some work remains to be completed in 2004/2005. This includes 40 acres of pre-commercial thinning, 38 acres of planting, and exams associated with these treatments. These activities are in addition to those that would be implemented under the Decision Notice for the Twomile Resource Area. Pre-commercial thinning and pruning would improve the growth and vigor of naturally regenerated and planted trees in several stands. Pre-commercial thinning stands would be prioritized on the district based on the amounts of the long-lived early seral species white pine, western larch and ponderosa pine. This would allow these species to better compete with the more shade tolerant species so they can better provide the desired forest structure and composition. Pruning of white pine reduces the potential of infection by white pine blister rust and also improves the tree's ability to survive infection by removing infected branches. Pruned trees have a better chance of reaching maturity and contributing to the desired forest structure and composition (Schwandt, 1994, VEG-R28). Thinning and pruning may also prepare trees and sites for underburning while stands are pre-commercial in size in the case of ponderosa pine and western larch. Administrative access to accomplish long-term tending activities will be vital to attain desired stand conditions economically.

The Bureau of Land Management is planning forest management activities within the Twomile resource area that will include underburning to reduce forest fuels. These activities will help contribute to the trend of increased resiliency across the Twomile landscape. None of the privately owned lands within the analysis area would be affected in terms of vegetation by any of the alternatives, nor are there any anticipated contributing vegetative effects from these lands.

While vegetative activities are planned in the near future (as listed in TSMRS and Chapter 2, Ongoing and Reasonable Foreseeable Activities), there would be no additional cumulative effects related to regeneration harvests from the remainder of the ongoing or reasonably foreseeable activities on National Forest lands.

### *H. Cumulative Effects to Forest Vegetation Resulting From Watershed and Wildlife Restoration Activities*

Roads proposed for permanent closure or decommissioning would eventually provide forest cover, although they would be likely to go through a prolonged period of grass, forbs and/or shrub dominance. Current costs of such stand tending activities when access is by 'walk in only' range from 20-50% greater than the same activities with road access.

## 3.2.5 Consistency with Forest Policy and Legal Mandates

Forest Plan direction provides that timber management activities will be the primary process used to minimize the hazards of insects and diseases and will be accomplished by maintaining stand vigor and diversity of plant communities and tree species (Forest Plan, page II-8). Direction regarding vegetation is also guided by the Forest Plan standards for old growth (Forest Plan, page II-29), timber (Forest Plan, pages II-31 to 32), forest protection (Forest Plan, pages II-38 to 39) and individual management areas (Forest Plan, pages III-1 to 87).

### Forest Plan Standards for Old Growth

**Old Growth Standard 10a: A definition for old growth is being developed by a Regional Task Force and will be used by the Forest when completed. As an interim guideline, stands classified as old growth should meet the definition given by Thomas (1979).**

Allocation of old growth within the Twomile Resource Area is based on current and widely accepted science and follows current old growth definitions from the Forest Plan (page II-29), the Regional Task Force Report including "Old Growth Forest Types of the Northern Region" (Green et al, 1992; PF Doc. VEG-R20) and

Forest Supervisor letters of direction for implementing Forest Plan old growth standards (PF Doc. VEG-15). This standard would be fully met under all alternatives.

**Old Growth Standard 10b: Maintain at least 10 percent of the forested portion of the IPNF as old growth.**

The IPNF old growth allocation of 10% (231,000 acres) was distributed among the districts as documented in the Forest Supervisor's May 7, 1991 letter concerning the subject "Forest Plan Explanation: Implementing Old Growth Standards (PF Doc. VEG-15). The Coeur d'Alene River Ranger District was responsible for allocating 56,000 acres for old growth management (with 18,000 acres on the former Fernan Ranger District and 38,000 on the former Wallace Ranger District).

Forest Plan monitoring indicates that the Forest's allocated old growth in 2002 was 276,494 acres (12%); and the Coeur d'Alene River Ranger District had a total of 65,211 acres (2002 Forest Plan Monitoring Report; PF Doc. VEG-19). Alternative 3 would reduce the OGMU and district allocation by 155 acres; even with this reduction, the district would still meet its share of the 10% IPNF old growth allocation. At both the IPNF and District level, this standard would be exceeded under all alternatives.

**Old Growth Standard 10c): Select and maintain at least five percent of the forested portion of those old growth units that have five percent or more of existing old growth.**

***and***

**Old Growth Standard 10d: Existing old growth stands may be harvested when there is more than 5% in an old growth unit, and the Forest total is more than 10%.**

The Twomile Resource Area is within a portion of Old Growth Management Unit 121 (OGMU), which is 15,103 acres in size. Of this, 1,067 acres (7.1%) is allocated old growth. Therefore OGMU 121 exceeds the minimum Forest Plan desired level of 5 percent allocated old growth per OGMU. Only Alternative 3 would commercially harvest a portion of old growth and change the old growth allocation. As a result of harvest in alternative 3, 155 acres would be removed from an old growth stand structure to a seedling structure. Under alternative 3, the change in allocation would reduce the percentage of allocated old growth in OGMU 121 from 7.1% to 6.1%, but would still meet the District and IPNF old growth allocation requirements. In alternatives 2, 3, and 4 approximately 75 acres of allocated old growth would be treated with a non-commercial slashing and underburning treatment. This treatment would not change the old growth structure of these areas; therefore these acres do not have a change in old growth allocation. Old growth standard 10d would be met under all alternatives.

A thorough review of the Twomile Resource Area was conducted by the project interdisciplinary team to verify the best possible old growth allocation. This review and all related old growth information is found in the project files (PF Doc. VEG-17).

**Old Growth Standard 10e: Old growth stands should reflect approximately the same habitat types series distribution as found on the IPNF.**

A demonstration of compliance with this standard is found in the Forest Plan 2002 Monitoring Report, which concludes, "Old growth on the IPNF does reflect approximately the habitat type series distribution of the forest…old growth distribution is less than proportional to habitat type series distribution only in the Douglas-fir and grand fir series…the huge, severe 1910 burn and other big early 20$^{th}$ century fires, subsequent suppression of low severity fires, early 20$^{th}$ century timber cutting, root diseases and bark beetles have contributed to the low proportion of old growth in these two habitat type series," (PF Doc. VEG-19).

**Old Growth Standard 10f: One or more old growth stands per old growth unit should be 300 acres or larger. Preferences should be given to a contiguous stand; however the stand may be subdivided into stands of 100 acres or larger if the stands are within one mile. The remaining old growth management stands should be at least 25 acres in size. Preferred size is 80 plus acres.**

The Twomile Resource Area is within old growth management unit (OGMU) 121. Supporting documentation for the following discussion is found in VEG-18. Allocated old growth in OGMU 121 includes three large patches. One patch is located in the upper Twomile drainage and is approximately 446 acres. The second large patch is found along the ridge running below Dago Peak and is approximately 275 acres. The third large patch is found along the east Resource Area boundary in upper Revenue Gulch and is approximately 326 acres in size. Two small patches are included with this large patch, due to the arrangement it would provide for flammulated owl habitat.

Harvest would occur in the second patch below Dago Peak in Alternative 3. The intent of treatment is to restore long-lived seral species in this patch while retaining as much old structure as possible within the patch, given the current condition. This standard would be fully met in the Twomile Resource Area under all alternatives.

**Old Growth Standard 10g: Roads should be planned to avoid old growth management stands to maintain unit size criteria.**

No new permanent road construction or temporary road construction occur in allocated old growth under any alternative.

**Old Growth Standard 10h: A long-term objective should be to minimize or exclude domestic grazing within old growth stands.**

The proposed activities would not include any new domestic grazing allotments in the Twomile Resource Area nor in allocated old growth. There are currently no grazing allotments in the area. It is unlikely that grazing would occur within mature or allocated old growth structures in the Twomile Resource Area in the future since mature and old growth structures do not normally provide much forage for these animals. This standard would be met under any alternative.

**Old Growth Standard 10i: Goals for lands to be managed as old growth within those lands suitable for timber production are identified in the management area prescriptions.**

Four stands of allocated old growth are proposed for harvest under Alternative 3. Two stands of allocated old growth are proposed for non-commercial fire/fuels treatment (slashing and underburning) in Alternatives 2 and 3, and three stands in Alternative 4. These stands fall within the Forest Plan *TIMBR* and *TMEKW* designations. The TIMBR designation denotes Forest Plan *Management Area 1* (MA1) and consists of lands designated for timber production. The TMEKW designation denotes Forest Plan Management Area 4 (MA4) and consists of lands designated for timber production within big game winter range. Under both of these designations standards require maintenance of old-growth acres to support viable populations of old-growth dependent species. These standards would be met under all alternatives.

## Forest Plan Standards for Timber

**Timber Standard 1. Both even aged and uneven aged silvicultural systems will be employed on the IPNF and will meet resource and vegetation management objectives identified in the Forest Plan.**

Under the action alternatives, there is the potential for both even- and uneven-aged silvicultural treatments. Through use of shelterwood with reserves, group shelterwood with reserves, commercial thinning, group seed tree with reserves, and pruning, this standard would be met under any alternative. Uneven-aged management was considered as a treatment method in the Twomile Resource Area. To be successful, uneven aged management (or individual tree selection/group selection) requires healthy stands with a high percentage of long-lived seral trees to manage. Most stands in the Twomile resource area do not have over a 25%

ponderosa pine, larch, or white pine component. There are a few stands in which this harvest method could be considered to establish a more resilient stand structure over the long-term. The uneven aged stand structure, however, includes ladder fuels within the stand long term, which can be a concern when addressing a stand's potential fire behavior.

Utilization of these treatments methods complies with Forest Plan standards (Forest Plan, p. III-3) and Forest Plan Vegetation Management Silvicultural Practices (pp. A-2 to 10; PF Doc. VEG-R3). ). These actions are consistent with the Forest Plan which states that prescribed fire be used to meet silvicultural objectives (Forest Plan, p. III-4; PF Doc. VEG-R3). Ponderosa pine, western larch, blister rust resistant white pine, and a possibly a small amount of lodgepole would be planted. This complies with Forest Plan direction that reforestation will normally feature seral tree species utilizing a mixture of species. (Forest Plan, p. II-32; PF Doc. VEG-R3). These actions would promote stand structures and compositions, which reduce susceptibility in the present and future to insects, diseases, and wildfire.

**Timber Standard 2. Timber stands that are substantially damaged by fire, wind throw, insect or disease attack, or other catastrophe may be harvested where this salvage is consistent with silvicultural and environmental standards. All management areas are open to this potential salvage activity except Management Areas 11 and 14.**

Salvage of damaged timber is integrated into the silvicultural treatments proposed under the action alternatives. This standard would be met under any alternative.

**Timber Standard 3. Recommended changes in timber resource land suitability from the approved Forest Plan will be based upon the criteria contained in 36 CFR 219.14(a) and the rationale displayed in environmental assessments. Changes from suitability classification will be done in accordance with the procedures outlined in Appendix M.**

No change in suitability classification is proposed under any alternative (PF Doc. VEG-3). This standard would be met under any alternative.

**Timber Standard 4. Reforestation will normally feature seral tree species, with a mixture of species usually present. Silvicultural practices will promote stand structure and species mix that reduce susceptibility to insect and disease damage.**

All regeneration harvests would be regenerated with seedlings from a site-adapted species/seed source, with the result that stands would be dominated by resilient, potentially long-lived seral species (Chapter 2 - Features Designed to Improve Vegetation Management). All treatments would retain (to the extent possible) resilient long-lived seral species. This standard would be met under any alternative.

**Timber Standard 5. Project design will provide for site preparation and slash hazard reduction practices that meet reforestation needs of the area.**

Site preparation and/or fuel treatment may include a combination of prescribed underburning, and hand slashing and/or hand piling depending on post harvest conditions and silvicultural treatment needs. This standard would be met under all alternatives.

**Timber Standard 6. Timber harvest schedules and access will be coordinated with intermingled landowners where applicable.**

Access to private property in the Twomile Resource Area would be maintained under all alternatives (Appendix H, Transportation). This standard would be met under all alternatives.

**Timber Standard 7. Openings created by even-aged silviculture will be shaped and blended to forms of the natural terrain to the extent practicable; in most situations they will be limited to 40 acres. Creation of larger openings must conform to current Regional guidelines regarding public notification, environmental analysis and approval.**

***and***

**Timber Standard 8. An area of National Forest land will no longer be considered an opening when vegetation meets management goals established for the management area in accordance with the Regional Guide. Lands in other ownership within or adjacent to National Forest land will be included in the analysis when planning openings.**

The public was informed in November 2003, that regeneration openings in excess of 40 acres were proposed under some alternatives (PF Doc. PI-20). A letter requesting approval to exceed the 40-acre opening size, with appropriate interdisciplinary analysis and documentation, will be received from the Regional Forester prior to project decision. The proposed openings, in conjunction with previously regenerated areas, will create opening of the landscape of the scale and pattern that are similar to the historic disturbance regimes for this resource area. Proposed harvest openings greater than 40 acres are identified in Table 3-VEG-7. This standard would be met under all alternatives.

**Timber Standard 9. The silvicultural prescription for each stand will establish the level of management intensity compatible with the management area goals. Preferred species management as identified in the silvicultural prescription will consider both biological and economic criteria.**

All vegetative treatments would have silvicultural prescriptions approved by a certified silviculturist. Prescriptions would consider site-specific factors (such as physical site, soils, climate, habitat type, and current vegetative composition and conditions) as well as interdisciplinary objectives and Forest Plan goals, objectives and standards. This standard would be met under any alternative.

## Forest Plan Standards for Forest Protection

**Forest Protection Standard 1. Use integrated pest management methods that provide protection of forest resources with the least hazard to humans, wildlife and the environment.**

***and***

**Forest Protection Standard 2. Use silvicultural methods and schedule practices that reduce the development and/or perpetuation of pest problems.**

As described earlier in this section, loss of the long-lived seral components (ponderosa pine, western larch and white pine) in the ecosystem is a major reason for the lack of vegetative resiliency. Use of various regeneration and intermediate treatments to trend toward species compositions with increased resilience is a major objective of Alternatives 2 and 3 (but not Alternative 4). In combination with alternative design features (Chapter 2, Features Designed to Improve Vegetation Management), these treatments would minimize adverse effects and maximize a range of objectives. Alternative 2 and 3 would meet these two Forest Plan standards. Alternative 4 would improve the health of the treated stands through some density reduction that in turn would reduce the susceptibility to pest problems. Alternative 4 would also meet these Forest protection standards but would not significantly trend species composition to a more long-lived seral component. Alternative 1 would not use integrated pest management methods or reduce the perpetuation of pest problems therefore would not meet Forest Protection Standards 1 and 2.

**Forest Protection Standard 3. Vegetation management will favor the use of fire, hand treatment, natural control, or mechanical methods wherever feasible and cost effective. Direct control methods, such as chemical or mechanical, may be used when other methods are inadequate to achieve control.**

Proposed vegetative treatments would utilize a combination of fire, hand treatment and natural and mechanical methods. Forest vegetative treatment using chemicals is not proposed under any alternatives. This standard would be met under any alternative.

**Consistency with Rangeland Renewable Resource Planning Act (RPA)/NFMA**

**Vegetation Manipulation (36 CFR 219.27(b).**

1. **Assure that technology and knowledge exists to adequately restock lands within fire years after final harvest.** Technology and knowledge does exist to comply with this requirement. The IPNF Forest Plan Monitoring and Evaluation Report, 1998, page 7, states that "over the last 11 years (1983-1993, of monitoring, our reforestation success rate has averaged 88 percent". Regeneration success on the Fernan and Wallace districts combined is 98 percent overall for the period 1976 to 1996 with 83 percent within 5 years of regeneration harvest (see PF VEG-4).

2. **Be chosen after considering potential effects on residual trees and adjacent stands.** The analysis considered the effects on residual trees and adjacent stands. The design of treatments is discussed in detail in the Forest Vegetation Environmental Consequences section in terms of selection and protection of residual trees within units as well as the effects to the resource area landscape.

**Silvicultural Practices (36 CFR 219.27(c) No timber harvest, other than salvage sales or sales to protect other multiple-use values, shall occur on lands not suitable for timber production.**

Guidelines for determining suitability are found in the Forest Plan and FSH 2409.13. The proposed harvest units are within the productive habitat types as described by the Forest Plan. An analysis of suitability for resource management was completed for the resource area (see PF VEG-3). The arrangement of the unsuitable areas is scattered across the resource area. Timber harvest will not occur in unsuitable sites. Harvest unit layout would consider suitability limitations.

**Even-aged Management (36 CFR 219.27(d) When timber is to be harvested using an even-aged management system, a determination that the system is appropriate to meet the objectives and requirements of the Forest Plan must be made. Where clearcutting is to be used, it must be determined to be the optimum harvest method.**

Under the action alternatives, there is the potential for both even- and uneven-aged silvicultural treatments through use of shelterwood with reserves, commercial thinning and group seed tree with reserves, pre-commercial thinning and pruning. While a shelterwood and group seed tree tends to develop a 2 age even-aged stand, the presence and/or development of 3 or more age classes (uneven-aged) is possible and desirable as stand resiliency increases in the future on these drier sites. Commercial thinning, precommercial thinning and pruning are neither even or uneven aged by definition but intermediate treatments for both. All treatments in alternative 2 and 3 are silviculturally appropriate and are within the timber and vegetation management practices outlined in the Forest Plan goals, objectives, management area direction and practices (Forest Plan Appendix A). Treatments under Alternative 4 would not meet all these objectives, as discussed in the forest vegetation environmental consequences section. No clearcutting is planned under any alternative.

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# 3.3 FIRE/FUELS

## 3.3.1 Regulatory Framework Related to Fire/Fuels

There are four guiding documents that establish the direction for fire management. These documents provide the framework for fire management and provide specific goals, standards, and objectives for implementing a fire management program. Additional site-specific guidance for the Twomile Resource Area is recommended by the Shoshone County Fire Mitigation Plan (discussed further in this section). Fire handbooks, guides, research, and technical papers provide further direction.

| Guiding Documents | Direction |
|---|---|
| **The IPNF Forest Plan** | Provides standards and goals that Management Plans need to address on the Forest as well as provides Forest-wide and Management Area guidelines that define land uses. |
| **The Forest Service Manual** | Mandates all National Forests and lists objectives for fuels management. |
| **Federal Wildland Fire Policy** | Establishes standardized procedures and policies for Federal wildland fire management agencies. |
| **National Fire Plan** | Directs a comprehensive approach to the management of wildland fire, hazardous fuels, and ecosystem restoration on Federal and adjacent State, tribal, and private forest and range lands. |

The Forest Plan (PF Doc. FF-25) objective is to implement efficient fire protection and fire use programs based on management objectives, site-specific conditions, and expected fire occurrence and behavior. The Forest Plan uses the term "fire use" in reference to management ignited (or prescribed) fire. However, "fire use" is not synonymous with "*wildland* fire use." Wildland fire use is the management of naturally ignited wildland fires to accomplish specific resource management objectives in predefined geographic areas outlined in a Fire Management Plan. The term "fire use" has been adopted by the Fire and Aviation Program to include the *combination* of wildland fire use opportunities and prescribed fire applications to meet natural resource objectives. The Forest Plan does not provide direction for wildland fire use as just described. However, the Forest Plan does provide for the use of unplanned ignitions for prescribed fire, provided that NEPA, a prescribed fire plan, and consultation with Fish and Wildlife Service and the public are complete. The following are the key standards currently guiding fire management plans:

- *Human life and property will be protected.*
- *The appropriate suppression response for designated old growth stands in all management areas, except in wilderness, will result in prevention of old growth loss.*
- *Activity fuels will be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.*

The primary Forest Plan Management Areas (MA1 and MA4) within the Twomile Resource Area include goals to manage suitable lands for timber production for the long-term growth and production of commercially valuable wood products. The fire protection standard to satisfy that goal is to use the most appropriate management response (confine, contain, and control) to achieve the best benefit based on commercial timber values and where appropriate, big-game winter range values. Prescribed fire is to be used as needed to meet silvicultural objectives and the objectives of the management area.

Forest Service Manual (FSM) 5105 (PF Doc. FF-29) 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 the flammability

and intensity of a fire may include mechanical, chemical, biological, or manual means, including the use of prescribed fire and wildland fire use (FSM 5150).

The "Federal Wildland Fire Management Policy and Program Review" was chartered by the Secretaries of the Interior and Agriculture in 1995 to examine the need for modification of and addition to Federal fire policy. 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 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, PF Doc. FF-17). 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, and commercial forests, fire cannot be fully restored to its historic character without severe consequences to humans, except perhaps in a few of the largest wilderness areas (Brown et al. 1994, in Hardy and Arno 1996, PF Doc. FF-15).

The National Fire Plan (NFP 2000) originated after the record-breaking wildfire season of 2000, President Bush requested a national strategy for preventing the loss of life, natural resources, private property, and livelihoods in the wildland/urban interface. Working with Congress, the Secretaries of Agriculture and Interior jointly developed the National Fire Plan ***(www.fireplan.gov)*** to respond to severe wildland fires, reduce their impacts on communities, and assure sufficient firefighting capabilities for the future. The National Fire Plan (2000) includes five key points:

- *Firefighting/ preparedness*
- *Rehabilitation and restoration of burned areas*
- *Reduction of hazardous fuels*
- *Community assistance*
- *Accountability*

The NFP is a long-term commitment based on cooperation and communication among federal agencies, states, local governments, tribes and interested publics. The federal wildland fire management agencies worked closely with these partners to prepare a 10-Year Comprehensive Strategy (PF Doc. FF-19). The four goals of the 10-Year Comprehensive Strategy are to

- *Improve fire prevention and suppression*
- *Reduce hazardous fuels*
- *Restore fire-adapted ecosystems*
- *Promote community assistance*

In response to a goal of the 10-Year Comprehensive Strategy (PF Doc. FF-19) to promote community assistance, Shoshone County initiated a contract to develop a Fire Mitigation Plan to aid in the protection of the communities within the county (Online: http://www2.state.id.us/lands/Natl%20Fire%20Plan/NFP.htm; PF Doc. FF-36). The plan identifies a goal to reduce the rate of fire spread and acres of land burned by forest fires through the implementation of targeted fuel mitigation treatments where the landscape has the potential to sustain fires that threaten communities in the rural-urban interface.

The Shoshone Fire Mitigation Plan has the following objectives:

- *Identify high risk areas for fire ignition*
- *Locate landscape features with a high risk for rapid fire spread*
- *Search out significant concentrations of home sites and other buildings*

- *Determine areas where initial efforts should be concentrated*
- *Develop risk reduction activities*

The fire mitigation plan describes the community of Silverton, adjacent to the Twomile resource area, as "having the entire perimeter at high risk to wildfire loss"(PF Doc. FF-36). The Shoshone County fire mitigation plan recommends, "Federal land managers responsible for the management of adjoining lands should consider forest management activities on the surrounding hillsides targeted at improving forest health and reducing fire risks to the community"(PF Doc. FF-36).

The Healthy Forests Restoration Act of 2003 defines the term Wildland Urban Interface as an area within or adjacent to an at-risk community that is identified in recommendations to the Secretary in a community wildfire protection plan (in this case the Shoshone County Fire Mitigation Plan). The Shoshone County Fire Mitigation Plan used the approach of population density (greater than 50 people living in the area) to define "communities" in Shoshone County. Sixteen communities were identified throughout the county as target communities, where a three-mile radius circle delineates the "area of initial concern for controlling wildfire hazard"(PF Doc. FF-36). Silverton and Osburn Idaho are identified as communities in the Shoshone County Fire Mitigation Plan, and the three-mile "area of initial concern for controlling wildfire hazard," referred in this document as the Wildland Urban Interface, encompasses the Twomile resource area and the proposed treatments meet the intent of both the Healthy Forest Restoration Act (2003) and the Shoshone County Fire Mitigation Plan in terms of reducing fire intensities in the Wildland Urban Interface.

Homes and other structures continue to be constructed near and around lands managed as National Forests. When wildland fires occur, these structures within the wildland-urban interface are vulnerable to destruction from fire, floods, and damage to natural resources. As people, homes, and structures continue to occupy the wildland-urban interface and as hazard fuels continue to accumulate, a high risk and volatile situation needs to be addressed. The proposed activities in the Twomile Resource Area are designed to restore fire-adapted ecosystems and reduce the wildfire risk to communities and the environment. The project is designed to capture all of the principles from guiding documents as well as the strategies of the National Fire Plan to reduce fire intensities in the urban-interface and restore fire-adapted ecosystems.

## 3.3.2 Methodology Used in the Fire/Fuels Analysis

Fire and fuel hazards have been identified through public concerns as a key issue of this Environmental Assessment (Chapter 2). Suppression of all wildfires in the Twomile Resource Area has been ongoing for nearly a century. Fire exclusion, along with other activities, has caused a substantial change in stand conditions and related fire behavior, especially in the dry habitat types of the resource area. Changes in surface, ladder and crown fuels have resulted in the potential for an increase in fire intensity and severity when fires do start. The arrangement and amount of fuels can now carry a fire into the crowns of trees, resulting in fires of an intensity and severity outside of the historic fire regime of the resource area. These intense fires are difficult to suppress, threaten human life and property, and can result in the loss of key ecosystem components.

The Fire and Fuels section tracts the key issue indicators throughout the analysis by delineating them with the "key" icon (above) to aide the reader. The issue indicators are potential flame lengths and the windspeed necessary for a stand to sustain an active crown fire (called crown index).

For the purposes of this analysis, historic fire occurrence and the existing fuel conditions were obtained through fire archives, research, and modeling.

### *A. Fire Archives*

The spatial location of fire disturbances for both the Coeur d'Alene River Ranger District and the Twomile Resource Area have been recorded and mapped by the Forest Service for approximately 130 years. Fires were initially mapped with colored pencil on a district map, but are now digitized and mapped using GIS (Geographic Information System) computer software. A map of the recorded fire history for the Twomile

Resource Area is located in the project file (PF Doc. FF-30), and was used to make assumptions as to when effective fire suppression began.

Records of fire ignitions were obtained from a national database containing information submitted by the Forest Service and Idaho Department of Lands (PF Doc. FF-31). Forest Service ignition records cover the years 1960-2000, while the Idaho Department of Lands records cover the years 1981-2000. These records include the year, size, location, and cause of each fire reported.

## *B. Fire Research*

Fire research for the Twomile Resource Area included an approach to use findings from applicable fire history studies and site-specific fire scar analysis. A fire history study of the Idaho Panhandle National Forests was conducted by Zack and Morgan in 1994 (PF Doc. FF-18) analyzing the interaction of fire disturbances in northern Idaho. The information gathered by this study and subsequent conclusions drawn from it (historic fire intensity and severity) are relevant to the Twomile Resource Area and were used to help characterize the existing condition of the area.

An analysis of fire scar samples was initiated for the Twomile Resource Area. Fire scars are open scars or "catfaces" resulting from one or more fires burning at the base of a tree. Once fire scars a tree, the tree is more likely to record subsequent fires, although it may not record every fire that burns near or around it. The low snow pack during the winter months of 2003 enabled field samples to be obtained. Sample trees were chosen randomly throughout the selected stand boundaries on trees that exhibited fire scars. Samples were taken using methods described by Arno and Sneck (1977; PF Doc. FF-3). The success of obtaining a complete cross-section fire scar was very discouraging. Several of the sampled trees had rotten pith, thus the complete chronology of the fire disturbances was unavailable. Of all the samples, only one included the entire cross section of the tree. This small fire scar analysis is not statistically comprehensive, but rather a way to shed more light on the fire history of the Twomile resource area. Therefore, rather than continuing to disturb more of the large legacy trees for marginal results, the small sample size was deemed sufficient for this analysis.

## *C. Computer Modeling*

**Forest Vegetation Simulator (FVS):** Information about existing vegetation was obtained from existing databases (Timber Stand Management Record System, TSMRS and field sampled vegetation, FSVeg) that were developed from stand exam information, historical records and aerial photo interpretation. This information was used in the Fire and Fuels Extension (FFE) to the Forest Vegetation Simulator (FVS), which was developed to assess the behavior, and impact of fire in forest ecosystems (Beaukema et al. 1999, p.1; PF Doc. FF-5). The Fire and Fuels Extension was created in order to link the changes in forest vegetation due to growth, natural or fire-based mortality and management, with changes in fire behavior, using existing models and information wherever possible (Beaukema et al. 1999, p.1; PF Doc. FF-5). FFE-FVS was used to assess the risk of fire to a stand with indicators such as potential flame length, the type of fire (e.g. surface fire or crown fire), and the critical wind speeds required to initiate and sustain a crown fire. This model is not intended to predict the probability of fire or the spread of fire between stands (Beukema et al. 2002, p.1; PF Doc. FF-11). It is used solely to assess the potential fire behavior and fire effects possible considering current and future stand conditions.

The Forest Vegetation Simulator (FVS), used for this analysis, is widely used by forest managers throughout the United States and Canada to predict the effects of various vegetation management actions on future forest conditions. The Fire and Fuels Extension (FFE) integrates FVS with elements from existing models of fire behavior and fire severity (such as the Rothermel fire spread equation). The models output displays fuels, stand structure, snags, and potential fire behavior over time and provides a basis for comparing proposed fuel treatments (Beukema et al. 2002, p.1; PF Doc. FF-11). FFE-FVS was used in this analysis to describe the existing conditions of the stands in the Twomile Resource Area, as well as to compare effects of proposed treatments within each alternative.

Two primary indicators of fire hazard were used to evaluate the alternatives. First, the potential flame length (which is related to fuel loading, among other factors) was used to determine the surface fire behavior potential, as well as the trend over time. Suppression tactics are directly related to flame lengths. For example, flame lengths under four feet can be effectively attacked using hand crews constructing direct fire line, while flame lengths larger than four feet will likely have to be attacked using dozers, engines, and retardant aircraft (NWCG 1993, p. B-59; PF Doc. FF-9).

**Active Crown Fire**

**A fire event that consumes ground, surface, and canopy fuels, burning with large flame lengths and great rates of spread**

The second indicator of fire hazard used to compare alternatives was the crowning index. The crowning index is the wind speed 20 feet above the canopy, at which active crown fire is possible (Scott and Reinhardt 2001, p.17; PF Doc. FF-8). Active crown fire, also called a running or continuous crown fire, is one in which the entire surface/canopy fuel complex becomes involved, but the crowning phase remains dependent on heat from the surface fuels for continued spread. Active crown fires are characterized by a solid wall of flame extending from the fuel bed surface through the top of the canopy (Scott and Reinhardt 2001, p.4; PF Doc. FF-8). Because active crown fires consume the crowns of trees, they result in complete mortality of the overstory where they burn. Sites that can initiate or sustain a crown fire at lower wind speeds are more prone to crown fire. Critical open wind speeds for crown fire initiation and active spread are stand-specific indicators of crown fire hazard. Although critical wind speeds were used as indices, the site conditions (surface and canopy fuels, slope steepness), not the weather, are being rated (Scott and Reinhardt 2001, p.16; PF Doc. FF-8).

The crowning index describes the point at which active crowning is *possible*, not necessarily the point at which a crown fire would start. Conventional wisdom is that a surface fire must first go through a passive crown fire phase before becoming active as burning conditions worsen. A passive crown fire phase is a phase in which individual or small groups of trees torch out, but solid flame is not consistently maintained in the canopy. This also suggests that any stand not capable of initiating a crown fire would not support an active crown fire under the same conditions (Scott and Reinhardt 2001, p.21; PF Doc. FF-8). However, it is possible to have an active crown fire in a stand that would not easily initiate an active crown fire, depending on the type of originating fire (Scott and Reinhardt 2001, p.22; FF-8). For example, some forested stands may not have enough ladder fuels to initiate a crown fire until the winds reach 75 miles an hour, if a crown fire enters that same stand from another area, it could sustain the crown fire at a much lower wind speed, say 20 miles per hour. This type of fire behavior is commonly referred to as independent crown fire, fire that solely burns through the crown of the stand while the surface/ ground fire catches up afterwards. Stands that are considered safe from crown fire initiation cannot necessarily be relied upon to cause crown fire cessation (Scott and Reinhardt 2001, p.26; PF Doc. FF-8). The spatial variability of fuel conditions in the Twomile Resource Area (and beyond) could lead to crown fires initiating elsewhere and entering the stands targeted with this project. Therefore, in order to analyze accurately the susceptibility of these stands to crown fire, the crowning index was used, regardless of the ability of a stand to initiate a crown fire.

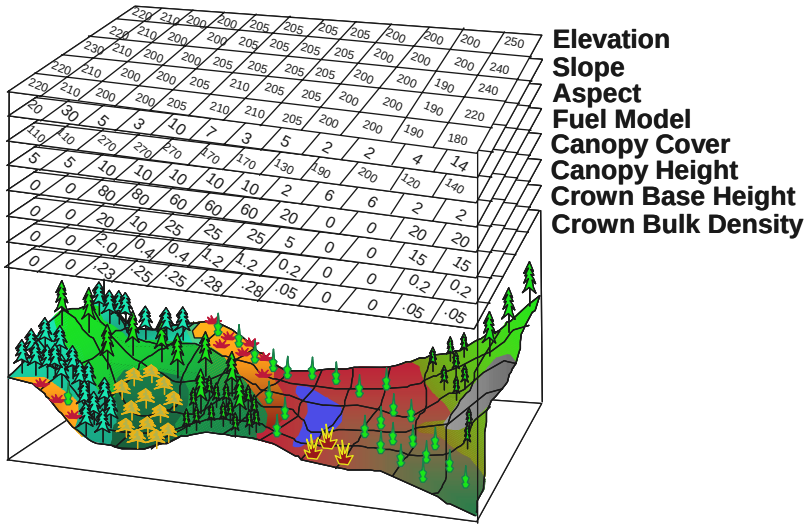



***Figure 3-FF-1: Raster themes the FlamMap model uses to capture variability on the landscape; used to estimate potential fire behavior on a 10 meter pixel basis.***

The two indices used, flame length and crown index, need to

be considered in conjunction with one another. For example, just because the crown index is increasing over time (crown fire hazard is decreasing), it does not necessarily indicate a positive trend for potential fire suppression activities. Flame lengths may be increasing at the same time, dictating different suppression tactics.

**Fire Behavior Mapping and Analysis (FlamMap):** FlamMap (Fire Behavior Mapping and Analysis) maps potential fire behavior characteristics (Rate of Spread, flame length, etc.) over an entire landscape for constant weather and fuel moisture conditions. FlamMap utilizes the same data as the Fire Area Simulator (FARSITE) to determine the potential fire behavior spatially. FlamMap requires the support of a Geographic Information System (GIS) to generate, manage, and provide spatial data themes containing fuels, vegetation, and topography. The FlamMap model helps illustrate the effectiveness of treatments on the landscape and the differences among alternatives. The latest software updates were used (FlamMap2 Beta Version 1) to estimate potential fire behavior in the Fire/Fuels analysis for the Twomile Resource Area.

Five raster data themes are required to run FlamMap; these include **elevation, slope, aspect, fuels, and canopy cover**.

The elevation, slope, and aspect themes were generated using 30-meter Digital Elevation Models (DEM)(Figure 3-FF-1). Fire behavior characteristics are most accurate when using accurate data at high spatial and temporal resolution. FlamMap uses 10-meter pixel resolution to derive fire behavior outputs, a resolution that is at a substantially finer scale than the landscape data that exists. Therefore, uses of aerial photography and some rule sets (PF Doc. FF-32) were necessary for creating fuel model, canopy height, and crown bulk density themes throughout the entire resource area. FlamMap outputs for the Twomile Resource Area are reasonable at a broader scale than 10-meter resolution, more appropriate at the stand-level.

FlamMap estimates potential fire behavior for each different 10-meter pixel with constant weather conditions that can be specified. Weather data for the fire and fuels analysis was obtained from a nearby Remote Automated Weather Station (RAWS) located in Revenue Gulch. Analyzing the historic weather data, probable extreme fire season weather was used to create the wind and weather files that are used to "condition" the live and dead fuel moistures (PF Doc. FF-33). Wind direction was set in the analysis for "direction of maximum spread" in order to capture the variability that may exist with weather events associated with fire spread. This approach is reasonable being that FlamMap is determining potential fire behavior everywhere on the landscape independent of influences from an approaching fire front or adjacent fire behavior. FlamMap differs from FARSITE in this regard, FARSITE "builds" a fire event from a defined ignition source and has influencing fire behavior characteristics based on adjacent pixels. This approach was not used for the fire and fuels analysis because ignition sources and locations on the landscape are random and cannot be predicted accurately to determine the direct effects of the proposed treatments that directly influence fire behavior in the wildland urban interface. For additional information on the modeling parameters used with FlamMap see PF Doc. FF-34.

## 3.3.3 Existing Fire/Fuels Conditions

### *A. Broad Scale Fire History*

Fire is a major disturbance factor that produces vegetation changes in our ecosystems. If the role of fire is altered, or removed, this will produce substantial changes in the ecosystem. Fire has burned in nearly every ecosystem and nearly every square meter of the coniferous forests and summer-dry mountainous forests of northern Idaho, western Montana, eastern Washington and adjacent portions of Canada. Fire was responsible for the widespread occurrence and even the existence of western larch, lodgepole pine, and western white pine. Fire maintained ponderosa pine on sites throughout its range at the lower elevations and killed ever-invading Douglas-fir and grand

**Severity**

**the degree to which a site may be altered or disrupted by a fire, often determined by the degree of soil heating**

**Return Interval**

**how often a particular type of fire occurs**

**Fireline Intensity**

**the energy release rate per unit length of fire line; a physical parameter related to flame length**

fir (Spurr and Barnes 1980; PF Doc. FF-14). Many ecosystems are regularly recycled by fire; life for many forest species literally begins and ends with fire. The types of fires that occur in forested ecosystems (Zack and Morgan 1994; pp. 19-22; PF Doc. FF-18) include:

- ***Nonlethal fires*** *- fires that kill 10% or less of the dominant tree canopy. A much larger percentage of small understory trees, shrubs and forbs may be burned back to the ground line. These are commonly low severity surface and understory fires, often with short return intervals (a few decades).*
- ***Mixed severity fires*** *- fires that kill more than 10%, but less than 90% of the dominant tree canopy. These fires are commonly patchy, irregular burns, producing a mosaic of different burn severities. Return intervals on mixed severity fires may be quite variable.*
- ***Lethal fires*** *- fires that kill 90% or more of the dominant tree canopy. These are often called "stand-replacing" fires and they often burn with high severity. They are commonly crown fires. In general lethal fires have long return intervals (140 to 250 years or more apart), but affect large areas when they do occur. Local examples of these types of fires would be the Sundance and Trapper Peak fires of 1967 that burned over 80,000 acres in a relatively short time period during late summer drought conditions.*

The Coeur d'Alene River Basin had a variable fire regime characterized by both infrequent large lethal (stand replacing) fires and more frequent shorter interval non-lethal and mixed severity fires (Zack and Morgan 1994, p. 31; PF Doc. FF-18). The variability of wildland fire severity and intensity in the Coeur d'Alene River Basin shaped forest structures throughout the landscape. Zack and Morgan (1994, p. 32; PF Doc. FF-18) found that lower severity fires structured how the landscape responded when a lethal severity fire did occur. The lower severity fires increased the proportion of the landscape with big trees and open canopies that would not sustain a crown fire. Reduction of ladder fuels would mean that even high intensity fire might not reach tree canopies in some cases. The larger trees that grew as a result of this thinning would be more likely to survive even intense fires. The net result would be that even lethal severity fires would be likely to leave more individual residual trees and patches of residual trees than if the lower severity fires had not occurred. This phenomenon exists in the Twomile Resource Area illustrated by the spatial extent of the 1889 and 1910 fire (discussed in further detail in the next section).

The interaction of fire on the landscape throughout the Coeur d'Alene River Basin historically was influenced by several different ignition methods, including but not limited to lightning and human ignitions. The number of lightning fires regularly experienced in northern Idaho is more than adequate to account for a disturbance regime that includes regular major wildfires (Zack and Morgan 1994, p.34; PF Doc. FF-18). Fire exclusion efforts have been effectively suppressing wildland fires since the 1930s, subsequently eliminating underburns and mixed severity fires which served as the thinning agents that favored dry habitat type legacy trees (larch and ponderosa pine). The changes that have occurred to western warm dry forests have been well documented by many authors. Keane et al. (1990, p. 190; PF Doc. FF-7) state:

> *Before 1900 most of these forests experienced frequent surface fires that maintained open, park-like stands of ponderosa pine, and western larch on moist sites, along with lesser amounts of Douglas-fir, grand fir and lodgepole pine (Arno 1980, Gruell et al. 1982, Martin 1982, Gruell 1985, Steele et al. 1986). Most areas have had few if any fires during the past 70 yr and, as a result, the more shade-tolerant Douglas-fir and grand fir have increased in numbers, often forming dense understories of dense immature stands arising after past logging activities (Weaver 1967, West 1969, Arno 1976, Hall 1976, Steele et al. 1986).*

Harvey (1994, p. 87; PF Doc. FF-12) states:

> *With effective exclusion of natural underburning in this century, dry forests quickly became over-stocked, often exceeding carrying capacity. In the absence of fire, native insects and pathogens regulate stocking by killing susceptible individuals and species. Frequent underburning also prevented excess accumulation of carbon and nutrients in woody biomass (Harvey 1994, Mutch 1994). The balance between fire and biological decomposition in regulating carbon accumulations in these forests has been disrupted (Olsen 1981). A current danger is stand-replacing wildfire with fuel accumulations so high that burns are extremely hot, resulting in critical reductions of stored nutrients, with accompanying losses in potential productivity (Harvey et al. 1994a). The effectiveness of fire prevention and suppression has permitted increased ground-fuel accumulations and stratified fuels (both living and dead) to the point where many fires cannot be easily contained or confined. They now burn hotter and more extensively than even 10 years ago (Auclair and Bedford 1994, Baker 1992, Brown 1983). This effect has been especially evident in dry forests that historically experienced fire every 5 to 25 years (Mutch 1994).*

The variability in wildland fire intensity and severity and spatial extent is largely dependent on the vegetation on the site. The Coeur d'Alene River Basin is unique in that it includes a variety of different habitat types. For the fire and fuels analysis the habitat types in the resource area are grouped into dry habitat type groups and moist habitat type groups. A discussion of them follows:

***Dry habitat types*** consist primarily of ponderosa pine, western larch, Douglas-fir, and grand fir. Prior to the 20$^{th}$ century, many stands in the dry forest types were burned frequently by low- or mixed- severity fire; occasional stand replacing fires occurred as well. Where fires occurred at relatively short intervals (less than 25 years), they were mostly non-lethal. Stands comprising all age structures were the result of non-lethal fire regimes, and even-age structures were the result of fire regimes with a combination of both non-lethal and severe fire patches (Smith and Fischer 1997, pp. 15-16; PF Doc. FF-3).

***Moist Habitat Types*** are dominated by a mixture of conifer species (western red cedar, western hemlock, western larch, Douglas-fir, grand fir, western white pine, lodgepole pine, etc). These are the most common forest types on mid-elevation sites in the mountains of the northern Idaho panhandle. Prior to the introduction of blister rust, when white pine was a dominant species, this was known as the "white pine type." These forests are very productive and prior to European settlement tended to accumulate large amounts of biomass (the collection of all the living plant in a forest) in the relatively long intervals (average 200+ years) between stand replacing fires. Sometimes, low-severity fire occurred two to three times as often as either moderate- or high-severity fire (Smith and Fischer 1997, pp. 15-16; PF Doc. FF-3). Because presettlement intervals between severe fires were generally long in these forest types, the effects of fire exclusion are subtle. However, exclusion of low- and mixed- severity fires over the past 90 years has reduced ecological diversity and increased homogeneity (stands of similar size, age, species composition, structure, etc.) across the landscape (Smith and Fischer, 1997, pp. 15-16; PF Doc. FF-3).

## *B. Twomile Resource Area Fire History*

The last substantial landscape fire that burned in the Twomile Resource Area occurred in 1889 (Figure 3-FF-2). Throughout the 1889 fire season approximately 320,000 acres burned in northern Idaho (PF Doc. FF-30). It is reasonable to assume that this fire event burned very characteristic to a mixed severity fire, because the large legacy ponderosa pine trees on the dry habitat types survived the fire and still exist in the resource area. Further discussion of their survival follows in the discussion of fire scar analysis in the area. A unique feature of the 1889 fire that supports mixed severity fire behavior is a polygon that exists in the middle of the fire extent that did not burn until 1910. This phenomenon is not uncommon with mosaic burned areas associated with mixed severity fire events in northern Idaho. It is reasonable to assume that as the 1889 fire progressed through the resource area it burned with low severity on the southern, dry aspects continuing in to moist habitat types with lethal fire behavior characteristics where site specific fuels and weather conditions permitted. Mosaic patterns where fire did not burn were also created, presumably influenced by greater fuel moistures and/or site-specific variability with wind and weather events. Arno and Davis (1980, p. 24; PF Doc. FF-27) state that fires in moist habitat types burned under variable intensities, ranging from light ground fires that did little direct damage, to crown fires that covered hundreds of acres in a major run. Overall, Arno and Davis (1980, p. 24; PF Doc. FF-27) conclude that pre-settlement fire history in moist habitat types left a patchy pattern of complete stand replacement, partially killed overstory, underburning with little overstory mortality, and unburned forest.

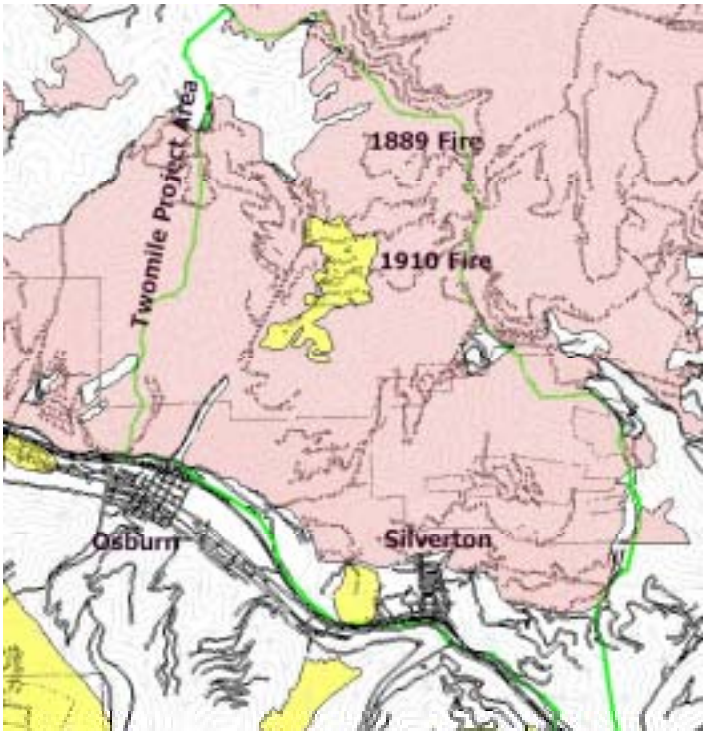



***Figure 3-FF-2: Fire history map showing the extent of the last landscape fire event that occurred in the Twomile Resource Area.***

***Figure 3-FF-3: Example of a dry habitat type stand in the resource area rated as Condition Class 3, where three fire return intervals have been missed and forest composition and structure has been highly altered.***

Goals of the National Fire Plan are to change trends in Condition Classes defined by Schmidt et al. (2002, p. 8; PF Doc. FF-1), from Condition Class 3 to Condition Class 1. The dry habitat types in the Twomile Resource Area primarily fall into Condition Class 3, which describes areas where fire regimes have been substantially altered from their historical range, the risk of losing key ecosystem components is high, and fire frequencies have departed from historical frequencies by multiple return intervals (Figure 3-FF-3). The moist habitat types in the resource area are also rated as a Condition Class 3 being that the forest composition and structure is highly altered from historic conditions. This change is

brought about by changes in vegetation composition due to western white pine blister rust and fire exclusion. The moist habitat types are within historic fire return intervals (average 200+ years), but the key ecosystem components (white pine and western larch) necessary for restoration to Condition Class 1 do not exist. This change in Condition Class ratings results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, and/or landscape patterns, and are consequently a high priority for treatment due to the proximity to the nearby communities.

In order to more accurately characterize the fire history in the Twomile Resource Area, fire scar samples were obtained (PF Doc. 3-FF-35). Samples were taken using methods described by Arno and Sneck (1977, pp. 11-14; PF Doc. FF-2). The earliest fire scar recorded occurred in approximately 1703, while the last fire scar recorded occurred in approximately 1938 (PF Doc. FF-35). Effective fire suppression influences are evident in the Twomile Resource Area after the last recorded fire scar of the 1930s.

Fire return intervals were calculated for the time period before 1938 (presumably before effective fire suppression) as an indicator of historic fire regimes on dry habitat types. The fire return interval was calculated to have a fire frequency of approximately every 29 years. This figure is an indicator of how often fire returned to the particular tree the sample was taken from. The shorter the fire return interval, the more often that particular tree burned. Choosing 1938 as the date to close the fire intervals and calculate the fire return interval may artificially shorten the fire return interval, especially if a fire occurred very near 1938. In addition, the calculations of fire return interval include an extra fire, assuming that the ponderosa pine sampled originated soon after a fire. Zack and Morgan (1994, p. 17; PF Doc. FF-18) also used tree origin dates as evidence of a fire. Ponderosa pine and western larch are well adapted to regeneration after fires, and regenerate best on burned seedbeds (Smith and Fischer 1997, pp. 15-16; PF Doc. FF-3). Using the a fire return interval of approximately every 29 years, it is reasonable to determine that the dry habitat types in the resource area have missed 3+ fire return intervals, a condition that allows for the continued succession of shade tolerant tree establishment.

***Figure 3-FF-4: Example of an open park-like, dry-habitat type stand where wind speeds greater than 20 mph would be necessary to sustain independent or active crown fire behavior.***

For the purposes of fire and fuels analysis, it is important to note that many nonlethal fires fail to leave scars on thick-barked trees (Arno and Sneck 1977, p. 25; PF Doc. FF-3), so the actual intervals between fires are probably even shorter than those reported here (Smith 1994, p. 85; PF Doc. FF-4). Even trees that are a few feet apart do not record the same fires, and the same tree may not record every fire evenly on each side of the scar. Considering these factors, as well as the bias that may be introduced with the calculation of Fire Return Interval (FRI), it would be reasonable to estimate an average fire return interval throughout the dry habitat types in the Twomile Resource Area of about 30 years (prior to effective fire suppression).

Throughout the Twomile Resource Area, conifers are regenerating, which will create a denser stand in the future if fire continues to be excluded. Surface fuels, which were once light on these sites, have accumulated for approximately 66 years and are most likely heavier than they were in 1938. Downed woody material is now common, from root disease influences, and the existing condition has some grassy areas but more commonly the understory brush is now 6 to 10 feet tall in many places.

Many stands in the Twomile Resource Area, despite habitat type, were found to have a very dense canopy in comparison to historic conditions. These stands would sustain a crown fire at wind speeds of approximately 20 miles per hour. Open forested stands such as the one depicted in Figure 3-FF-4 would need a greater wind speed to sustain crown fire, and consequently have a lower crown fire hazard.

***Figure 3-FF-5: Extreme fire behavior that resulted in the evacuation of California residences during the 2003 fire season.***

Fire exclusion in fire-adapted ecosystems can cause many changes in vegetation and potential fire behavior, which are well documented. Large stand-destroying wildfires, which were historically rare in the open dry habitat type ponderosa pine forests, have become common in the dense stands that have developed as a result of fire exclusion. These dense stands provide abundant fuel ladders that allow fires to increase in intensity and burn explosively through the tree crowns (Arno et al. 1996, p. 114; PF Doc. FF-6). The increased potential for crown fire as a result of fire exclusion is of concern to fire managers, particularly when the conditions exist adjacent to communities. Crown fires are the most difficult to suppress and as a result are more likely to become large. The Twomile Resource Area is close to private land and homes and a large, uncontrolled fire could threaten the community of Silverton and Osburn, Idaho. Even if a large fire was not directly encroaching on the homes nearby, they may still need to be evacuated, because a large, uncontrolled fire in such close proximity would pose a danger due to its unpredictability (Figure 3-FF-5). Home evacuations have a major impact on the community, because they not only disrupt the lives of those evacuated, they affect the surrounding community that will have to help support evacuees with food, shelter and comfort. A large wildfire in the resource area would not only threaten homes and private land, but also negatively impact air quality and threaten public safety. Economic impacts could be substantial based on the potential loss of private property. In addition, the tourism industry would likely be slowed by the presence of a large fire in the area.

According to Forest Service and Idaho Department of Lands records (PF Doc. FF-31), there have been 38 (combined) ignitions in the Twomile Resource Area (Forest Service records include the years 1960-2000, while IDL records include the years 1981-2000). Of the 38 total ignitions, lightning caused 9 of them, while 29 were human-caused. Most of the fires were kept under one-quarter acre, while 9 of the fires were between one-quarter and 10 acres. From this ignition history data, it would be reasonable to assume that at least one lightning fire was ignited every other year somewhere in the resource area. Assuming this frequency of lightning-caused fires can be applied to the past, this frequency of lightning fires would have been sufficient to maintain the historic fire return intervals. Consequently, it is clear that fire has played a major role in shaping the ecosystem in the Twomile Resource Area.

## 3.3.4 Environmental Consequences to Fire/Fuels

### *B. Effects to Fire/Fuels Common to All Action Alternatives*

**Direct and Indirect Effects to Fire/Fuels Common to All Action Alternatives**

There are a variety of different fuel reduction treatments included in the three action alternatives including piling, chipping, and prescribed burning. The predominate fuel reduction method involves the use of prescribed burning, which can have a range of effects depending on the fuel and weather conditions at the time of the fire. Prescribed burning is completed using a prescription and burn plan in order to control and predict the effects of the fire. Common effects of prescribed burning include surface fuel reduction, understory and overstory mortality, duff consumption, soil heating, and mineral soil exposure. The degree of each effect of a prescribed fire can be controlled by careful ignition in the appropriate weather conditions. Weather conditions, however, cannot be predicted completely accurately, so there is some risk of escape with every prescribed fire that is ignited. The proximity of the Twomile Resource Area to private land and communities increases the values-at-risk, and dictates very careful implementation of any prescribed burning.

A substantial amount of prescribed burning has been carried out in the Twomile Resource Area and in the Coeur d'Alene River Ranger District in the past. Based on that history, it is reasonable to expect that the burning planned in the action alternatives would be implemented safely and effectively, with little effect to private property. The boundaries of the proposed treatment areas were established with consideration of the prescribed burning to occur after the harvest, and will likely allow efficient ignition and suppression of prescribed fires. Specifically, changes in aspect and shaded draws were commonly used as boundaries; these areas often have higher fuel moistures (especially in the spring), and in many cases will burn with very little intensity, if at all. Even with careful forethought and planning, prescribed burning can be uncertain, and small burned areas outside of the designated treatment areas should be expected. These "slop-overs" are commonly relatively small, contained quickly, and should not cause substantial effects.

The action alternatives would also decommission 3.4 miles of road (converting it to a trail system). Fire ignitions from human-caused sources have the greatest probability in developed areas. Although decreasing the road density could result in a small decrease in human-caused wildland fires, there would not be a substantial change in road densities or use patterns on those travel zones with the highest ignition density. Additional trails in the resource area can also increase the probability of human-caused fire ignitions. However, these too would have minimal, if any, effect to the fire/fuels discipline.

**Cumulative Effects Common to All Alternatives**

The fuel build up over time in the Twomile Resource Area will most likely lead to an increased probability of a large, uncontrollable wildfire due to increased fire intensity associated with higher fuel loads, which would hamper fire suppression efforts. Large fires in north Idaho have historically been wind-driven events, occurring when uncontained fires were hit by strong winds (such as the north Idaho and western Montana fires of 1910, MacPherson Fire of 1931, and Sundance Fire of 1967; Figure 3-FF-6). These wind-driven fires often spread several miles within hours – the Sundance Fire traveled 16 miles in 9 hours (Anderson 1968, p. 1; PF Doc. FF-23). Firebrands were found 10-12 miles in advance of the Sundance Fire (Anderson 1968, p. 18; PF Doc. FF-23), indicating the potential for spot-fires to develop ahead of the main fire.

Wind-driven fires such as these often have a characteristic spread direction, traveling from the west or southwest to the east or northeast. A wind-driven fire originating in the Twomile Resource Area would most likely have its primary spread away from adjacent communities, but backing spread and wind shifts would still pose substantial threats to communities. However, other possibilities exist depending on the weather situation and the behavior of the potential wildfire. A potential fire could be plume-dominated, rather than wind-driven, which would result in far more unpredictable spread, because downdrafts created by the plume could surface in any direction. Another possibility is the presence of easterly winds, which could push a fire in the resource area towards Silverton or Osburn Idaho. Easterly winds, however, are most common in the cool months, and are more frequent in the periods from September through April than during summer months

(Rothermel, 1983, p. 26; PF Doc. FF-23).

***Figure 3-FF-6. Aftermath of the city of Wallace Idaho when the 1910 fire burned through northen Idaho.***

Many different methods of timber harvesting have occurred, from removal of selected individual trees to clearcutting. The effects on fire from timber harvest can vary, depending on the amount of canopy removed, the subsequent fuel treatment, and the time since harvest. Timber harvest without subsequent fuel treatment may have much the same effect as fire suppression, by causing an increase in surface fuels. In many cases, selective timber harvesting does not reduce the tree density (spacing of the tree crowns) enough to have a long-term effect on the potential for crown fire in a stand (Fiedler et al. 2001, p. 11; PF Doc. FF-21). In addition, research suggests that despite repeated silvicultural cuttings over a period of over 80 years, thickets of understory conifers (ladder fuels), down woody fuels, and litter fuels tend to increase in the absence of fire (Smith and Arno, 1999, p. 47; PF Doc. FF-26). These findings support the conclusion that the primary factor in analyzing cumulative effects for the fire/fuels resource is the absence of fire, caused by over 90 years of effective fire suppression.

Fire suppression has been effective in the Twomile Resource Area for over 90 years, and the incremental effect of suppressing each small fire in the watershed has contributed to a substantial change in the resource area. Fire suppression is currently occurring in the Twomile Resource Area, and it is reasonable to assume that it will continue in the future, considering the close proximity to communities. Fire suppression will allow the continuation of surface fuel accumulation, as well as allowing the continuation of succession and the preference for shade-tolerant/ fire-intolerant species (Douglas-fir and grand fir) to reproduce. Without management intervention, succession would continue, favoring shade-tolerant vegetation, limiting future management alternatives to preserve the remnant fire-resistant trees. Dry stands would continue to trend farther away from their historical structure, which was maintained by low intensity, frequent fire. This change in structure has also caused a change in potential fire behavior, intensity, and severity. Moist stands in the resource area would also be affected by fire suppression, specifically by promoting shade tolerant species (Douglas-fir and grand fir) rather than long-lived seral species (white pine and western larch). Those changes in forest structure in moist habitat types correspond with changes in potential fire behavior (intensity and severity) also (Zack and Morgan 1994, p. 32; PF Doc. FF-18). Similar changes in ecosystem structure in the past have undoubtedly contributed to historic fires, from lethal stand-replacing fires to low severity underburns that recycled inland ecosystems. These changes in forest composition and structure can have prolonged effects in the event of catastrophic fire behavior.

It is not possible or desirable to "fireproof" fire-dependent ecosystems, but active land management can reduce the potential of severe fire. Federal land management agencies can mimic natural disturbances, but it is essential for managers to consider that current conditions may be considerably different than those conditions that occurred historically. Reintroduction of native processes such as fire without modification of structural patterns, fuel loadings, and spatial distributions can produce unpredictable and undesirable effects (Quigley et al. 1996, pp. 165, 184; PF Doc. FF-16). Multiple treatments will be needed to regulate vegetation structure, composition, and associated biomass loadings. Long management horizons may be required to restore unhealthy ecosystems to more sustainable conditions. The most effective means to restore long-term forest health will be tree density and fuels management, plus regulation of species composition to improve the dominance and distribution of seral species (Harvey, et.al. 1995; PF Doc. FF-13). The use of prescribed fire alone for stand restoration would be largely ineffective with spring burns, and destructive with dry season burns (Barrett, S. W. 1994; PF Doc. FF-10). In the case of the Idaho Panhandle National Forests, the lack of

an adequate seral species seed source in many of the current, altered timber stands would assure long-term failure of vegetative restoration efforts without artificial regeneration (planting) of seral species.

## *B. Effects to Fire/Fuels Under Alternative 1 (No-Action)*

**Direct and Indirect Effects to Fire/Fuels Under Alternative 1**

In terms of the fire and fuels analysis, direct effects (those which are caused by the action and occur at the same time and place) would be minimal if not absent under Alternative 1, because there are no proposed activities under the No-Action Alternative (the reasonably foreseeable activities identified in Chapter 2 would occur, and changes could occur due to natural events). The primary effects of Alternative 1 are indirect and cumulative. Indirect effects of Alternative 1 include the continuation of surface fuel accumulation and successional changes in stand structure that affect fire behavior. Figures 3-FF-8 - 11 display the potential fire behavior that would be reasonably expected over time, if none of the proposed activities are implemented.

Flame length is a characteristic of fire behavior that can be employed to indicate how fire would respond to different forest conditions. Flame length is measured from midway in the active flaming combustion zone to the average tip of the flames (Figure 3-FF-7). Potential flame length for the fire and fuels analysis is delineated by habitat type groups within the resource area. The habitat types are described in both dry and moist groups to capture the variability throughout the landscape and within the stands considered for treatment.

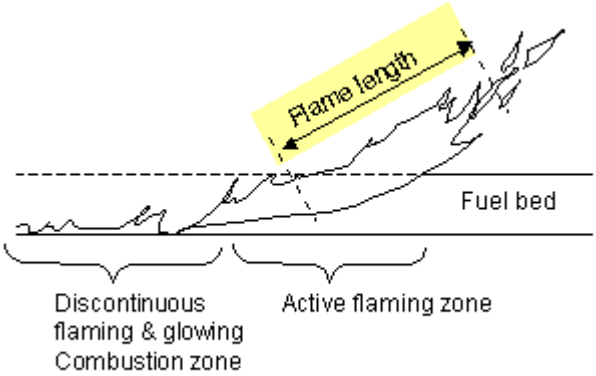



***Figure 3-FF-7. The length of flames within an active flaming front.***

As displayed in the figures below, potential flame length is substantially different when comparing the dry and moist habitat groups (Figures 3-FF-8 and 3-FF-9). This difference is due to variability in site productivity, forest structure and function. Nevertheless, both dry and moist habitat type groups have modeled increases in expected flame lengths given no action. The increase in flame length is in response to increases in surface fuels and understory fuels as the stands break down from disturbance processes such as forest insects and disease. The increase in flame lengths shown in the figures below would necessitate a change in suppression tactics over time. Direct attack with hand crews can only be effective with flame lengths under four feet. Once flame lengths surpass this mark fires are too intense for direct attack, other indirect suppression tactics such as backfiring or burnouts must be used to control the spread of the fire. Indirect tactics are those where suppression forces would retreat to a safe and defensible place where they believe the fire can be stopped, and attempt to hold the fire at that location. Use of this tactic often results in more acreage burned.

**Once flame lengths are greater than 11 feet, crowning, spotting, and major fire runs are common. That type of fire behavior presents serious control problems that increase threats of wildland fire to life and property, and increases costs associated with fire suppression activities.**

***Figure 3-FF- 8. Flame length potential in the dry habitat type groups over time modeled without any of the proposed activities.***

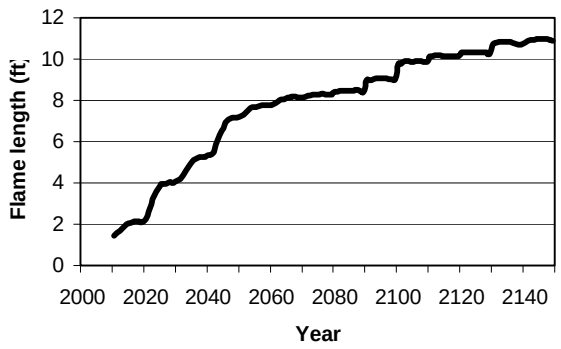
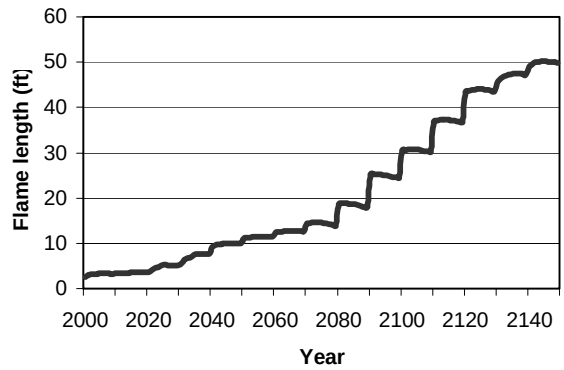



***Figure 3-FF- 9. Flame length potential in the moist habitat type groups over time modeled without any of the proposed activities.***




While the above figures reflect the change in surface fuels, crown fuels will also change over time without management intervention. Tree spacing, tree height, and limb heights are stand-structure attributes that influence the potential for fire to burn in the crowns of trees. Analyzing the Crowning Index, which is the wind speed at which a crown fire could be sustained given certain canopy characteristics, helps to determine the potential for crown fire. The Crowning Index is a key issue indicator and used to illustrate the susceptibility of the stand to crown fire from adjacent stands. The crowning index for the dry and moist habitat type groups (Figure 3-FF-10 and 11) is currently about 20 miles per hour, but over time that wind speed increases until it reaches approximately 50 miles per hour (a lower wind speed indicates a higher risk of crown fire). Unfortunately this change is a response to forest health concerns, a reduction in the density of the crowns, likely caused by mortality of Douglas-fir in the overstory due to root disease.

Analysis of flame length potential (Figures 3-FF-8 though 11) indicate that as the Douglas-fir overstory dies and falls down, it causes an accumulation of surface fuels and an increase in potential flame lengths. This phenomenon has some variability due to moisture, but the general trend is the same for both the dry and moist stands throughout the resource area. Under the No-Action Alternative, the stand would continue in succession until some disturbance process takes place, and being that fire is excluded, forest insects and disease dictate the future of the stands. The accumulation of biomass on the forest floor is then associated with greater flame lengths and subsequently greater fire intensities.

The Crowning Index analysis suggests that the existing condition is one where crown fire cessation (greater than 50 mph) would not occur if that type of fire behavior approached these stands from adjacent areas. In other words, if an active or independent crown fire approached these stands it would not fall to the ground and burn on the surface, rather continue through the crowns burning the tree canopies and/ or the surface fuels.

Another indirect effect of the No-Action Alternative is to allow the dry forest stands in the Twomile Resource Area to remain in (or further progress into) Condition Class 3 (Schmidt et al. 2002, p. 8; PF Doc. FF-1), which would not be consistent with the goals of the 10-Year Comprehensive Strategy Implementation Plan (www.fireplan.gov) to reduce hazardous fuels and restore fire-adapted ecosystems.

**Crowning index reflects the wind speed at which a canopy fire is possible.**

***Lower wind speed indicates a higher risk of crown fire.***

***Figure 3-FF- 10. The wind speed at which a crown fire would be sustained in dry habitat type groups, modeled with no disturbance.***

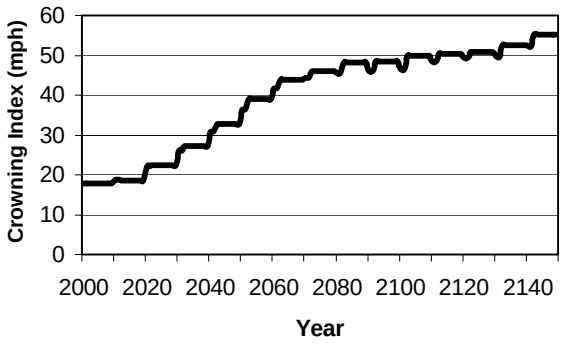
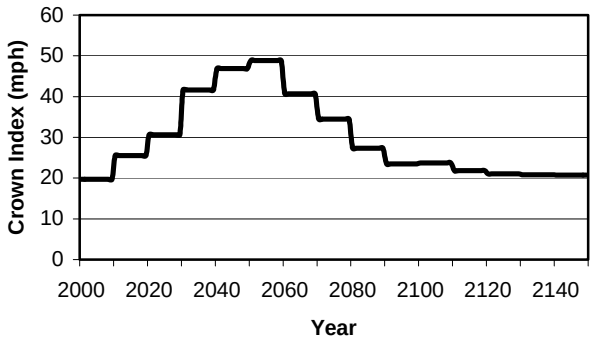



***Figure 3-FF- 11. The wind speed at which a crown fire would be sustained in moist habitat type groups, modeled with no disturbance.***




**Cumulative Effects to Fire/Fuels Under Alternative 1**

Under Alternative 1, the effects of 90 years of fire suppression would continue on its current trend. Alternative 1 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. The dry habitat type groups would have the greatest risk of losing the fire-resistant species that are less resilient to fire, meaning that they could experience more pronounced fire effects and an increased amount of mortality associated with a wildfire.

Historically on the drier aspects, ponderosa pine forests were very resilient to fire; they experienced very little change after they burned due to the fire resistance of the species and the low-intensity fire behavior. Alternative 1 would allow the dry forests of the Twomile Resource Area to continue on their trend of decreasing resilience to fire, and consequently put more of the watershed at risk to catastrophic fire.

***Figure 3-FF-12. Example of a root rot pocket in the Twomile Resource Area where stand structure is falling apart.***

**<u>Alternative 1 (No-Action)</u>**
**Over time stands would fall apart, decreasing the stand density and increasing surface fuels and potential flame lengths.**

The moist habitat types would continue to degrade by means of root disease and contribute substantial biomass to the forest floor, increasing the probability of intense fire behavior. Shade-tolerant regeneration would become established faster in the productive aspects and provide a greater opportunity for fire to burn lethally. In mixed severity fire regimes this type of fire behavior is not historically uncommon, however due to the proximity of these stands to the urban communities of Silverton and Osburn, adverse effects to life and property could occur.

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 root disease is an increasing problem will also contain more snags, which are particularly dangerous for firefighters. Larger, more intense

fires that threaten nearby homes and communities could have various unwanted effects (evacuations, threatened and burned structures, adverse health effects from smoke, negative economic impacts).

Alternative 1 would allow the forested areas adjacent to and within the Wildland Urban Interface to remain in or further progress into Condition Class 3, which would not be consistent with the goals of the National Fire Plan and 10-Year Comprehensive Strategy Implementation Plan (www.fireplan.gov) to reduce hazardous fuels and restore fire-adapted ecosystems.

## *C. Effects to Fire/Fuels Under Alternative 2*

**Direct and Indirect Effects to Fire/Fuels Under Alternative 2**

The direct effects under Alternative 2 (those which are caused by the action and occur at the same time and place) are attributed to a variety of different silvicultural prescriptions and fuel reduction methods to satisfy the purpose and need of reducing fire intensities in the urban interface and restoring fire-adapted ecosystems. The treatments would remove enough of the fuel biomass to directly affect fire behavior and capitalize on opportunities to address forest health issues, restoring a sustainable ecosystem structure and function. Primarily, Alternative 2 would use shelterwood harvest, thinning, slashing, piling, chipping, and prescribed burning activities in the wildland urban interface to directly effect the potential fire behavior.

The stands selected for treatment in this alternative have substantial variability in terms of landscape position, elevation, vegetative species present, and habitat types. Therefore the treatments prescribed in this alternative may differ from traditional regeneration harvests. The prescriptions incorporate the existing conditions on the ground and provide for opportunities to promote the advantageous characteristics of the stand and fix the adverse conditions. For example, many of the units in this alternative vary from relatively dry sites to moist sites with small changes in aspect. The dry habitat types would include treatments that would be best to ensure the vigor and survival of the ponderosa pine trees, whereas the moist habitat types would transition into a combination of long-lived seral tree species including western larch and western white pine. Areas with severe root disease would be harvested and cleared of advanced Douglas-fir and grand fir regeneration so they could be planted with more desirable species that are resistant to low intensity fire and root diseases. These variable land management techniques do not necessarily correspond with traditional silvicultural nomenclature at the "stand level" scale. For this reason, the identified treatments in this alternative depict the most invasive treatment for analysis purposes, however, the planned implementation is going to be depicted by on-the-ground site characteristics that are less impactive, improving forest health and directly effecting potential fire behavior.

To determine direct and indirect effects, the thinning and shelterwood harvest prescriptions are used to model the changes in potential fire behavior over time. The issue indicators for fire/fuels hazards are potential flame lengths and crown indices. Flame lengths increase following harvest, but then subside after fuels are treated in both prescriptions. As shown in the following figures, after treatment and after the slash is taken care of, flame lengths would be reduced in comparison to Alternative 1, but over time would still follow the same increasing trend if there is no additional maintenance. Regardless of habitat type, flame lengths could be reduced by around the year 2015, so that they are less than 4 feet (considered the threshold that enables direct fire suppression tactics), which would be less than under the No-Action Alternative at the same point in time. The year 2015 is also the point in time when prescribed burning activities would occur to maintain the stand. If maintenance activities do not occur the stand progression would be associated with flame lengths that are greater than the existing condition.

The small flame lengths displayed in the figures below are indicators of reduced potential fire intensities, but cannot be used alone to determine the effectiveness of the proposed treatments. Canopy density and the associated crowning index is an issue indicator that must be analyzed concurrently with potential flame lengths. The Crowning Index for the treatments (Figures 3-FF-18 through 3-FF-21) is a more dramatic change, showing that on all habitat types the wind necessary to support a crown fire increases from around 20 mph to over 50 mph. This change in the crowning index shows that the prescribed treatments reduce the probability of independent (crown fire burning through the crowns only) and active (ground, surface, and

crown fuels all fully ignited) crown fire events. Both of these effects will be discussed in further detail throughout this section.

The moist habitat type groups have stand exam data that exists previous to the year 2003, so the year 2000 was used to describe inventory conditions.

***Figure 3-FF- 13. Flame length potential in shelterwood harvest treatments in the dry habitat type groups over time under Alternatives 2 and 3, in comparison to the No Action Alternative.*** *Short-term increases in flame lengths decrease by approximately year 2015 where maintenance activities would be initiated to prevent the increase of flame length into the future.*

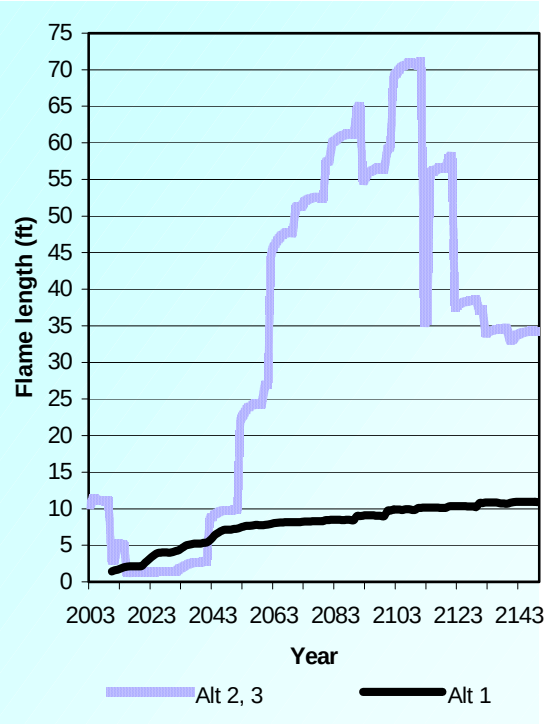



***Figure 3-FF- 14. Flame length potential in shelterwood harvest treatment areas of the moist habitat type groups over time under Alternatives 2 and 3, in comparison to the No-Action Alternative.*** *Short-term increases in flame lengths decrease by approximately year 2015 where maintenance activities would be initiated to prevent the increase in flame length into the future.*

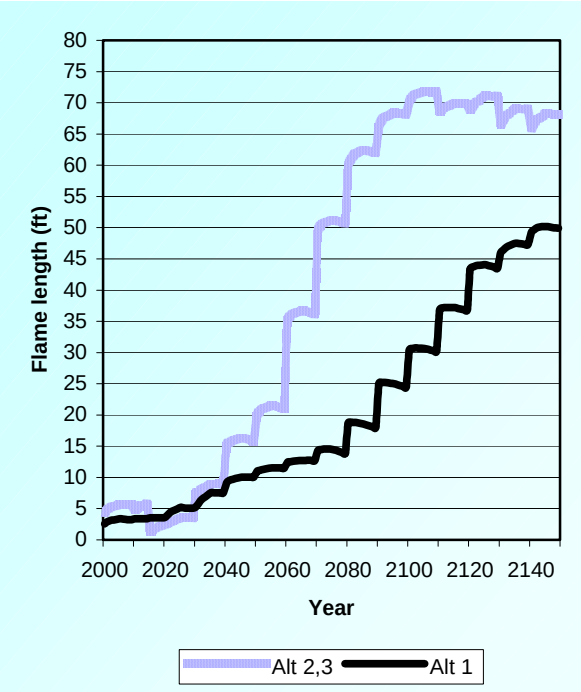


***Figure 3-FF- 15. Flame length potential in thinning treatment areas of the dry habitat type groups over time under Alternative 2 and 3, in comparison to under the No-Action Alternative.*** *Flame lengths are decreased post-harvest (yr 2015) where maintenance activities would be necessary to prevent the increase of flame lengths into the future with stand re-initiation.*

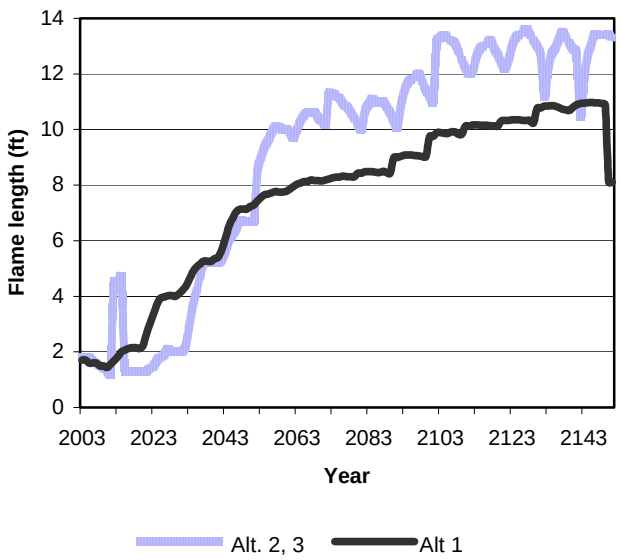
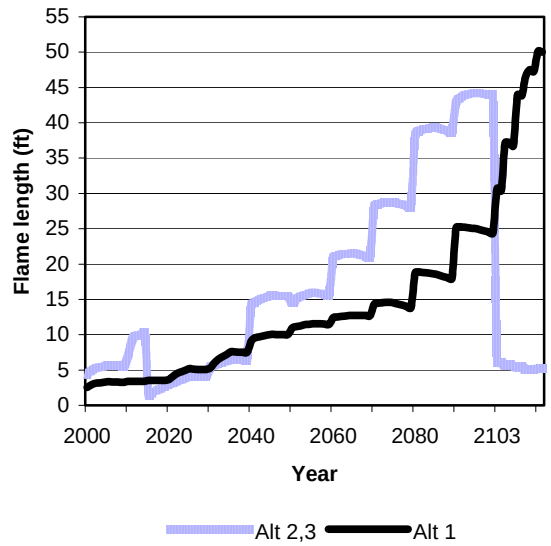



***Figure 3-FF- 16. Flame length potential in thinning treatment areas of the moist habitat type groups over time under Alternatives 2 and 3, in comparison to the No-Action Alternative.*** *Flame lengths are decreased post-harvest (yr 2015) where maintenance activities would be necessary to prevent the increase of flame lengths into the future with stand re-initiation.*




In shelterwood harvest area, flame lengths would increase immediately as they do with all harvests, and then subside after treatment of activity fuels. A unique characteristic of shelterwood harvests relative to fire behavior characteristics is that these harvests are meant to stimulate regeneration of small trees, which can increase the potential flame lengths in the early stages of succession. Regeneration is necessary to establish seral species such as ponderosa pine in order to create a sustainable structure for the long-term, but if thickets of regeneration are not managed in the future, they could pose a risk due to their ladder fuels and dense canopies. These risks can be mitigated through precommercial thinning, pruning, piling and burning, and underburning treatments.

The crowning index would increases substantially with shelterwood harvests in both the dry and moist habitat types. This increase shows that the stand would not be able to sustain a crown fire until wind speeds were very strong - approximately 60 to 80 miles per hour, instead of the approximately 20 miles per hour under the No-Action Alternative. The increase in crown fire index would change throughout time without any additional entry, because regeneration would increase the density of the canopy. Maintenance treatments such as prescribed burning would have to be accomplished to retain structural conditions that would be associated with a 60-80 mph crowning index.

The same relationship exists with thinning treatments on dry and moist habitat types as shelterwood harvests, although to a somewhat lesser extent. For example, in the moist habitat types thinning treatments reduce the density of the crowns, increasing the crowning index throughout time approximately 10 mph greater than Alternative 1(Figure 3-FF-16); whereas shelterwood harvests increased the crowning index approximately 25 mph post treatment (Figure 3-FF-18). The greater the crowning index, the less susceptible the stand is to supporting active crown fire behavior. After treatment the crowning index on both the dry and moist habitat types increases to approximately 30 mph, an effect that makes the stands less likely to support crown fire behavior, but not quite as effective as the crowning index associated with shelterwood harvests (approximately 60 to 80 miles per hour). This is because not as much of the canopy is removed with thinning treatments compared to shelterwood harvests. Successional stages dictate the management prescriptions of

both thinning and shelterwood harvests, but both prescriptions have direct effects of reducing flame lengths and increasing the wind speed necessary to sustain a crown fire (post activity, post slash treatments).

The land management activities included in Alternative 2 cause an increase in surface fuel loading in terms of logging slash, as well as an immediate decrease in tree density due to harvesting. The unmerchantable branches and other fuels that are left after harvest can substantially increase the fuel load, and consequently the potential flame lengths on any given site. This fuel load causes an increase in the fire hazard for a short period of time (1-3 years), until the fuel on the site is treated with an underburn or other slash treatment activity (piling, chipping).

Short-term (1-3 years) increase in fire hazards from the development of slash is exacerbated by human activity that increases the possibility of ignition and consequently, wildfire. Common ignition sources include: equipment and vehicle operation, smoking, and arson. A timber purchaser would be required to have fire suppression equipment on site and to take necessary fire precautions to prevent a wildfire from occurring. In the event of extreme fire conditions, harvest activities would be regulated or suspended until conditions improved. A timber sale administrator closely monitors the fire prevention requirements of the timber contract throughout the timber harvest operations. In addition due to the proximity of the treatment units to the urban interface, initial response times would be decreased, mitigating some portion of the risk of a wildfire event during the period of time the slash remains on site.

Alternative 2 proposes the removal of forest canopy, which reduces the moderating effect of canopy (sheltering) on wind speed, so surface winds (winds beneath the canopy that effect surface fuels) would increase. Scott and Reinhardt (2001, pg 31-32; PF Doc. FF-8) have addressed this subject. They state,

> *"The increased fuel-level wind speed coupled with increased insulation also leads to lower dead fuel moisture in treated stands during summer. These two factors tend to exacerbate surface fire behavior. However, properly executed treatments also tend to reduce the crown fire potential. Crown fire mitigation treatments often represent a tradeoff – the decrease in crown fire potential comes at the expense of increased surface fire spread rate and intensity. The greatly increased spread rate and intensity of crown fires makes this tradeoff reasonable."*

Alternative 2 does prescribe hazardous fuel reduction treatments in stands that have attributes associated with old growth. Treatments that allow the reintroduction of low intensity fire into these stands will help increase the probability of the survival of key ecosystem components, for example ponderosa pine and western larch trees. Alternative 2 proposes activities that reduce the stand density and decrease potential flame lengths in the old growth stands, which are associated with fire behavior characteristics that reduce the probability of stand replacing or lethal fire behavior. Historically the dry-site old growth stands in the resource area were more open and park-like with frequent fire disturbances (30 years), a forest structure that Alternative 2 would recreate. However, short-term increases in flame lengths and potential fire intensities would have to be incurred until the slash generated from the activities was treated. Arno et al. (1997, p.19; PF Doc. FF-28) state:

**<u>Alternative 2</u>**
**Over time stands would more closely resemble Condition Class 1, where fire regimes are within an historical range, and the risk of losing key ecosystem components is low.**

> *A common perception in American society is that old growth forests can be perpetuated by leaving them alone- letting nature take its course without human interference. This concept has serious shortcomings in forests that evolved under the influence of fire and where preservation continues the practice of excluding fire. The problem of preservation is further compounded in old growth stands historically associated with a frequent fire regime, because fire exclusion has drastically altered these ecosystems (Agee 1993; Covington and Moore 1994; Habeck 1988; Moir and Dieterich 1988; Swetnam and Dieterich 1985).*

A direct effect of Alternative 2 is the change in Condition Class (Schmidt et al. 2002, p. 8; PF Doc. FF-1) of the treated stands. The dry habitat types proposed for treatment in the resource area are currently in Condition Class 3, due to a high departure from the natural (historical) fire regimes and the risk of losing the key

ecosystem components (fire resilient ponderosa pine and western larch) given a fire event. The moist habitat types proposed for treatment in the resource area are also in Condition Class 3 based on the highly altered composition and structure of the stands. The forest composition is lacking the long-lived seral species and shade tolerant trees have replaced them. All of the treatments proposed in Alternative 2 (1,103 acres) would change the stand conditions to more closely resemble Condition Class 1. Condition Class 1 is described as a stand where fire regimes are within an historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within an historical range (Schmidt et al. (2002, p. 8; PF Doc. FF-1). The treatments proposed in Alternative 2 would be consistent with, and further the goals of the 10-Year Comprehensive Strategy Implementation Plan (www.fireplan.gov) to reduce hazardous fuels and restore fire-adapted ecosystems.

***Figure 3-FF- 17. The wind speed at which a crown fire could be sustained in shelterwood harvest treatment areas of the dry habitat type groups over time under Alternatives 2 and 3, in comparison to the No-Action Alternative.*** *The crowning index increases post-harvest (yr 2015) where maintenance activities would be necessary to ensure an open stand into the*

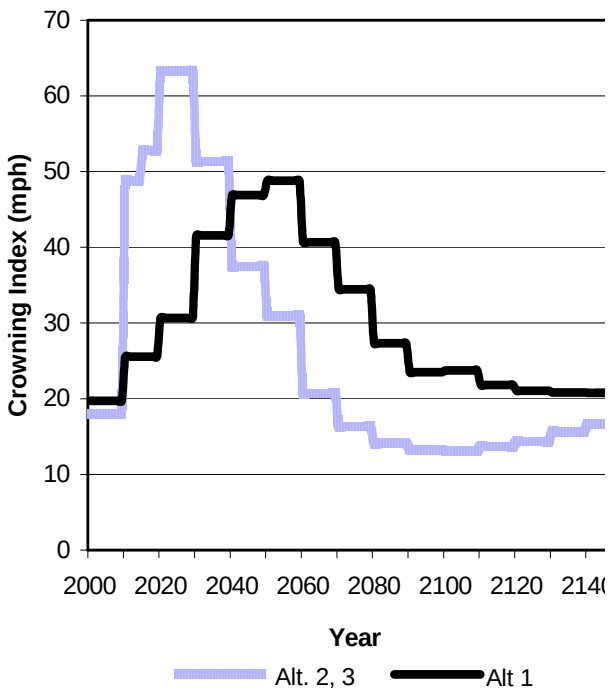



***Figure 3-FF- 18. The wind speed at which a crown fire could be sustained in shelterwood harvest treatment areas of the moist habitat type groups over time under Alternatives 2 and 3, in comparison to the No-Action Alternative.*** *The crowning index increases post-harvest (yr 2015) where maintenance activities would be necessary to ensure an open stand into the future.*

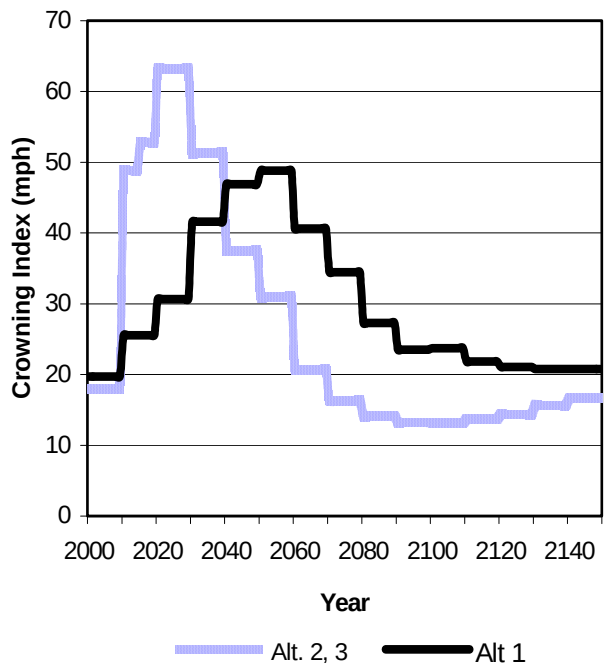


***Figure 3-FF- 19. The wind speed at which a crown fire could be sustained in thinning treatment areas of the dry habitat type groups over time under Alternatives 2 and 3, in comparison to the No-Action Alternative.***

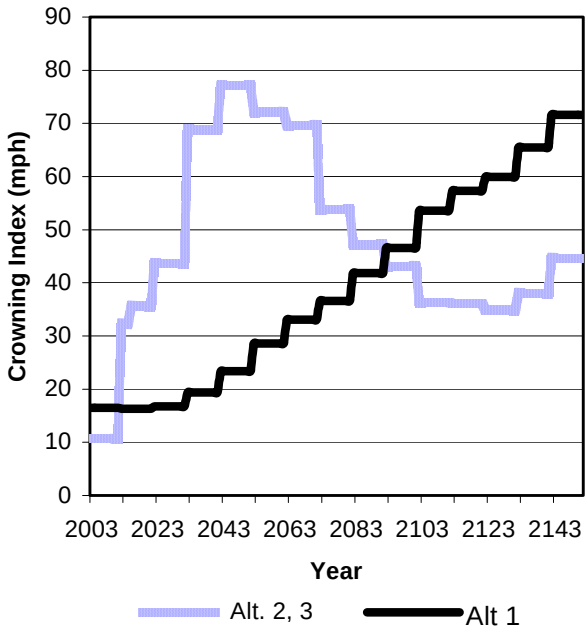
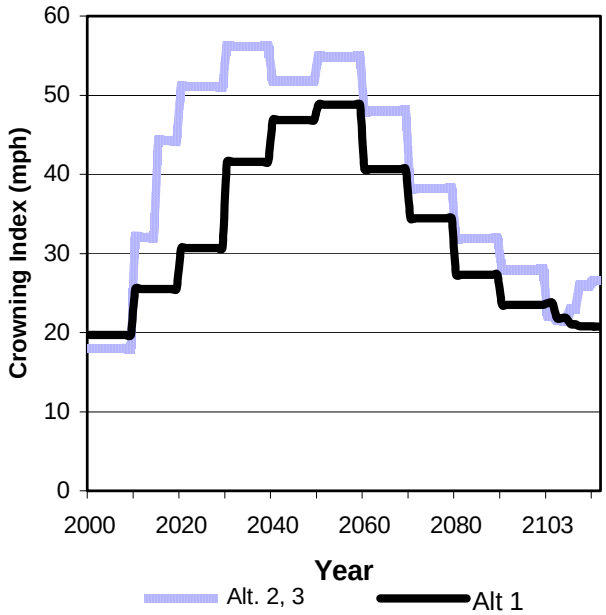
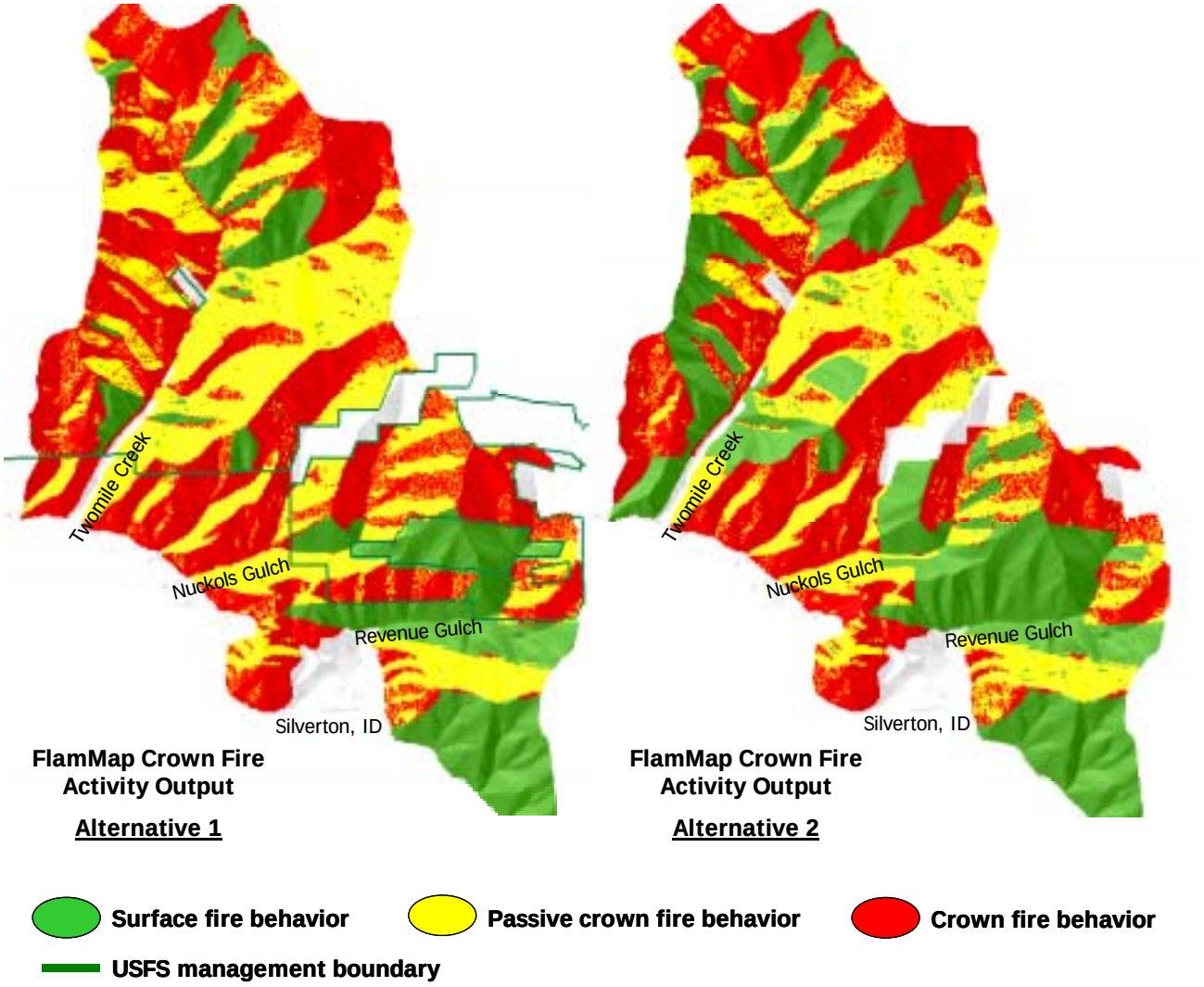



***Figure 3-FF- 20. The wind speed at which a crown fire could be sustained in thinning treatment areas of the moist habitat type groups over time under Alternatives 2 and 3, in comparison to the No-Action Alternative.***




The relationship between the forest canopy, surface fuel moisture, soil moisture and fire behavior and effects is complex and has[1] many aspects which must be considered when determining effects. In addition to those site factors that remain constant, current weather, season of the year, presence of drought and the characteristics of the fire in question are all very important but highly variable factors that influence fire behavior and effects. Spatial modeling tools, such as FlamMap, attempt to capture variability and compare effects throughout the landscape. It is reasonable to compare the existing condition fire behavior outputs to that of the proposed alternative to illustrate treatment effectiveness of reducing fire intensities in the wildland urban interface (as shown in the figure below).

***Figure 3-FF-21: FlamMap outputs of potential crown fire behavior comparing Alternative 1 to the proposed activities under Alternative 2.***




### Cumulative Effects to Fire/Fuels Under Alternative 2

Cumulative effects are those that would result from activities proposed in Alternative 2, in addition to the incremental impacts of past, present, and reasonably foreseeable future actions. The primary action to be considered when evaluating cumulative impacts in the fire/fuels analysis is fire suppression, which has occurred in the past, is occurring in the present, and is likely to continue into the future. Fire suppression has had a major impact on the vegetation in the Twomile Resource Area, changing historical fire regimes.

Reasonably foreseeable activities within the project include fuel reduction treatments on the lands managed by the Bureau of Land Management. Once planning documents are complete and NEPA analysis accomplished (2004-05), the Bureau of Land Management could slash/underburn approximately 115 acres of dry habitat types, partial cut/chip approximately 10 acres, and prescribe a shelterwood harvest/underburn on approximately 15 acres to reduce crown densities and restore long-lived seral species. If accomplished, these activities would likely increase the effectiveness of Alternative 2 for reducing fire intensities in the urban interface and restoring fire-adapted ecosystems. Activities such as these manage for reduced flame lengths and low tree densities, a future condition that lends connectivity to the proposed activities in Alternative 2, increasing the effectiveness of the treatments for the fire/ fuels discipline.

Other reasonably foreseeable actions are described in Chapter 2. These actions are not expected to substantially affect fire behavior, and do not occur on a scale that would allow meaningful analysis.

## *E. Effects to Fire/Fuels Under Alternative 3*

**Direct and Indirect Effects to Fire/Fuels Under Alternative 3**

The direct effects under Alternative 3 (those which are caused by the action and occur at the same time and place) are the same as those described above in Alternative 2. The same silvicultural prescriptions are proposed under Alternative 3, however a difference exists among the spatial extent of those treatments in the wildland urban interface (WUI). Alternative 2 proposes activities on 1,104 acres total, whereas Alternative 3 proposes treatment on 1,178 acres in the wildland urban interface. The different spatial location of treatments on the landscape has different effects in term of reducing fire intensities and restoring fire-adapted ecosystems. The effectiveness of these alternatives warrants delineating the effects analysis to describe each alternative separately. The following discussion on Alternative 3 reiterates the direct and indirect effects that are similar to Alternative 2, and contrasts the differences of the alternatives on the landscape scale.

The issue indicators for wildfire hazards are potential flame lengths and the wind speed necessary to sustain a crown fire. In terms of the fire and fuels analysis to determine direct and indirect effects, two different harvest prescriptions (thinning and shelterwood) are used to model the changes in potential fire behavior over time, identical to Alternative 2 (refer to the discussion under Alternative 2). Flame lengths increase following harvest, but then subside after fuels are treated in both prescriptions. Figures 3-FF-13 -16 show that flame lengths are reduced after treatment and after the slash is taken care of compared to Alternative 1. The Crowning Index for each treatment (Figures 3-FF-17 through 3-FF-20) is a more dramatic change, showing that on all habitat types the wind necessary to support a crown fire increases from around 20 mph to over 50 mph. This change in the crowning index shows that the prescribed treatments reduce the probability of independent (crown fire burning through the crowns only) and active (ground, surface, and crown fuels all fully ignited) crown fire events.

A direct effect of Alternative 3 would be the change in Condition Class (Schmidt et al. (2002, p. 8; PF Doc. FF-1) of the treated stands. The dry habitat types proposed for treatment in the Twomile Resource Area are currently in Condition Class 3, due to a high departure from the natural (historical) fire regimes and the risk of losing the key ecosystem components given a fire event. The moist habitat types proposed for treatment in the resource area are also in Condition Class 3 based on the highly altered composition and structure of the stands. The forest composition is lacking the long-lived seral species and shade tolerant trees have replaced them. All of the treatments proposed in Alternative 3 (1,178 acres) would change the stand conditions to more closely resemble Condition Class 1. Condition Class 1 is described as a stand where fire regimes are within an historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within an historical range (Schmidt et al. (2002, p. 8; PF Doc. FF-1).

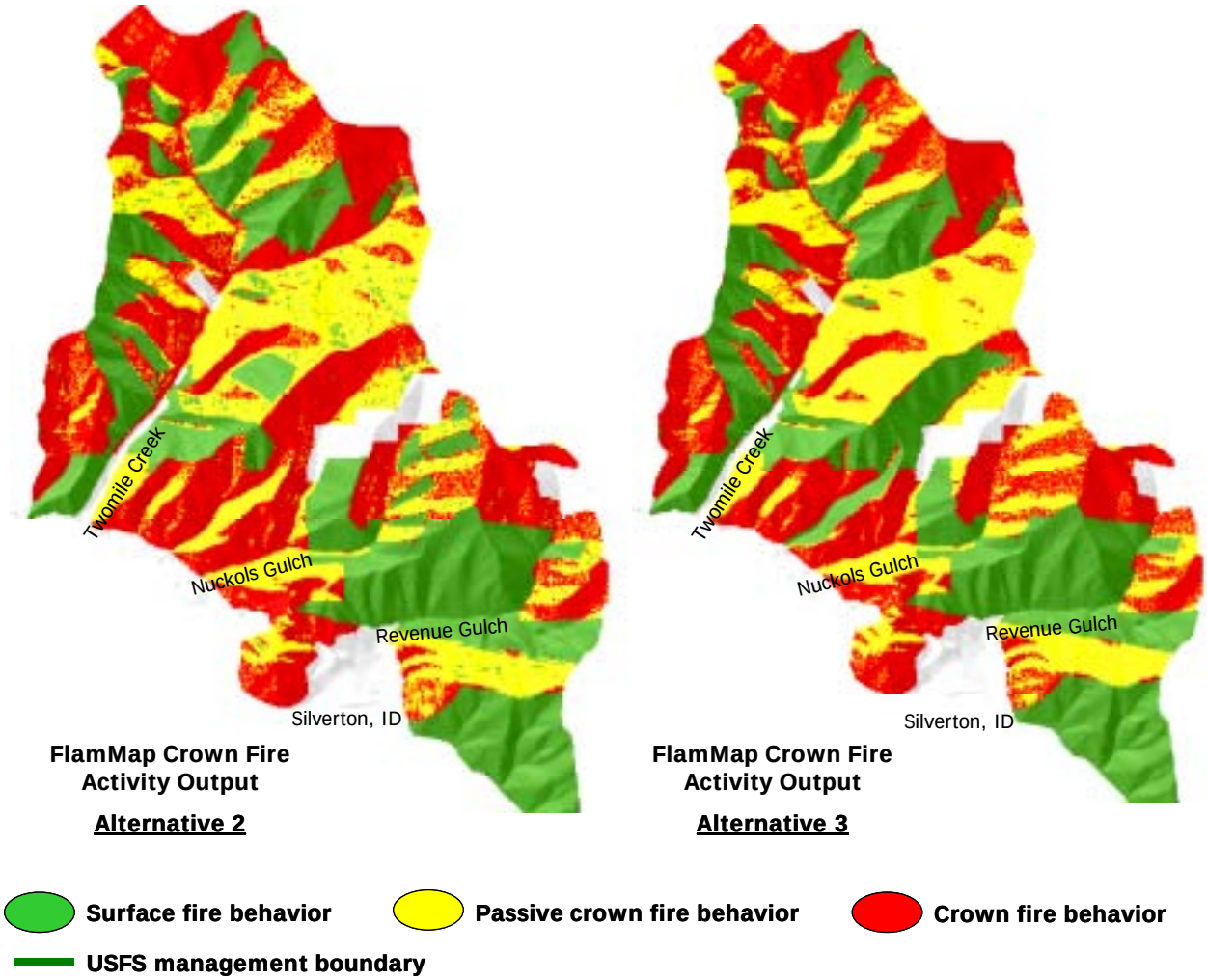
Similar to Alternative 2, Alternative 3 activities would cause an increase in short-term (1-5 years) surface fuel loading in terms of logging slash, as well as an immediate decrease in tree density due to harvesting. The unmerchantable branches and other fuels that are left after harvest can substantially increase the fuel load, and consequently the potential flame lengths on any given site. This fuel load causes an increase in the fire hazard for a short period of time (1-3 years), until the fuel on the site is treated with an underburn or other slash treatment activity (piling, chipping). In addition, short-term (1-3 years) increase in fire hazards from the development of slash is exacerbated by human activity that increases the possibility of ignition and consequently, wildfire.

**Alternative 3**
**Over time stands would more closely resemble Condition Class 1, where fire regimes are within an historical range, and the risk of losing key ecosystem components is low.**

Alternative 3 proposes the removal of forest canopy, which reduces the moderating effect of canopy (sheltering) on wind speed, so surface winds (winds beneath the canopy that effect surface fuels) would increase. Also the removal of the forest canopy results in more sunlight that penetrates to the forest floor, resulting in lower dead fuel moistures. Increased surface wind speeds and lower fuel moistures can increase surface fire behavior. However, the treatments that lead to this increased surface fire behavior also make crown fire behavior less likely. Due to

the substantial difference in fire behavior intensity and severity between surface and crown fire behavior, it is a reasonable tradeoff to incur the greater surface fire intensities and inhibit the probability of a crown fire event.

***Figure 3-FF-22: FlamMap outputs of potential crown fire behavior comparing Alternative 2 to the activities in Alternative 3, an alternative that treats a greater number of acres than the proposed alternative.***




With the use of FlamMap, which estimates fire behavior characteristics spatially, a context of expected fire behavior can be gained for the Twomile Resource Area and the wildland urban interface with the existing conditions. The estimations of potential fire behavior are characteristic of a dry, hot fire season typical of the 1994 season in northern Idaho. Figure 3-FF-22 spatially illustrates the differences between Alternative 3 and the proposed Alternative 2. Alternative 3 prescribes activities that reduce potential fire behavior on a greater number of acres than Alternative 2. In terms of reducing fire intensities in the wildland urban interface, alternative 3 proposes activities that address the issue more aptly. The spatial location of Units 11, 16, 17, 18, 19, and 24 propose treatments that would create an open stand structure of fire-resistant long-lived tree species (ponderosa pine and western larch) on a southeast-facing slope that could potentially be a pathway for wildland fire to threaten the rural residences in Dago Peak Gulch and Shirttail Gulch.

**Cumulative Effects to Fire/Fuels Under Alternative 3**

Cumulative effects are the effects that would result from activities proposed in Alternative 3, in addition to the incremental impacts of past, present, and reasonable foreseeable future actions. For the fire and fuels

analysis the primary action to be considered when evaluating cumulative impacts is fire suppression. Alternative 3 includes treatments on more stands adjacent to the urban interface than Alternative 2, thus creating greater spatial areas to reduce fire intensities in the urban interface and facilitate more efficient fire suppression tactics to control the spread of wildfire.

Reasonably foreseeable activities within the Resource Area would be the same as Alternative 2, which include fuel reduction treatments on the lands managed by the Bureau of Land Management (as described in Chapter 2). If accomplished, these activities would likely increase the effectiveness of Alternative 3 in reducing fire intensities in the urban interface and restoring fire-adapted ecosystems. Activities such as these manage for reduced flame lengths and low tree densities, a future condition that lends connectivity to the proposed activities in Alternative 3, increasing the effectiveness of the treatments for the fire/ fuels discipline.

There are other reasonably foreseeable actions described in Chapter 2; these actions would not be expected to substantially affect fire behavior, and do not occur on a scale that would allow meaningful analysis.

Cumulative effects of treatments on private lands, fuel reduction treatments implemented through the efforts of the Shoshone County Fire Mitigation Working Group, pre-commercial thinning, and aquatic restoration features would all have the same cumulative effects under Alternative 3 as they would under Alternative 2. On private lands, harvest practices that remove fire-resistant trees trend the vegetation to a species composition and structure with the potential for greater flame lengths and greater tree densities that support crown fires with low necessary wind speeds. As forest succession and fire exclusion continues at the overall project scale without any disturbance, the probability of suppressing fires is not a likely scenario given a conducive weather event and ignition source.

## *E. Effects to Fire/Fuels Under Alternative 4*

**Direct and Indirect Effects to Fire/Fuels Under Alternative 4**

Direct effects of Alternative 4 would include an immediate reduction in surface fuels on the 375 acres that would be treated without the means of commercial harvests. Figure 3-FF-24 shows that underburning would reduce flame lengths initially but then over time they trend similarly to that of the No-Action Alternative. This is most likely due to the understory response after the burning activities take place, providing fuel for potential flame lengths. The underburns proposed in Alternative 4 are not meant to cause a substantial amount of mortality to the overstory, thus the density of the stands will does not change substantially. Figure 3-FF-25 shows that the activities in Alternative 4 do not substantially change the amount of wind necessary to sustain crown fire behavior until the stand continues into the future, falling apart due to forest insects and disease.

**Alternative 4**
**Underburning would reduce flame lengths initially, but over time stands would fall apart, decreasing stand density and increasing surface fuels and potential flame lengths.**

Stands that have a canopy that is too dense will keep surface fuels too moist through the spring burning season, or when the surface fuels dry out enough to burn, there is a risk of the fire burning too intensely, causing too much mortality, and threatening escape. In many stands, it is necessary to remove excess understory and weaker overstory trees that cannot be safely killed in an underburn (Arno et al. 1996, p. 115; PF Doc. FF-6). Because of the difficulties associated with re-introducing fire into some stands without commercial harvest, this alternative would treat a smaller area than the other action alternatives, so the benefit to potential fire behavior in the wildland urban interface is also limited.

Although this alternative would slightly change conditions in the treated stands, it would not cause substantial change to the structure of the dry forest stands in the Twomile Resource Area, so it would not likely change the Condition Class of those stands. Alternative 4 would allow the forested areas adjacent to and within the wildland urban interface to remain in, or further progress into Condition Class 3 (Schmidt et al. 2002, p. 8; PF Doc. FF-1), which would not be consistent with the goals of the National Fire Plan and 10-Year Comprehensive Strategy Implementation Plan (www.fireplan.gov) to reduce hazardous fuels and restore fire-adapted ecosystems.

***Figure 3-FF-23: FlamMap outputs of potential crown fire behavior comparing Alternative 2 to the activities in Alternative 4, an alternative that only includes activities that do not involve commercial harvesting to achieve fuel reduction goals.***

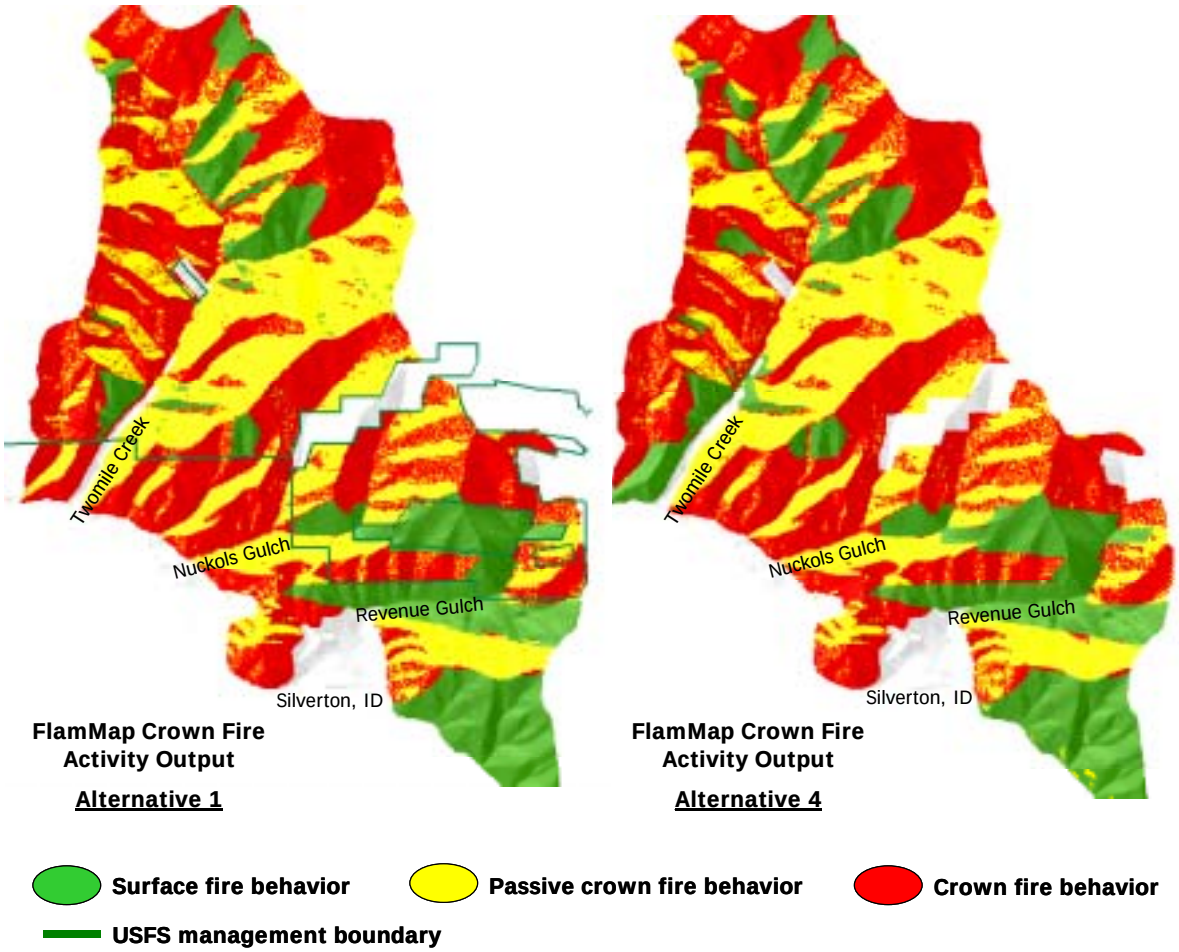



***Figure 3-FF-24. Flame length potential in underburning treatment areas of the dry habitat type groups over time under Alternative 4, in comparison to the No-Action Alternative.***

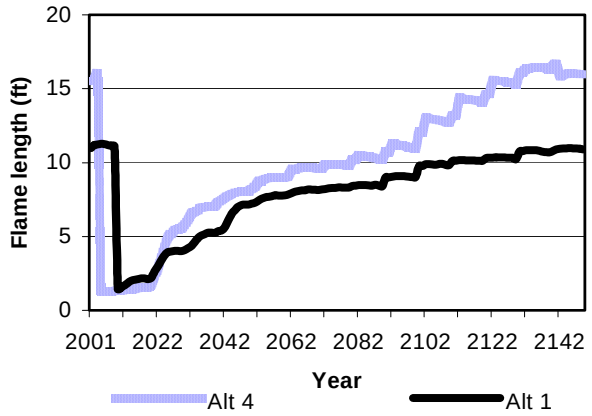
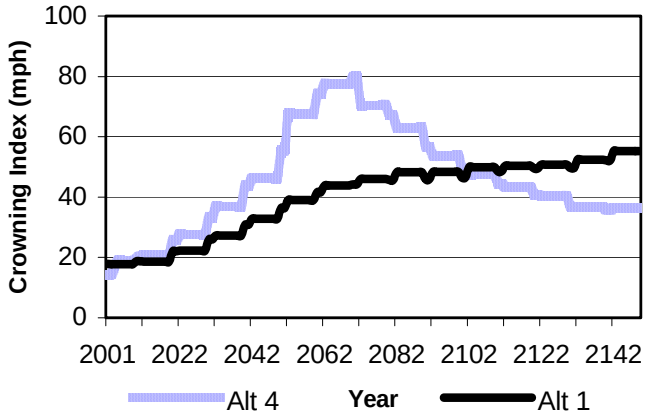



***Figure 3-FF-25. Windspeed at which a crown fire would be sustained in underburning treatment areas of the dry habitat type groups over time under Alternative 4, in comparison to the No-Action Alternative.***



### Cumulative Effects to Fire/Fuels Under Alternative 4

Although Alternative 4 would temporarily reduce surface fuels and flame lengths, it would have very little effect on the canopy fuel characteristics, which have been substantially changed over time due to the incremental effect of fire suppression and advanced succession. Alternative 4 would likely delay the changes in stand structure and surface fuel characteristics that are progressing due to fire exclusion, but would not likely change the course of the stands away from the trend they are on with Alternative 1. Ultimately, the cumulative effects of Alternative 4 would not change the trend away from historic conditions substantially enough to recognize on the resource area scale.

## *F. Cumulative Effects to Fire/Fuels From Activities on Private Lands*

Most often, timber harvests on private lands tend to be partial cuts that remove trees of the highest economic value (usually the largest) and typically removes large fire resistant seral species. Natural regeneration is relied on to fill most created openings. This tends to favor shade tolerant Douglas-fir and grand fir trees over early seral species such as ponderosa pine and western larch. With increased values for private timber, and historic harvest practices on private lands, it is probably safe to say that inherent disturbance regimes and historic vegetation patterns will never be re-established on private lands within the analysis area.

Slash treatment after harvesting is controlled by the Idaho Department of Lands. Because private lands are likely to convert to more shade tolerant species, the structure of stands on private land will probably not approximate what existed there historically. However, currently, there is fuel reduction efforts focused on private lands, primarily around structures within the resource area. These efforts are part of the Shoshone County Fire Mitigation Working Group, an interagency partnership that works collaboratively to reduce hazardous fuels in the urban interface across all ownerships.

It is reasonable to assume that the Shoshone County Fire Mitigation Working Group will explore options to conduct fuel reduction treatments on private lands within the resource area once implementation of the Twomile WUI hazardous fuel reduction project occurs. The fuel reduction activities would include thinning/ pruning/ harvesting treatments to reduce potential flame lengths and reduce the probability of crown fire behavior. Slash treatments would include activities such as lop and scatter, piling, chipping, and prescribed fire. The location and extent of the treatments is unknown, and would depend on landowner participation/ cooperation with the Shoshone County fire mitigation program, an element of the National Fire Plan and the 10 Year Comprehensive Strategy Implementation Plan (www.fireplan.gov). These activities would complement Alternative 2 by progressing towards a landscape approach of reducing fire intensities in the wildland urban interface.

## *G. Cumulative Effects to Fire/Fuels From Specific Opportunities*

Timber Stand Improvement (Precommercial Thinning and Pruning): Stands identified as future thinning needs are identified in Chapter 2. Thinning redistributes growth and adjusts species composition for the future. Thinning would favor healthy trees of desired species adapted to the various habitat types. The seral species of ponderosa pine, western larch, and white pine would be favored when present on the appropriate growing sites. Over the long term, the effects of precommercial thinning would be to favor the establishment of long-lived seral species and increase the probability of survival from low intensity disturbances such as wildfire. In the short term, slash generated from the activities could increase dead fuels, causing an increase in wildfire intensity should one occur.

## 3.3.5 Consistency With Forest Policy and Legal Mandates Regarding Fire/Fuels

The goal of the Forest Plan is to provide efficient fire protection and fire use to help accomplish land management objectives (Forest Plan, Chapter II, pages 10 and 38; PF Doc. FF-25). This section will list the Forest Plan Standards for fire management and illustrate the consistency of each alternative with Forest policy. Forest Plan standards 2d and 2e relate to wildfire suppression policy and requirements that are not

affected by this project, and therefore compliance with these standards is not described. In addition, this project does not determine Forest Fuel Management expenditure priorities, so compliance with standard 2g will not be addressed.

The first Forest Plan Standard for fire management is as follows:

> *"Fire protection and use standards are specified by management area. Cost effective fire protection programs will be developed to implement management direction based on on-site characteristics that effect fire occurrence, fire effects, fire management costs and fire caused changes in values (Forest Plan, Chapter II, p. 38; PF Doc. FF-25)."*

Alternative 1 (No-Action) is inconsistent with the Forest Plan standard to use fire to achieve management goals according to the direction in management areas 1 and 4. With Alternative 1 there is no effort to develop cost-effective fire programs because no-action allows the fire exclusion trends to continue increasing the probability of intense and severe fire behavior. Given intense and severe fire behavior it is reasonable to expect expensive wildfire suppression costs, and damages/ changes to values such as water quality, soil productivity, recreation, aesthetics, etc. Effects to these resources could be prevented or lessened with activities that treat forest fuels.

Alternatives 2 and 3 use prescribed fire to help meet the goals of the Management Areas 1 and 4 within the Twomile Resource Area. This action is consistent with the Forest Plan. Alternatives 2 and 3 help develop cost-effective fire programs because they make substantial progress in reducing the potential intensities of wildfire in the wildland urban interface. The more area treated to restore and promote fire resistant species composition in the forested stands adjacent to the urban residences, the better the alternative meets the Forest Plan goals. Alternative 3 would treat the most area, and therefore best meet the goals, objectives and standards of the Forest Plan. Both Alternatives 2 and 3 would take substantial steps to reduce the severity of fire effects, the costs of potential wildfire, and fire caused changes in values if burned.

Alternative 4 would uses prescribed fire to help meet the goals of the management areas within the Twomile Resource Area, an action that is consistent with Forest Plan standards. However, with the limited amount of area treated, and the minimal effectiveness of this treatment to reduce potential fire behavior, Alternative 4 does not substantially help develop cost-effective fire programs because the stands appropriate for treatment do not represent a substantial portion of the landscape. Alternative 4 would allow far more intense potential fire behavior to exist in stands throughout the landscape that, with treatment, could exhibit low intensity, easily controlled fire behavior. With Alternative 4, severe fire effects, large wildfire management costs, and fire caused changes in values could reasonably be expected, whereas these results could likely be prevented or lessened with more effective fuel treatment methods. The second Forest Plan Standard for fire management is as follows: (Forest Plan, Chapter II, p.38; PF Doc. FF-25)."

> *The Fire Management Action Plan will be guided by the following Forest-wide standards:*
>
> *a. Management area standards.*
>
> *b. Human life and property will be protected.*
>
> *c. Fire will be used to achieve management goals according to direction in management areas. Implementation guides will be prepared for prescribed fire projects and programs identified in Table 10 (Appendix F) using unplanned ignitions.*
>
> *d. Management area standards will be used in Escaped Fire Situation Analyses as a basis for establishing resource priorities and values.*
>
> *e. The appropriate suppression response for designated old-growth stands in all management areas, except in wilderness, will result in preventing the loss of old growth. Fire policy in relation to old growth within wilderness will be provided in specific management direction developed for each wilderness area.*
>
> *f. Activity fuels will be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.*

*g. Forest Fuel Management Fund expenditure priorities are:*

*1) natural fuels that pose a threat to human life and property*

*2) unfunded activity fuel projects*

3) *areas where fuels/fire behavior is a threat to management area objectives.*

Alternative 1 would take no preventative steps to protect human life and property within the wildland urban interface from an uncontrolled wildfire, and/or erratic fire behavior. The continued succession of fuels, vegetation, mortality from insect disease, and the exclusion of fire would create areas where the trend in fire behavior characteristics exceed the goals, objectives and standards established in the Forest Plan. No activity fuels would created in Alternative 1, so there would be no need treat activity fuels, which is consistent with the Forest Plan.

Treatments proposed under Alternatives 2 and 3 would trend the proposed treatment areas away from potential fire behavior that could threaten human life and property in the wildland urban interface. The activity fuels that would be created would be treated in a manner that is consistent with the standards of the Forest Plan.

Treatments proposed under Alternative 4 would have very little effectiveness in reducing potential fire behavior, so no substantial preventative steps are taken to protect human life and property within the resource area from an uncontrolled wildfire. The continued succession of fuels and vegetation, mortality from insect disease, and the exclusion of fire would create areas where the trend in fire behavior characteristics would in time exceed the goals, objectives and standards established in the Forest Plan. Activity fuels generated from the slashing treatment would be underburned, a management tool that is consistent with the Forest Plan.

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# 3.4 AQUATIC RESOURCES

The following section focuses on the existing condition for water quality and fishery resources in the area and what the effects would be from implementing one of the alternatives. As discussed in Chapter 2, issues addressed serve as indicators for measuring how the alternatives may impact water quality and fish habitat.

## 3.4.1. Regulatory Framework for Aquatic Resources

The regulatory framework governing management of watershed and fisheries for the analysis is based on:

- *National Forest Management Act*
- *Endangered Species Act*
- *Clean Water Act and amendments.*
- *Idaho Department of Environmental Quality (IDEQ) implementation of the Clean Water Act*
- *Rules Pertaining to the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code, 2000)*
- *Executive Order 12962 (Recreational Fishing)*
- *State of Idaho Governor's Bull Trout Plan*

The National Forest Management Act (NFMA 1976) requires that the Forest Service manage for a diversity of fish habitat to support viable fish populations (36 CFR 219.19). Regulations further state that the effects on these species and the reason for their choice as management indicator species be documented (36 CFR 219.19(a)(1)). Direction is also included in the Idaho Panhandle National Forests Forest Plan (USDA 1987). The Inland Native Fish Strategy (INFS; USDA 1995; PF Doc. AQ-9) amended some Forest Plan direction regarding stream and fish habitat protections measures. See Appendix B for details.

Section 7 of the 1973 Endangered Species Act (ESA) includes direction that Federal agencies, in consultation with the U.S. Fish and Wildlife Service, 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. Currently, bull trout are not known to inhabit any watersheds in the Twomile Resource Area. The South Fork Coeur d'Alene River is not proposed as critical habitat by the U.S. Fish & Wildlife Service (USFWS, 2001 - Proposed Rule).

Under authority of the Clean Water Act, the Environmental Protection Agency (EPA) and the states must develop plans and objectives that will eventually restore identified stream segments of concern. The South Fork Coeur d'Alene River is currently a listed 303(d) water quality limited segment from Placer Creek to Big Creek (Water Quality Limited Segment 3518, IDEQ 1998; PF Doc. AQ-10). The pollutants of concern are metals and sediment. The current status is that there is an approved Total Maximum Daily Load (TMDL), and its implementation plan is pending. Under this status, there should not be a net increase in metal or sediment through management activities in the South Fork Coeur d'Alene River. There are no streams in the Twomile Resource Area that are listed on the 303d list but the three steams in the project, Twomile Creek, Nuckols Gulch, and Revenue Gulch are area tributaries to the South Fork of the Coeur d'Alene River.

The Forest Service will develop an implementation plan for its portion of the TMDL in the South Fork Coeur d'Alene River in cooperation with IDEQ and interested local parties. In the interim, any activities we undertake or permit on National Forest System lands will be designed to substantially reduce pollutants of concern, where feasible. The timeframe for completion of the implementation plan has not yet been determined.

The Forest Service has agreements with the State of Idaho to implement Best Management Practices (BMPs) or Soil and Water Conservation Practices for all management activities. Proposed activities will be in compliance with the guidelines in the Soil and Water Conservation Handbook (Forest Service Manual 2509.22), which outlines Best Management Practices (BMPs) that meet the intent of the water quality protection elements of the Idaho Forest Practices Act.

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."

The mission of the Governor's Bull Trout Plan is to "…maintain and or restore complex interacting groups of bull trout populations throughout their native range in Idaho" (State of Idaho 1996; PF Doc. AQ-11). The Governor's Bull trout plan incorporates the entire Coeur d'Alene River drainage and its tributaries, which in this project would include the South Fork Coeur d'Alene River and its tributaries.

## 3.4.2. Affected Aquatic Environment

### *A. Methodology Used in the Assessment and Description of the Affected Aquatic Environment*

**Geographic Scale of the Analyses**

For this analysis, the resource area was subdivided into manageable units referred to as "subwatersheds" (Figure 3-AQ-1). Three of these units are true subwatersheds and one area involves "face drainages." True subwatersheds are areas of land in which all of the streams are interconnected and drain through a single point and leave the watershed through a distinct outlet or "pore point." Face drainages consist of smaller independent watersheds grouped together. There are no major streams in face drainages, and their drainages are not as directly interconnected as those in true watersheds. The discussions focus on the three subwatersheds of the Twomile Resource Area, in the following order:

- *Twomile Creek*
- *Nuckols Gulch*
- *Revenue Gulch*

In the Twomile Resource Area, there are two smaller areas between Twomile Creek and Revenue Gulch that are considered as a single face drainage called "Silverton Face Drainage". The Silverton face drainage is discussed and analyzed qualitatively due to the difficulty in modeling and predicting cumulative effects to water quality and aquatic habitat. Specifically:

- *There are no single pour points where water and sediment would flow through;*
- *Sediment and water flow changes could not be practically measured for this area;*
- *There are no perennial streams within the face drainage;*
- *Only 5% or less of the proposed treatment areas occurs in the face drainage;*
- *Ground disturbance activities that are typically most impactive to water quality (such as new road construction and road reconstruction) are not proposed in the face drainage under any alternative.*

Each of the subwatersheds in the Twomile Resource Area was analyzed as its own cumulative effect area using the WATSED model, which is the appropriate scale to analyze cumulative effects from this proposed project. This scale is also consistent with the analysis in the Geographic Assessment. The entire South Fork Coeur d'Alene River basin was not selected as the cumulative effects area because the Twomile Resource Area occupies only 15% of the basin upstream of the Twomile Creek confluence. The entire upper South Fork of Coeur d'Alene River is difficult to assess for cumulative effects resulting from the proposed activities because 1) the resource area is small compared to the South Fork Basin; 2) land types and their coefficients used in soil erosion and sediment delivery predictions are not entirely available, and 3) the privately owned land has varying levels of disturbance that is difficult to account for in WATSED. Aerial photographs were used to estimate location and types of vegetative management on non-forest lands so that all land management activities could be accounted for in the cumulative effects analysis areas.

Water quality in the South Fork Coeur d'Alene River, just downstream of the Twomile Resource Area, is qualitatively addressed in this Environmental Assessment based on changes in contribution of pollutants. The

Geographic Assessment recommends one integrated strategy that will help respond to issues and process of the terrestrial, aquatic and recreation components of the ecosystem (Geographic Assessment, page 59; PF Doc. AQ-12). This strategy identified different implementation strategies for different areas, so native aquatic resources can be conserved and protected.

The aquatic ecosystems of the Twomile Resource Area were identified as falling into one of three condition classes, as defined in the Geographic Assessment (USDA Forest Service, 1998, pages 59-61; PF Doc. AQ-12):

- *Properly functioning: Within the scope of this assessment, a properly functioning watershed system is one that is exhibiting dynamic equilibrium characteristics and whose streams are operating and responding appropriately under their current environment. These systems can absorb and respond to disturbances that they have evolved under within their historic range. Typically, parts of these systems, or the system as a whole, can move toward a more stable condition over time following a disturbance (or a series of disturbances) within a certain time period. As a system, these watersheds will not benefit from large-scale watershed restoration actions (although local, site-specific improvements may be productive.)*
- *Functioning at risk: A watershed system that is functioning-at-risk is one that is essentially still properly functioning. However, it may be exhibiting trends or it may contain known risks that are likely to compromise that status and the ability to fully support beneficial uses in the future. This status may be assigned where the apparent watershed status is uncertain because the complexity of the system and disturbances. These systems are the first priority for large-scale watershed system restoration and improvement programs. Such programs will often produce effective and timely responses in the near future.*

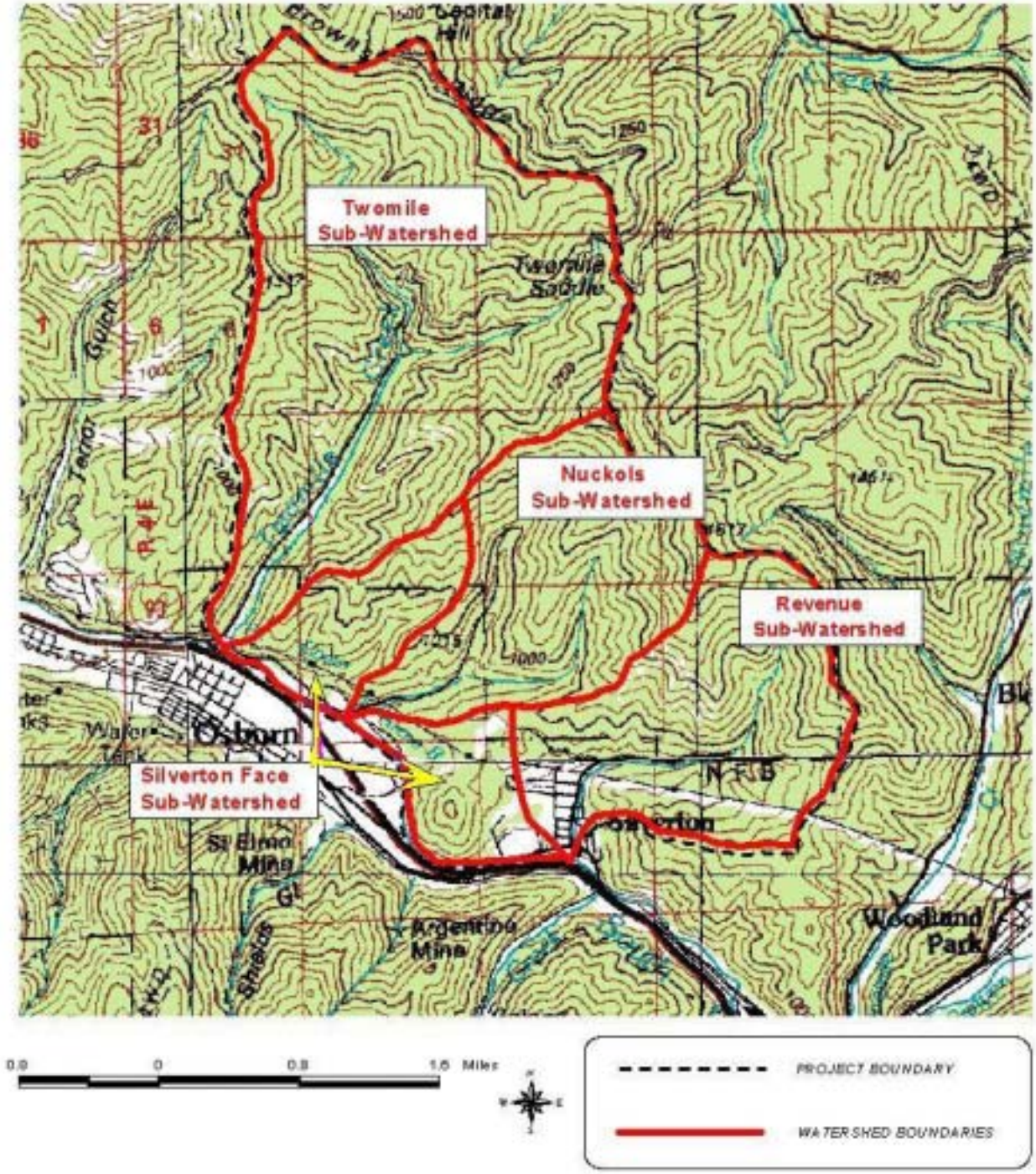
***All watersheds in the Twomile Resource Area have been identified by the Geographic Assessment as "functioning at risk," as is the entire South Fork Coeur d'Alene River drainage.***

- *Not properly functioning: Watershed systems that are not properly functioning often exhibit rapid adverse trends and may not fully support beneficial uses. These systems may appear to be responding to their own last adjustment, rather than toward stabilizing the last disturbance. They are "out-of-balance" with their environment and may not be in dynamic equilibrium, in periods of at least several decades. These systems are in need of large-scale restoration. These watersheds are usually second priority due to limited availability of resources, uncertain technology, and the long time period expected for positive responses.*

**Literature and Office Review**

The assessment of existing condition is critical to an environmental analysis because it describes the current condition of the Twomile Resource Area and provides a basis for comparing the effects of management alternatives. Information for the watershed and fisheries analysis was compiled using data from the field observations and measurements made between the years of 2001 and 2003. Additional information was gathered from district files, historical records, aerial photographs, and published scientific literature. Also, discussions with the Idaho Department of Fish and Game (IDFG) provided electrofishing and stocking data and comprehensive knowledge of the fisheries resources in the South Fork Coeur d'Alene River Watershed. The Roads Analysis Process (USDA 1999c; PF Doc. AQ-13) was also completed, which established recommendations for long-term road management objectives within the Twomile Resource Area.

***Figure 3-AQ-1. Watershed Cumulative Effects Area for the Twomile Resource Area.*** *Three subwatersheds (Twomile Creek, Nuckols Gulch and Revenue Gulch) were modeled and analyzed quantitatively. The Silverton Face Drainage (between Twomile Creek and Revenue Gulch) was not modeled, but was qualitatively analyzed.*




## The WATSED Model

Anticipated sediment and water yield runoff modification for the Twomile Creek, Nuckols Gulch, and Revenue Gulch watersheds were estimated from the methods documented in the R1/R4 Sediment Guides (USDA 1981; PF Doc. AQ-14) and the WATBAL Technical User Guide (Patten 1989; PF Doc. AQ-15). The version calibrated for the Idaho Panhandle National Forests, known as WATSED, is an analysis tool that

spatially and temporally organizes typical watershed response relationships as a result of forest practices. The estimated responses are combined with other sources of information and analyses to help determine the findings of probable effects.

WATSED estimates a series of anticipated annual values over a period of years. The model predicts an estimate of most likely mean annual sediment loads (reported as tons per square mile per year, or as routed tons per year), and the expected sediment load modifications over time. The estimate of additional loading is expressed as a percent of the "natural" (i.e., historic mean load prior to significant development activities) sediment load, which is based on the history of disturbances and average climate patterns in the watershed. In this analysis, the existing condition represents the year 2003, which is prior to any anticipated disturbances related to the proposed activities.

The estimates of sediment and peak flow reflect how watersheds with similar conditions and landtypes have responded over time to a similar history of disturbance. WATSED is neither intended nor designed to model event-based processes and functions, or specific in-channel responses. It does, however, incorporate the results of those processes in the calibration of its driving coefficients. WATSED does not evaluate increases in sediment and peak flows specifically resulting from "rain-on-snow" events or other stochastic events, nor does it attempt to estimate in-channel and stream-bank erosion. The Idaho Panhandle National Forests (IPNF) frequently validates the WATSED coefficients and estimates using long-term water quality monitoring networks on the IPNF (USDA 2000, 1999, and 1998b; PF Doc. AQ-5-7).

The forest management activities used to calibrate the model include standard BMPs and Soil and Water Conservation Practices; therefore, standard BMPs and Soil and Water Conservation Practices are necessary requirements for maintaining an effective confidence level in the model's use. Non-standard BMPs, management or natural disturbances not related to forest practices, and site-specific non-standard BMPs must be integrated into the final analysis to fully determine watershed response.

WATSED was designed to address and integrate a vast and complex array of landtypes and disturbances within the context of a watershed and organize the evaluation according to rule sets established by the author and cooperators. In the case of WATSED, the rule sets reflect watershed processes and functions based on research, data, and analyses collected locally and regionally. Forest Plan monitoring reports (USDA 2000, 1999, and 1998b; PF Doc. AQ-5-7) describe how the calibration and validation of WATSED has been an annual process on the forest and where changes have been made. The model, however, also includes simplifying assumptions, and does not include all possible controlling factors. Therefore, the use of models is to provide one set of information to the technical user, who, along with knowledge of the model and its limitations, other models, data, analysis, experience and judgment must integrate all those sources to make the appropriate findings and conclusions.

**Field Review**

All roads within the Twomile Resource Area were surveyed during the 2002 and 2003 field seasons. Sites where roads cross drainages were inventoried to assess erosional hazards and risks to aquatic ecosystems, using a protocol developed locally for the Coeur d'Alene River Ranger District. This method gathered information on road-stream crossings that included fill volumes, culvert sizes, erosional features, and other variables, so that sediment risk from culvert failure could be assessed. From this information culverts and stream crossings could be prioritized for upgrading or removal (see Sediment Risk Analysis, watershed project file).

Stream information was collected in the lower reaches of the larger streams within the Twomile Resource Area, Twomile and its tributaries during the 2002 field season (watershed project file). Representative segments within the lower reaches and those that are most sensitive to watershed disturbance were selected for collecting information to determine stream channel types, cross sectional profiles, longitudinal profiles, woody debris composition, bank erosion, and stream temperature. A modified version of the R1/R4 fish and fish habitat inventory (Overton et al. 1997; PF Doc. AQ-16) was conducted along these same index reaches.

These sites are mapped, documented, and marked on the ground so that repeat measurements can be accomplished to track changes in conditions (see monitoring, Appendix C and project records).

**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 descriptions were input into GIS layers to evaluate the existing condition and for the effects analysis.

## *B. Characterization of the Affected Aquatics Environment*

**Designated Beneficial Uses in the Twomile Resource Area**

Status Report on Nonpoint Assessment Report (Idaho Department of Health and Welfare, 1992; PF Doc. AQ-17). Twomile Creek, Nuckols Gulch, Revenue Gulch, and the Silverton Face Drainage all have the following beneficial uses:

- *salmonid spawning and rearing habitat*
- *cold water biota*
- *primary contact recreation*
- *secondary contact recreation*
- *drinking water*
- *agriculture water supply*

**Impaired Waters**

There are no streams within the Twomile Resource Area that are water quality limited or listed for any pollutant. All the streams in the Twomile Resource Area flow through private land or BLM managed land in their lower reaches and then flow into South Fork Coeur d'Alene River. The South Fork Coeur d'Alene River is water quality limited (303d listed) for both metals and sediment.

**Subwatersheds**

The Geographic Assessment lists all the tributaries in the Twomile Resource Area as "Functioning at Risk," which are the highest priority for aquatic restoration and protection. The following outline will be used for each watershed to characterize the current conditions in the Resource Areas:

- Overview (size, topology, and past activities)
- Stream Flow Regime (peak flows, rain on snow sensitivity, Equivalent Clearcut Area (ECA))
- Stream Channel Morphology, (narrative and results from stream surveys in 2002)
- Water Quality (number of Inventoried road channel crossings)

***Table 3-AQ-1. Summary of existing conditions for each subwatershed in the Twomile Resource Area.***

| Subwatershed Name | Acres (NFS + Private) | % NFS lands | Ave. Precip. (inches/year) | Ave. Road Density on NFS (mi/mi2) | 303d water quality limited | Pollutant not meeting Standard |
|---|---|---|---|---|---|---|
| Twomile Creek | 3,103 | 95% | 47.5 | 4.78 | SF Coeur d'Alene River | Metals, sediment |
| Nuckols Gulch | 1,275 | 65% | 46.5 | 3.02 | SF Coeur d'Alene River | Metals, sediment |
| Revenue Gulch | 1,334 | 37% | 40.9 | 4.02 | SF Coeur d'Alene River | Metals, sediment |
| Silverton Face Drainage | 1,888 | 23% | 39.2 | 1.50 | SF Coeur d'Alene River | Metals, sediment |

***Aquatic Conditions in the Twomile Creek Watershed***

**Overview:** Twomile Creek is within a 3,103-acre drainage that flows in a southerly direction to the South Fork of the Coeur d'Alene River. The lower stream reaches indicate the channel is out of equilibrium and still adjusting from past disturbances. County Road 271 parallels the lower reaches of Twomile Creek and has segments that encroach on the floodplain, negatively affecting the natural pattern and flow of the stream. Flooding in 1994 and 1996 caused washout and erosion on the lower segments of Road 271 along Twomile Creek. Shortly after these events, the road was repaired. This history of flood damage is a good indication that the encroaching road segments along lower Twomile Creek are not compatible with the natural process of the stream and function of the Twomile Creek floodplain. The upper reaches of Twomile Creek are generally steep with narrow confined valley bottoms, and are composed of coarse gravel and cobble substrate. The upper stream reaches are relatively stable except for isolated areas where roads, road crossings, and past mining activity have caused local disturbance to the natural channel form and function. The subwatershed is "Functioning at Risk" according to the Geographic Assessment, and is a high priority for restoration.

**Stream Flow Regime:** Past management activities have altered the flow regime in much of the Twomile Creek subwatershed. Hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-18; Jones and Grant 1996, PF Doc. AQ-19; Brooks 1991, PF Doc. AQ-20; Harr 1986, PF Doc. AQ-21; Troendle and King 1983, PF Doc. AQ-22). WATSED model results estimate that average monthly peak flows in the Twomile Creek subwatershed are currently modified to approximately 3% above baseline conditions. Harvest activities in the early 1980's and again in 1998 opened up some canopy to cause this 3% increase in peak flows. Stream flow conditions and hydrologic recovery are still responding to many types of activities, such as mining, timber harvest, floodplain alteration, and stream channelization. For a more detailed discussion of processes and the interpretation of WATSED, refer to the WATSED project reports (PF Doc. AQ-62).

**Stream Channel Morphology:** Roads 271UAB (a road up the East Fork of Twomile Creek) and Road 271-UF-UNK (a road up the mainstem headwaters of Twomile Creek), have constricted the stream and have decreased the channel's ability to handle the increased energy associated with large flows or sediment input (Figures 3-AQ-2b and 3-AQ-3). Channel pattern changes resulting from streamside road placement may cause drastic and long-term changes to the stream flow and sediment routing regime. Additionally, streamside roads are subject to frequent or continual stress of flow against the road fill, particularly during peak discharges. These roads manifest frequent and chronic surface sediment to the stream. Other contributors to altered stream morphology are headwater road failures and damage to streambanks from unauthorized vehicle use, which have added sediment to the stream. Sediment introduction has been deposited in slower downstream segments, decreasing channel capacity and altering channel morphology from its natural state of equilibrium.

There is a disturbed site in a tributary to the lowermost portion of the Twomile Creek. This site was once used for mining waste and explosives development in the mid-1900s. This site (Figure 3-AQ-2a) is detrementally impacted, where an intermittant channel was re-routed and now is located in an unatural location approximately 50 feet from where it originally was. The soils at this site have been sampled for metals and potentially dangerous levels of cadmium are present. This site is the location of a proposed helicopter landing under Alternatives 2 and 3.

***Figure 3-AQ-2a. Proposed helicopter landing in Twomile Creek tributary, former site of explosives development and mining waste deposits.***

***Figure 3-AQ-2b. Road 271UAB in the East Fork of Twomile Creek.*** *The location of this road is causing negative effects to channel stability, water quality, and aquatic habitat.*

***Figure 3-AQ-3. Road 271-UF-UNK, near the West Fork of Twomile Creek.*** *This encroaching road displays active surface erosion causing negative effects to channel stability, water quality, and aquatic habitat.*

Increased bedload supply and bed mobility can result from riparian harvest and may result in increases in stream bank erosion. Toews and Moore (1982; PF Doc. AQ-23b) report streambank erosion was more than 250 percent greater after logging than before in clearcut areas where no buffers strips were left.

**Water Quality***:* There are approximately 4.78 miles per square mile of roads within the Twomile drainage. The riparian road density is approximately 0.8 miles per square mile. This represents a relatively high amount of riparian disturbance that has occurred within the Twomile Creek drainage.

**Riparian Road Density**

An estimation of the amount of roads (measured in miles of road per square mile of land) that are located within approximately 300 feet of any stream channel and could potentially influence the stream; derived through GIS mapping.

Inventories of roads and their conditions including culvert conditions were completed in the Twomile subwatershed. The other three subwatersheds were not inventoried. Of the 16 inventoried road-stream crossings in the Twomile Creek subwatershed, there is a risk of 36 tons of sediment per year being routed and delivered downstream if some of these stream crossings were to fail. There are several sites within the subwatershed that are chronically causing direct sediment input into Twomile Creek that are not represented by the 16 inventoried sites. Encroaching road segments along Road 271-UBA, two failed culverts, and an abandoned mine site with erosive waste rock slopes are all contributing sediment in the East Fork of Twomile Creek on an annual basis. Of the known 16 culvert crossings in the subwatershed, each of them has the potential to plug at their inlets and subsequently fail, particularly on roads that are no longer maintained. Fills at channel crossings without culverts may also fail because of steep slopes and/or unstable fill material perched in the stream channel. There are approximately 11 miles per square mile of existing roads that fall on sensitive land types that are prone to high landslide potential, surface erosion, and/or sediment delivery. Frequent bank erosion was observed along the East and West Fork of Twomile Creek. A chronic sediment source to Twomile Creek is located at an undersized culvert on the main Road 271 crossing. This culvert is currently elevated above the natural streambed and is causing bank-derived sediment in the downstream scour zone of the pipe (Figures 3-AQ-4 and 3-AQ-5).

***Figure 3-AQ-4. The main culvert on Road 271 (viewing upstream).***

***Figure 3-AQ-5. The main culvert on Road 271 (viewing downstream from the pipe).***

***<u>Aquatic Conditions in the Nuckols Gulch Watershed</u>***

**Overview:** Throughout most of its reach, Nuckols Gulch is intermittent. The main segment is approximately 4 miles in length. The lower half mile (on private land) is perennial during years of average precipitation. Several small intermittent tributaries feed into Nuckols Gulch along its entire length. This subwatershed encompasses an area of two square miles, with a road density of 3 miles per square mile. Nuckols Gulch has experienced past harvest activity in and near riparian areas. About 35% of the Nuckols Gulch drainage is within private ownership that has been intensively managed and developed (the activities are discussed under "Past, Present, and Reasonably Foreseeable Activities"). Most of this ownership and extensive development is in the lower portion of the subwatershed, located between areas of National Forest System land in the headwaters. The subwatershed is "Functioning at Risk" according to the Geographic Assessment and is a high priority for restoration.

**Stream Flow Regime:** Flows are extremely variable in Nuckols Gulch. The channel is formed primarily by storm events that occur from rain-on-snow events and spring run-off during years when snow-pack is above normal. Hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-18; Jones and Grant 1996, PF Doc. AQ-19; Brooks 1991, PF Doc. AQ-20; Harr 1986, PF Doc. AQ-21; Troendle and King 1983, PF Doc. AQ-22). WATSED model results estimate that average monthly peak flows in the Twomile subwatershed are currently modified to approximately 14% above baseline conditions. In 1998 and 2002, harvest activities on private lands opened up canopy enough to cause a 14% increase in peak flows. Stream flow conditions and hydrologic recovery are still responding to many types of activities, such as, timber harvest and stream channelization in the lower reaches, on privately owned lands. WATSED model outputs show that recovery occurs slowly as overstory canopy increases and ground cover improves through 2020, when peak flows would theoretically stabilize around 6% of pre-1980 conditions. For a more detailed discussion of processes and the interpretation of WATSED, refer to the WATSED project file reports (PF Doc. AQ-63).

**Stream Channel Morphology**: Road 271UU is an encroaching road along a portion of Nuckols Gulch, downstream of the National Forest Boundary; the road is constricting the stream and has decreased channel's ability to handle increased energy associated with large flows or sediment input. Channel pattern changes resulting from this streamside road may cause in drastic and long-term changes to the stream flow and sediment routing regime. This road contributes frequent and chronic surface sediment to the Nuckols Gulch**.**

**Water Quality:** There are approximately 3 miles of road per square mile of land within the Nuckols Gulch drainage. The riparian road density is approximately 0.8 miles of road per square mile of land. There are no known National Forest System road-stream crossings that are at risk of failing and dislodging sediment downstream. There are no known major erosion sites or sources of sediment that directly route sediment into Nuckols Gulch or the South Fork Coeur d'Alene River.

***Aquatic Conditions in the Revenue Gulch Watershed***

**Overview:** Revenue Gulch flows for approximately three miles before entering the South Fork Coeur d'Alene River. Revenue Gulch encompasses an area of just over two square miles, with a road density of 4 miles of road per square mile of land. Harvest activity has occurred in Revenue Gulch, both in and near riparian areas. Several small intermittent tributaries feed the watershed for its entire length. Nearly two-thirds of the land in Revenue Gulch (63%) is under BLM or private ownership that has been intensively managed and developed (described under "Past, Present, and Reasonably Foreseeable Activities"). The subwatershed is "Functioning-At-Risk" according to the Geographic Assessment and is a high priority for restoration.

**Stream Flow Regime:** Flows are variable in Revenue Gulch. The main channel in this drainage is formed primarily by storm events that occur from rain-on-snow and spring run-off during above-normal snow-pack years. Hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-18; Jones and Grant 1996, PF Doc. AQ-19; Brooks 1991, PF Doc. AQ-20; Harr 1986, PF Doc. AQ-21; Troendle and King 1983, PF Doc. AQ-22). WATSED model results estimate that average monthly peak flows in the Revenue Gulch subwatershed are currently modified to approximately 11% above baseline conditions. In 1989, 1995, and 2001 harvest activities opened up canopy enough to cause an increase in peak flows, from 4% above baseline to 13%. Peak flow increases are slowly recovering and would theoretically stabilize to 6% above baseline by the year 2026 as modeled by WATSED. Stream flow conditions and hydrologic recovery are still responding to many types of activities, such as timber harvest and stream channelization on other ownership in the lower reaches. For a more detailed discussion of processes and the interpretation of WATSED, refer to the WATSED project reports (PF Doc. AQ-64).

**Stream Channel Morphology:** Streamside roads exist in most of lower Revenue Gulch, which flows through the city of Silverton. National Forest Road 6533-UA has constricted the stream and decreased the channel's ability to handle increased energy associated with large flows or sediment input. Channel pattern changes resulting from streamside road placement may result in drastic and long-term changes to the stream flow and sediment routing regime. All roads along Revenue Gulch that channelize or restrict natural meander patterns contribute frequent and chronic surface sediment to Revenue Gulch**.**

**Water Quality:** There are approximately 4 miles per square mile of roads within the Revenue Gulch drainage. The riparian road density is approximately 0.5 mile of road per square mile of land. There are no known National Forest System road-stream crossings that are at risk of failing and generating sediment downstream. There are no known major erosion sources within the subwatershed that directly route sediment into the South Fork of the Coeur d'Alene River.

***Aquatic Conditions in the Silverton Face Drainage***

**Overview:** Silverton Face Drainage contains intermittent drainages and dry swales that flow towards the South Fork Coeur d'Alene River. Water only flows in these drainages during high-water storm events or above average snowmelt periods in the late winter and spring. The lower three-quarters of the face drainage is under private ownership or BLM management that has been intensively managed and developed. Most of

this other ownership has had extensive development in the lower portions of these areas. The subwatershed is "Functioning at Risk" according to the Geographic Assessment, and is a high priority for restoration.

**Stream Flow Regime:** WATSED was not used to model the Silverton Face Drainage. This drainage area contains channels that only flow water during high water storm events or above average snowmelt periods in the late winter and spring. No perennial streams exist in this drainage area.

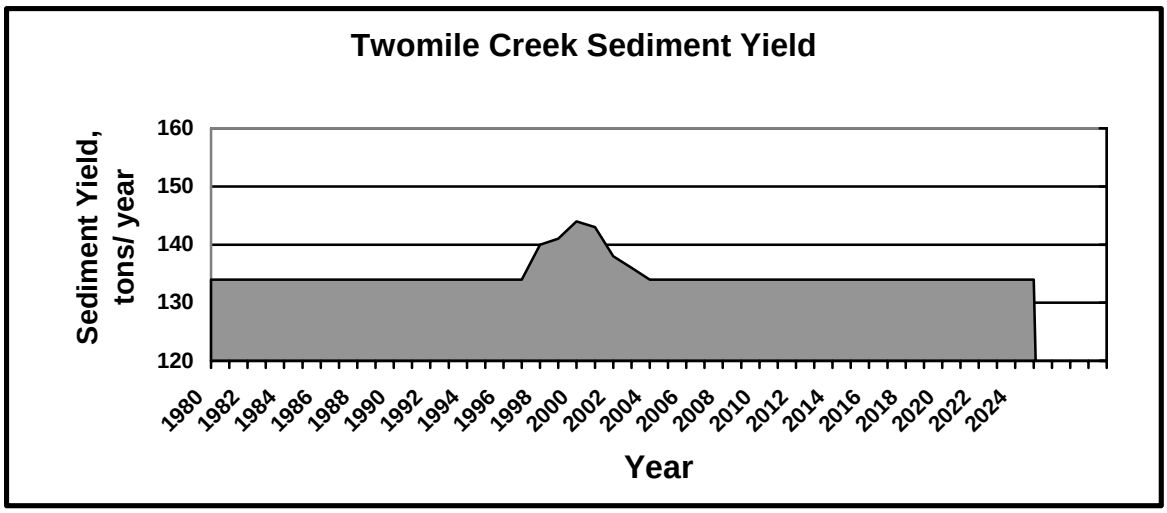
**Stream Channel Morphology:** No roads are known to encroach on streams in this area. The stream channels are mostly steep sided, high gradient channels in their upper reaches, with lesser gradients in the lower reaches. Some channel down-cutting and bank erosion is occurring on private lands in the lower stream reaches. This is probably a result of stream sections that have channelized and straightened. Several road crossings on private lands pose an unknown risk to roads in the drainage area.

**Water Quality:** There are approximately 1.5 miles of road per square mile of land within the Silverton Face drainage. There are no known National Forest road-stream crossings in this drainage area that are at risk of failing and generating sediment downstream. There are no known major erosion sources within the drainage that directly route sediment into the South Fork of the Coeur d'Alene River. Instream channel erosion in the lower reaches is likely the only measurable sources of sediment generated from the Silverton Face drainage area.

**Sediment Yield**

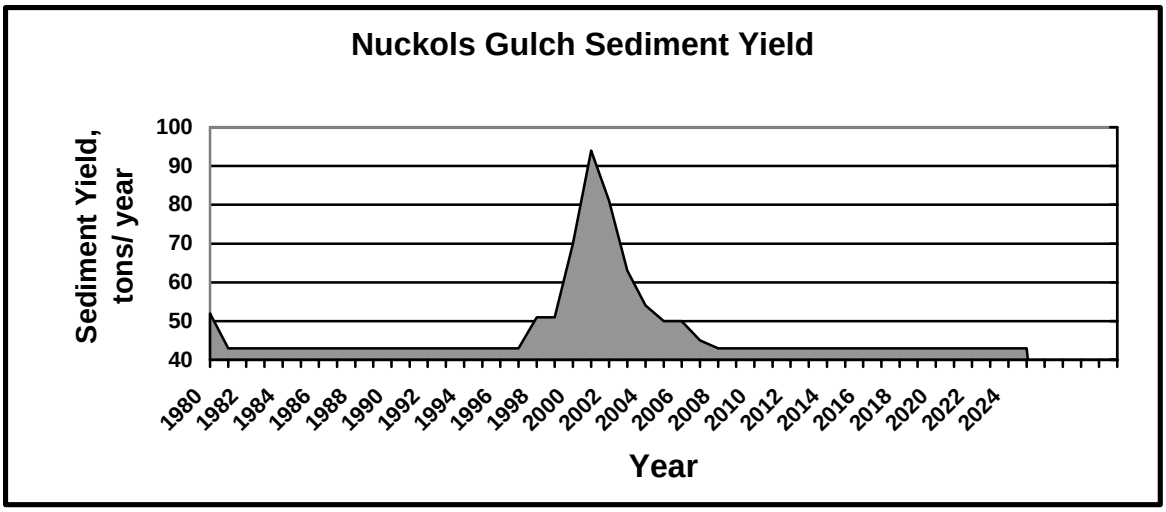
All the major streams in the Twomile Resource Area have experienced increased sediment yield from past timber harvest activities. The existing bedload movement and high deposition in downstream reaches of support the generalization that sediment yields are elevated as a result of past activities. The following graphs display past changes to sediment yield and existing conditions based on WATSED modeling. Timing and type of timber harvest on other ownership in the Twomile Resource Area were estimated using 2002 aerial photographs and personal observations by Forest Service personnel. The degree of regeneration and amount of ground cover in the harvested units were estimated from observable evidence in aerial photographs. Ground scars seen in the photographs were also used to determine harvest methods. For example, skid trail scars could be observed in the photographs to help determine if a particular area was tractor logged, and skyline corridors were observed to help determine that a unit might have been skyline logged.

***Figure 3-AQ-6. Existing Sediment Yield in the Twomile Creek Subwatershed.***



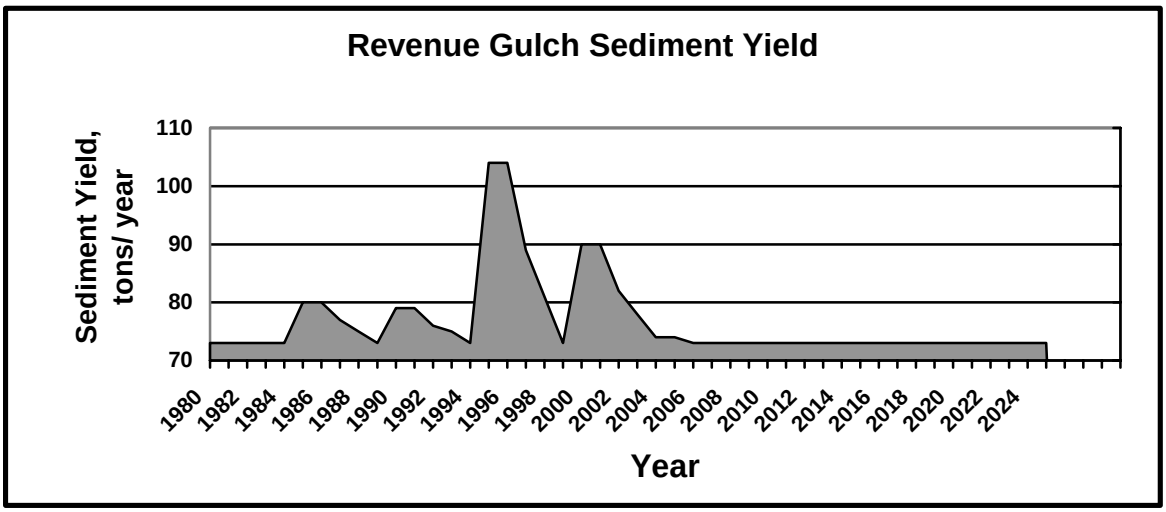

Some timber harvest occurred on private lands in the Twomile Creek subwatershed in 1999 and again in 2001. Vegetation and soil recovery is occurring rapidly and is expected to recover to pre-1999 conditions by approximately 2005.

***Figure 3-AQ-7. Existing Sediment Yield in the Nuckols Gulch Subwatershed.***




Some timber harvest occurred on private lands in Nuckols Creek subwatershed in 2000 and again in 2002. Vegetation and soil recovery appear to be occurring rapidly, with full recovery by 2010.

***Figure 3-AQ-8. Existing Sediment Yield in the Revenue Gulch Subwatershed.***




Sediment yield has fluctuated over the last 20 years, increasing every time timber harvest occurred. WATSED modeling shows upward trends with each harvest, followed by downward trends as the ground disturbance recovers. The existing roads are the primary sediment producer within the Twomile Resource Area. It generally takes about 7 years after disturbance caused by using tractor-based yarding systems for the vegetation to re-establish and for the disturbance area stop producing sediment erosion and transport. Harvest activity occurred on private and BLM lands within the Twomile Resource Area in 1986, 1991, 1996, and 2001.

Existing sediment yield in **Silverton Face drainage** was not modeled, but is predicted to have sediment yields similar to those in Nuckols Gulch and Revenue Gulch. Logging activities occurred in the face drainage in the mid- to late-1990's, and sediment yield is recovering as understory vegetation grows back into the disturbance area. Compared to Revenue Gulch and Nuckols Gulch, there are fewer roads in the face drainage so baseline sediment yields would likely be lower.

**Rain-on-snow Events and Watershed Responses**

Northern Idaho experiences a strong maritime influence with warm moist weather fronts invading in the winter from the Pacific Coast. These relatively warm and moisture-laden air masses are frequent and have a profound effect on the climate and hydrology of the Coeur d'Alene Mountains. As a result, midwinter snowmelt, thaws, and rainfall are common in the region. The snow pack within the 3,000 to 4,500 foot-elevation range is most susceptible to rain-on-snow events. Approximately 75% of the Twomile Resource Area is in the zone susceptible to rain-on-snow events. Below 3,000 feet, the snow pack often may accumulate and abate several times during the season, and would therefore not be a substantial contributor to overall basin runoff. Many years, the snow pack above about 4,500 feet is "cold" and less susceptible to rain-on-snow events.

Rain-on-snow is a natural process under which the streams of the basin developed. Historically, streams of the basin were very stable and resilient because they developed in response to the variability of the climatic processes and the dominant geology of the basin. Historically, rain-on-snow events probably did not cause the loss of mainstream equilibrium. Changes in vegetation resulting from management or natural events can affect the frequency and magnitude of rain-on-snow events.

***Table 3-AQ-2. Amount of Rain-on-Snow Zone within the Twomile Resource Area.***

| Subwatershed | Size (acres) | % of Subwatershed in Rain-on-Snow Zone |
|---|---|---|
| Twomile Creek | 3,103 | 79% |
| Nuckols Gulch | 1,275 | 73% |
| Revenue Gulch | 1,334 | 71% |
| Silverton Face Drainage | 1,888 | 72% |

## *C. Fisheries*

**Overview**

The cumulative effects areas contain approximately 3.5-miles of a fish-bearing stream, all of which is contained within the Twomile Creek drainage. Fish species that inhabit or potentially inhabit streams in the Twomile Resource Area include native populations of westslope cutthroat (*Oncorhynchus clarki lewisi*), sculpin (*Cottus spp*.; primarily slimy sculpin [*C. cognatus]* and possibly torrent sculpin [*C. rhotheus]*), and longnose dace (*Rhinichthys cataractae*).

Introduced fish species include populations of rainbow trout/Kamloops (*O. mykiss*) and eastern brook trout (*S. fontinalis*). The creation of hybrid fish between native westslope cutthroat trout and exotic rainbow trout may be present. Distribution of these fish is identified in the table below.

***Table 3-AQ-3. Stocking records (Idaho Fish & Game) and electrofishing records (Idaho Fish & Game and USDA Forest Service) for watersheds in the Twomile Resource Area analysis.*** *IDF&G stocking data was gathered using a search engine located on the website: http://www2.state.id.us/fishgame/. (PF Doc. AQ-23).*

| Stream | Species* | Info. Source | Date of Sample | Species/Year Stocked by IDF&G |
|---|---|---|---|---|
| South Fork Coeur d'Alene River | Eastern brook trout, westslope cutthroat trout, rainbow trout, sculpin, westslope cutthroat trout/rainbow trout hybrids | IDF&G<br>USDA FS | 2002 | Kamloops, rainbow, Kokanee (1967-1999; various types/amounts) |
| Twomile Creek | Eastern brook trout, westslope cutthroat trout, rainbow trout, sculpin, westslope cutthroat trout/rainbow trout hybrids | USDA FS | 2002-03 | ----- |
| Nuckols Gulch | Unknown Trout | USDA FS | 1992 | ----- |
| Revenue Gulch | None | | | |

Streams listed in the above table flow into other fish-bearing waterways, specifically the Coeur d'Alene and South Fork Coeur d'Alene Rivers. Given the scope of this proposal and ensuing analysis, it was determined that cumulative effects would not be detected in the South Fork Coeur d'Alene River. Non-fish bearing perennial and intermittent streams occur within the Twomile Resource Area, but are not named on Forest Service topographic maps.

Due to the large number of fish species within the cumulative effects area, 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, bull trout, and rainbow trout as potential Management Indicator Species (MIS) for fisheries (Forest Plan Appendix L, PF Doc. AQ-24). Currently, westslope cutthroat trout are known to utilize streams within the Twomile Resource Area for spawning, rearing, and over-wintering. Consequently, westslope cutthroat have been selected as appropriate MIS for the fisheries analysis of this project.

The life history of the torrent sculpin is included because the Regional Forester recognizes it as sensitive, and it is a cold-water species. Torrent sculpin might be present within the South Fork Coeur d'Alene River; this species will be covered under the effects to MIS.

The life history of the bull trout is included because it is listed as threatened under the Endangered Species Act (1973). However, there is no set or sub-set of data that has identified bull trout in the South Fork Coeur d'Alene River. Therefore bull trout will be recognized as listed within its larger geographical area for this document.

White sturgeon, burbot, and interior redband are found to naturalize only in the Kootenai River system, and possibly large tributaries (e.g., Yaak River for sturgeon and burbot) and smaller tributaries (e.g. interior redband trout). Therefore, these fishes will be given no further analysis within the context of this document since they do not naturally inhabit the South Fork Coeur d'Alene River drainage or its tributaries.

**Bull Trout (Threatened and Endangered)**

Bull trout are listed under the Endangered Species Act as a threatened species. They are not known to reside in the South Fork Coeur d'Alene River. Streams within the Twomile Resource Area were surveyed for bull trout in 2002 and 2003 (USDA Forest Service, Coeur d'Alene River Ranger District fisheries files). The Governor's Bull Trout Plan (1996, PF Doc. AQ-11), historical data for the watershed (IDF&G and USDA FS), and the bull trout recovery plan indicate that the larger Coeur d'Alene River drainage is occupied by bull trout. The South Fork Coeur d'Alene River drainage is not proposed as critical habitat by the USFWS (November 8, 2002; http://pacific.fws.gov/ ; PF Doc. AQ-25)

**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) lists westslope cutthroat trout as a "species of concern" with respect to section 7(c) of the 1973 Endangered Species Act (ESA; USDI 2002; PF Doc. AQ-26). 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 Twomile Resource Area. But first, a brief history is necessary to ascertain the background of status reviews on westslope cutthroat:

> *On two separate occasions (1997 and 1998) petitioners petitioned to list westslope cutthroat trout as threatened. On June 10, 1998, the USFWS published a Federal Register notice announcing a 90-day finding that an amended petition to list the westslope cutthroat trout as threatened under the Endangered Species Act, where substantial information was provided to indicate that such a listing may be warranted. After review, the USFWS concluded in April 2000 that listing westslope cutthroat trout as a threatened or endangered species under the act was not warranted at that time.*

> *However, in 2001 the court ordered USFWS to review the status of westslope cutthroat trout based on three key points. In response, on September 3, 2002 in the Federal Register (vol. 67, #170: 50 CFR Part 17), the USFWS set forward a notice of intent to prepare a status review for the westslope cutthroat trout. In summary, the USFWS announced the initiation of a new status review for the westslope cutthroat trout in the U.S. pursuant to a recent court order and the Endangered Species Act of 1973, as amended.*
>
> *After a thorough review of all the available scientific information, the USFWS reaffirmed their previous decision that the westslope cutthroat trout did not warrant listing as a threatened species because abundant, stable, and reproducing populations remain well distributed throughout its historic range.*

Westslope cutthroat trout have been identified in nearly all streams in the Twomile Resource Area. Unknown variations of cutthroat trout and other salmonids have been previously stocked in South Fork Coeur d'Alene River basin through the years of 1968-1999 by Idaho Department of Fish and Game (Table 3-AQ-3). However, the populations that resided there prior to the introductions were likely native westslope cutthroat trout.

There are three possible life-history forms that westslope cutthroat trout could exhibit within the South Fork Coeur d'Alene River system. These are adfluvial, fluvial, and resident forms (for definitions refer to the Glossary in this environmental assessment). Westslope cutthroat trout are spring spawners. There is a possibility that they have much more habitat available to them than fall spawning salmonids, principally due to higher water conditions creating more habitat.

The preferred habitat of westslope cutthroat trout is cold, clear streams with rocky, silt-free riffles for spawning and slow, deep pools for feeding, resting, and over-wintering (Reel et al. 1989; PF Doc. AQ-27). Pools are a particularly important habitat component as cutthroat trout occupy pool habitat more than 70 percent of the time (Mesa 1991; PF Doc. AQ-28). Other key features of westslope cutthroat habitat are large woody debris (LWD) for persistent cover and habitat diversity as well as small headwater streams for spawning and early rearing.

A population status review of westslope cutthroat trout in Idaho has determined that populations in northern Idaho have declined over their historic distribution with viable populations existing in only 36 percent of the original Idaho range. The primary cause of the decline was found to be habitat degradation (Rieman and Apperson 1989; PF Doc. AQ-29).

**Torrent Sculpin (Sensitive)**

Torrent sculpin were added to the IPNF's sensitive species list March 12, 1999. This species is not known to inhabit drainages to the South Fork Coeur d'Alene River; however, data on distribution by stream is limited, therefore it is treated here as if distributed. It is unlikely that it exists in these drainages, since it ecologically favors riverine habitats. Torrent sculpin prefer riffle habitat in medium to wide streams and rivers (Markle et al. 1996; PF Doc. AQ-30), where large adults (>150 mm) are found in pools. Spawning usually occurs in May and June and occurs in riffles with moderate to swift flows. Similar to westslope cutthroat and bull trout, the torrent sculpin is also a cold-water species and consequently its range overlaps with both these species. Analyzing effects on the westslope cutthroat trout will cover possible effects to this species.

**Reference Condition for Fisheries**

The reference condition for fish habitat is based on reference reaches in Twomile Creek, habitat surveys in Twomile Creek headwater tributaries (see "Watershed Reference Condition"), historic information, electrofishing data, knowledge of basic ecological processes, and professional judgment. Physical attributes of fish habitat are mainly defined by stream channel condition.

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; PF Doc. AQ-31).

The historic distribution of westslope cutthroat in the tributaries within the Twomile Resource Area are speculated, but no known natural mainstem barriers would have limited access (except headwater stream gradient). If adfluvial or fluvial stocks of westslope cutthroat trout were present they would utilize main channel and headwater habitat with resident forms. Several data sources have identified westslope cutthroat trout within the Twomile Creek system. These include Forest Service and IDFG records indicate that westslope cutthroat trout have been identified within the system and that other species of salmonids have been identified in the basin during surveys (Table 3-AQ-3). Historical plantings of rainbow trout are known (Table 3-AQ-3); eastern brook trout are not known to be stocked (pre-1960), but occur in the Twomile Creek drainage.

**Existing Condition for Fisheries**

***Stream Channel Characteristics in the Twomile Resource Area***

Stream habitats are influenced by woody debris constrictions and local confinement, which typically produce scour pools and riffles. Streambank erosion rates are normally low as are channel aggradation and degradation process rates. For a complete description of each watershed's condition, please refer to Section B ("Characterization of the Affected Aquatic Environment").

Stream temperature data from 2002 (fisheries project file; PF Doc. AQ-32) have shown that temperature requirements for cold-water aquatic life (i.e. salmonids) are being met. Consequently, these standards are more inclusive than the INFS (1995; PF Doc. AQ-9) for meeting the Riparian Management Objectives (RMO) set-forth for temperature requirements.

***Fish Populations in the Twomile Resource Area***

Bull trout are not currently known to use the South Fork Coeur d'Alene River drainage or its tributaries for spawning or rearing, including Twomile Creek and Nuckols Gulch. Populations of sculpin species, westslope cutthroat, rainbow, rainbow/westslope cutthroat hybrids, and eastern brook trout inhabit Twomile Creek and its tributaries (Table 3-AQ-3; data in district fisheries files). Westslope cutthroat, eastern brook, rainbow, westslope cutthroat/rainbow hybrids, and sculpin species densities calculated from electrofishing samples in 2002 are summarized for Twomile Creek and its tributaries in the below section.

***Fish Habitat in the Twomile Resource Area***

In 2002, fisheries habitat data was collected in Twomile Creek and water temperature was monitored at points throughout the Twomile Resource Area. All data and summaries are located in the project file (PF Doc. AQ-74 through AQ-80). The following is a summary of this data collection effort.

**Fish Habitat in Twomile Creek:** The main stem of Twomile Creek flows approximately 4 miles before entering the South Fork Coeur d'Alene River; this does not include its headwater tributary (East Fork Twomile Creek) which is addressed below). Twomile Creek encompasses an area of nearly 5 square miles, with a road density of 4.78 miles of road per square mile of area, and a stream riparian road density of approximately 0.8 mile per square miles. The Twomile Creek drainage has experienced past levels of harvest activity, including in and near the riparian areas. Several small intermittent and perennial non-fish bearing tributaries feed Twomile Creek for its entire length. Stream channel habitat and morphology were evaluated using modified R1/R4 stream survey methodologies (Overton et al. 1997; PF Doc. AQ-16); Rosgen channel analysis (1996; PF Doc. AQ-33); and the Wolman Pebble Count. The R1/R4 stream survey protocol was used to sub-sample an identified monitoring reach and collect important variables (e.g. LWD information; pool, riffle, and run habitat information; pool volume, etc.)

Forest Service stream survey crews conducted electrofishing in Twomile Creek in 2002-03 to determine fish density, presence and absence data. Additional electrofishing surveys in Twomile Creek were conducted by IDFG in 1995. In the 2002-03 electrofishing surveys, eastern brook trout were the only salmonid found in the main stem of Twomile Creek (19 fish/100m$^2$), followed by sculpin species (14 fish/100m$^2$). In the East Fork Twomile Creek, westslope cutthroat, rainbow, and/or hybrids were sampled at a density of 12 fish/100m$^2$.

Adfluvial, fluvial, and/or resident forms of westslope cutthroat are likely in Twomile Creek watershed with the most likely being resident forms. Historical introductions or stocking of rainbow/Kamloops trout in the South Fork Coeur d'Alene River basin (1968-99) have occurred that may alter fish populations and/or spawning and rearing habitat for westslope cutthroat trout.

In the Twomile Resource Area there are four proposed helispot landings. One of these is proposed on a site that has very compacted soils and is detrimentally disturbed. It is near an intermittent stream corridor that currently has a nonfunctional-high risk culvert crossing. This proposed helispot is near and within the 65-buffer of the Category 4 (intermittent) stream channel located in the lower-most portion of the Twomile Creek watershed. The goal of proposed activities is to use this location as a helispot for proposed harvest activities and then fully reclaim the site and restore the intermittent stream corridors hydrologic function and riparian condition that is currently detrimentally disturbed.

A portion of Twomile Creek (just over 5%) is within private landownership and has been intensively managed and developed (refer to "Past, Present, and Reasonably Foreseeable Activities"). Most of this ownership and extensive development occurred along approximately the last three-quarters of a mile of the Twomile Creek riparian area. In 2002, the Forest Service survey crews documented stream temperatures below the East Fork Twomile Creek confluence using a Hobo tidbit-recording device. Data was collected every hour over a 24-hour period from June 3rd to October 21, 2002, with an average mean temperature of 10°C. Temperature data collected indicate that criteria for cold-water aquatic life are being met, while westslope cutthroat trout spawning and incubation periods were periodically exceeded (IDAPA 250.02.f).

Twomile Creek was surveyed in the lowermost portion of the drainage to establish a long-term monitoring site, where one Rosgen stream channel type was identified (1996; PF Doc. AQ-33). Overall, Twomile Creek had a low pool to riffle ratio (approximately 1:5) in this monitoring reach and most pools surveyed were created by large woody debris (LWD). Single LWD pieces within the monitoring site equaled 55 pieces per 100 meters. Most single LWD pieces surveyed (86%) were either very small in length and diameter or were associated within the channel as aggregates. The Twomile Creek monitoring site survey data indicated:

*1) Fish density was relatively high, but non-native eastern brook trout dominated;*
*2) channel stability was fair;*
*3) pool-to-riffle ratio was low; and*
*4) LWD class was small in length and diameter and few aggregates exist.*

**Fish Habitat in East Fork Twomile Creek:** The stream is a large headwater drainage that creates Twomile Creek; it is a higher gradient with wood and boulder pools, low and high gradient riffle habitat. East Fork Twomile Creek flows approximately 1.8 miles before entering main stem Twomile, encompassing an area of approximately 1.25 square miles. The East Fork Twomile drainage has had road building, mining, and harvest activity, including near and in riparian areas. In 2003, Forest Service survey crews conducted electrofishing in the stream, finding westslope cutthroat, rainbow, and/or westslope/rainbow hybrid trout. The East Fork Twomile system has one human-caused fish barrier located approximately one-half mile upstream of its confluence with the main stem Twomile Creek, which would hinder adfluvial, fluvial, and/or resident forms of westslope cutthroat's use of habitat in the watershed. Another in-channel barrier likely exists above this road/stream crossing. Specifically, past roading and mining operations near the channel have stored considerable bedload in and adjacent to the channel. Through the hydrologic dynamics of the channel, this bedload is beginning to erode and scour into the channel, resulting in downstream fish habitat and hydrologic function loss and likely the failure of the crossing mentioned previously. The combination of non-native fish introductions and past activities (both natural and management related) in the East Fork Twomile watershed have likely affected fish populations and/or spawning and rearing habitat in the watershed.

**Fish Habitat in Nuckols Gulch:** The stream in Nuckols Gulch flows approximately 4 miles before entering the South Fork Coeur d'Alene River. Nuckols Gulch encompasses an area of two square miles, with a road density of 3 miles of road per square mile of land. Past harvest activity has occurred in Nuckols Gulch, both

near and in riparian areas. Several small intermittent tributaries feed the watershed for its entire length. During stream surveys by Forest Service personnel, trout were noted occupying the stream channel, however species designation was undetermined. Adfluvial, fluvial, and/or resident forms of westslope cutthroat are likely in Nuckols Gulch watershed (resident forms are the most likely). Historical introductions or stocking of rainbow/Kamloops trout in the South Fork Coeur d'Alene River basin (1968-99) have occurred that may have altered fish populations and/or spawning and rearing habitat for westslope cutthroat trout within the watershed.

A portion of Nuckols Gulch (35%) is within private landownership that has been intensively managed and developed (refer to "Past, Present, and Reasonably Foreseeable Activities"). Most of this ownership and extensive development has occurred in the lower portion of the basin and in an area between National Forest System lands in the headwaters.

**Fish Habitat in Revenue Gulch:** The stream in Revenue Gulch flows approximately 3 miles before entering the South Fork Coeur d'Alene River. Revenue Gulch encompasses an area of just over 2 square miles, with a road density of 4 miles of road per square mile of land. Revenue Gulch has experienced past levels of harvest activity, including near and in riparian areas. Several small intermittent tributaries feed the watershed for its entire length. Nearly two-thirds of Revenue Gulch (63%) is within either BLM or private landownership that has been intensively managed and developed (refer to "Past, Present, and Reasonably Foreseeable Activities"). Revenue Gulch is an intermittent stream in the headwaters and perennial non-fish bearing in the valley floor. Currently, adfluvial, fluvial, and/or resident forms of westslope cutthroat and other salmonid species do not inhabit the channel within the Twomile Resource Area.

## 3.4.3. Environmental Consequences to Aquatic Resources

The following discussion discloses the direct, indirect, and cumulative effects of the proposed and reasonably foreseeable activities on the aquatic resources. The discussion of effects is based on the key issues and issue indicators identified in Chapter 2 for Aquatics. The reasonably foreseeable activities are also listed in Chapter 2 of this document and those relevant to the aquatics analysis are thoroughly discussed later in this section.

### *A. Methodology Used in the Assessment and Description of Environmental Consequences to Aquatic Resources*

The effect of the proposed activities on stream channels is the main concern related watershed and fisheries resources. Hillslope conditions are reflected in stream channels, which in turn are the formative features of aquatic habitat. The analysis of direct and indirect effects is based on how the various components of the project (*e.g.*, location, size of cutting units, methods of logging systems, road construction and road work, and reasonably foreseeable actions) are expected to affect each subwatershed within the Twomile Resource Area.

For this environmental analysis, the WATSED model was used to compare the cumulative effects of the No-Action Alternative (Alternative 1) to effects of the action alternatives (2, 3, and 4). For Alternatives 2, 3, and 4, the risk analysis applied the specific mitigation measures described in Chapter 2.

***Direct effects:*** *those immediately detected in time or space as a result of activities. Example: an immediate delivery of sediment to a creek.*

***Indirect effects:*** *those that are detected at a later time or place, and occurring separate from actual activities. Example: an increase in water yield as a result of removing canopy closure.*

***Direct and indirect effects analyses are combined in this document.***

***Cumulative effects:*** *based on the existing condition, the direct and indirect effects of proposed activities and any ongoing or reasonably foreseeable actions.*

*The reference condition of the cumulative effects analysis is presented in the Existing Condition section of this chapter.*

*Reasonably foreseeable activities in the Twomile Resource Area include ongoing road maintenance and noxious weed treatments on National Forest System lands, and continued residential growth, road building, grazing and timber harvest on private lands.*

**Methodology Used in Estimating Effects to Water Yield and Peak Flow (Flow Regime)**

Peak flows represent the change in runoff and is expressed as the percent change from the estimated "natural" peak month discharge. The WATSED model was used for this analysis to estimate the effects of the proposed timber harvest, construction, reconstruction and decommissioning of temporary and classified roads, and site preparation treatments. Reasonably foreseeable actions are included in this analysis. Changes in peak flows are compared to the existing peak flows discussed in the affected environment section. The timeframes for the estimated direct and indirect effects, for all alternatives is 2004 (estimated start of activity), through 2031.

| Guidelines for Changes to Water Yield and Peak Flow | |
|---|---|
| **Zero** | If the increase over the existing level is zero, there is no potential for an increase in water yield and peak flow or delay of watershed recovery. |
| **0 to 5%** | Potential exists for an increase in water yield and peak flow or delay of watershed recovery, but the increase would not be measurable. For example, if you dumped a cup of water into a stream, you know the flow has increased; yet it would not be measurable at a gauging station. |
| **5 to 10%** | There is a slight potential that there would be a measurable increase in water yield and peak flow or delay of watershed recovery. |
| **10% or more** | There would likely be a definite increase in water yield and peak flow resulting in a visible change in stream morphology and delay of watershed recovery. |

**Methodology Used in Estimating Effects to Channel Morphology**

Morphology is the shape of the stream channel – such as bank height, bank slope, channel width, and pool size. 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 et al. 1991, PF Doc. AQ-34; Rosgen 1996, PF Doc. AQ-33). Stream channels are more stable with respect to fluctuations in flow and sediment yields when the substrate is composed of bedrock and boulders that have a good portion of large woody debris jams and are more confined within the valley bottom (Chamberlin et al 1991, PF Doc. AQ-34; Rosgen 1996, PF Doc. AQ-33). This analysis compares effects of proposed activities under Alternatives 2, 3, and 4, in regard to changes in channel morphology (such as bank erosion, downcutting, and deposition of bedload sediment). The analysis stems from interpretation of WATSED's sediment and water flow changes and where (or if) any changes may be occur in the more sensitive reaches of the streams. The analysis is based on judgment supported by WATSED modeling by subwatershed.

**Methodology Used in Estimating Effects to Water Quality**

Water quality is analyzed from two different aspects: 1) changes in sediment yield from proposed vegetation activities, burning, road construction and road reconstruction; and 2) in respect to aquatic restoration activities such as road decommissioning and treatment of road crossings.

**Methodology Used to Estimate Effects to Sediment Yield:** Percent increase in sediment yield is estimated as the annual sediment above existing levels loading into Twomile Creek, Nuckols Gulch, and Revenue Gulch subwatersheds. This percent is compared to the current sediment load discussed in the existing conditions section. Sediment yield percent is calculated for each alternative using the WATSED model. The proposed timber harvest units, construction, reconstruction, and decommissioning of temporary and classified roads, and site preparation treatments are included in the analysis. Some of the reasonably foreseeable actions discussed below are also calculated in the analysis. The estimated short-term or direct and indirect effects analysis timeframe for sediment yields is through 2009, the latest year that sediment yield would recover to baseline.

| Guidelines for changes to Sediment Yield | |
|---|---|
| **Zero** | If the increase over the existing level is zero, there is no potential for an increase in sediment or delay of watershed recovery. |
| **0 to 10%** | Potential exists for an increase in sediment or delay of watershed recovery, but the increase would not be measurable. For example, if you dumped a cup of dirt into a stream, you know the sediment has increased; yet it would not be measurable at a gauging station or by using a sampler. |
| **10 to 20%** | There is a slight potential that there would be a measurable increase in sediment or delay of watershed recovery. |
| **20% or more** | There would likely be a definite increase in sediment resulting in a visible change in stream morphology and delay of watershed recovery. |

**Methodology Used to Estimate Effects to Sediment Risk Associated With Drainage Structures:** This is the anticipated change in sediment risk associated with stream crossings that were inventoried within the scope of the project. The associated risk is presented in terms of tons of sediment as discussed in the affected environment section. This figure was calculated based on measurements or estimates of road throughfill located at stream crossings. This issue indicator is important in assessing watershed improvement work associated with the alternatives.

**Methodology Used to Estimate Effects on Rain-on-Snow**

There is a potential for localized effects at the subwatershed scale. It is difficult to predict large-scale, catastrophic effects at the larger watershed scale and the effects to The South Fork of the Coeur d'Alene River downstream of Twomile Creek resource area. The analysis is based on change of canopy openings, the size of those openings, and conclusions drawn from studies specific to the Pacific and Inland Northwest including Rothacher (1973; PF Doc. AQ-35), Harr and McCorison (1979; PF Doc. AQ-36), Harr (1981; PF Doc. AQ-37), Christner and Harr (1983; PF Doc. AQ-38), Harr (1986; PF Doc. AQ-21), Berris and Harr (1987; PF Doc. AQ-39), King (1989; PF Doc. AQ-40), and Coffin and Harr (1991; PF Doc. AQ-41).

The issue is whether the management activities proposed with this project will affect the hydrologic response to rain-on-snow events at a scale beyond that disclosed in this analysis. The rationale used for this analysis is:

1) *The scale of the management activities with this project is insufficient to affect the hydrologic response of large watersheds to rain-on-snow events.*
2) *The magnitude of the management activities proposed with this project is insufficient to affect the hydrologic response of large watersheds to rain-on-snow events.*

## *B. Direct and Indirect Effects to Aquatic Resources*

**Direct and Indirect Effects to Aquatic Resources Under the No-Action Alternative (Alternative 1)**

Since no management activities would be implemented with this alternative, there would be no direct effects associated with this project. Sediment yield values and trends as discussed in the existing conditions would not change from existing predicted trends. Water yield values would continue to decrease very slowly by an average of approximately 0.5% for the next 18 years in Nuckols Gulch and Revenue Gulch as vegetation recovers from recent harvest. Water yield in Twomile Drainage would remain at current levels due to vegetation of past harvest activities already recovered to effectively intercept, utilize, and transpire water. Sediment yield values would continue to recover to a baseline condition after recovery from past activities because no roads would be decommissioned or culverts upgraded.

Under this alternative, none of the aquatic restoration activities such as removing/upgrading at-risk road drainage crossings, decommissioning roads, would be accomplished. Without the proposed improvements,

the net associated risk of sediment delivery would remain at 36 tons/year in Twomile Subwatershed (watershed project file). The failure of these crossings would likely happen fewer than two scenarios; first if a large stand-replacing fire occurs and is then followed by a high intensity rain or a rain-on-snow event. Second, if a large rain-on-snow event were to occur as discussed in the affected environment section. Under both scenarios, if a flash flood and/or debris flow is triggered by either event, culvert failures occur when debris plugs culverts or when the capacity of the culvert is exceeded. Water then is either concentrated over the top of road fills or is diverted down the road or ditch and onto hillslopes unaccustomed to concentrated overland flow.

With either of these scenarios, the additional sediment pulse could result in adverse effects to fish populations and/or fish habitat. If either of these events were to occur while salmonid eggs or alevins were still in the gravels, they could potentially be entombed by the additional sediment and suffocate.

### Direct and Indirect Effects to Aquatic Resources Common to the Action Alternatives

**Direct and Indirect Effects to Water Yield and Peak Flow (Flow Regime) Under the Action Alternatives:** Twomile, Nuckols, and Revenue Subwatersheds would have peak flow and water yield increases ranging from 2 to 7% over existing, which constitutes a slight potential that there would be a measurable increase in water yield and peak flow or delay of watershed recovery (see Table 3-AQ-4). There would be very little difference in peak flow changes between Alternatives 2 and 3. This means that Alternative 3 would have an overall slightly greater risk in increased peak flows compared to Alternative 2 but the difference would be undetectable when measuring flows in the streams. Alternatives 2 and 3 could both potentially result in a slight increase in peak flows within the first order, headwater drainages. This potential for a slight increase would be localized only in the headwaters and would not be great enough to cause channel degradation or increase fine sediment or coarse bedload particles.

Alternative 4 includes thinning and burning activities where only low intensity under-story burns would occur. This would cause very little over-story mortality. With overstory mortality ranging from 1 to 2 %, there would not be enough heat to scorch soils or kill trees that provide canopy and there would be no change in water yield or peak flows.

***Table 3-AQ-4. Comparison of Changes to Peak Flow and Water Yield in the Twomile Resource Area, by alternative.***

| Indicator | Alternative 1 (No Action) | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|
| **WATER YIELD**<br>Effects of commercial harvest and resulting canopy openings on % increase in water yield.<br><br>**(% increase over existing)** | Twomile Creek, Nuckols Gulch and Revenue Gulch watersheds would all have a **0% increase** in water yield due to no loss of overstory canopy. Only in the event of an uncharacteristically large wildfire would water yield increase. | Twomile **5%**<br>Nuckols **6%**<br>Revenue **2%**<br><br>**Range = 2 to 7%**<br>**Mean = 4.3%** | Twomile **4%**<br>Nuckols **7%**<br>Revenue **2%**<br><br>**Range = 2 to 7%**<br>**Mean = 4.3%** | Twomile Creek, Nuckols Gulch and Revenue Gulch watersheds would all have a **0% increase** in water yield due to no loss of overstory canopy. Thinning and understory removal would not cause measurable increases in water yield. |
| **PEAK FLOW**<br>Effects of commercial harvest and resulting canopy openings on % increases in peak flows.<br><br>**(% increase over existing**) | Twomile Creek, Nuckols Gulch and Revenue Gulch watersheds would all have a **0% increase** in peak flow due to no loss of overstory canopy. Only in the event of an uncharacteristically large fire would peak flow increase. | Twomile **7%**<br>Nuckols **6%**<br>Revenue **2%**<br><br>**Range = 2 to 7%**<br>**Mean = 5.0%** | Twomile **7%**<br>Nuckols **8%**<br>Revenue **2%**<br><br>**Range = 2 to 8%**<br>**Mean = 5.7%** | Twomile Creek, Nuckols Gulch and Revenue Gulch watersheds would all have a **0% increase** in peak flow due to no loss of overstory canopy. Thinning and understory burning would not cause measurable increases in peak flows. |

**Direct and Indirect Effects of Water Yield Increases on Fisheries Under the Action Alternatives:** Water yield increase in Twomile Creek and Nuckols and Revenue Gulch watersheds would increase from 2% to 7% above the existing conditions with the proposed vegetation treatments and road prescriptions. Within the drainages in the Twomile Resource Area, Alternative 2 would increase peak flows by an estimated mean of 5.3 % above current levels (range 2% to 7 %). Within the drainages in the Twomile Resource Area, Alternative 3 would increase peak flows by an estimated mean of 5.7 % above current levels (range 2% to 9 %). The actions associated with Alternatives 2 and 3 would be essentially the same, and each alternative may initiate a small increase in peak flows, likely within the first and second order, headwater drainages. The effects in peak flows would be localized in the headwaters. Increases in water yield under these action alternatives would not be detectable in the mainstem of Twomile Resource Area streams and would not change existing fisheries habitat conditions in any of the fish-bearing stream segments. Since any change in water yield associated with this project probably would not be differentiated from normal climatic fluctuations in the Twomile Resource Area watersheds any additional bedload scour during high flows would not be expected. Salmonid redds existing in the cumulative effects area would not be directly or indirectly affected by the expected increase in water yield.

**Direct and Indirect Effects to Channel Morphology Under the Action Alternatives:** Changes in the magnitude, intensity or duration of peak flows and sediment yields have the potential to change stream channel characteristics. The action alternatives would modify the magnitude, intensity and duration of peak flows and sediment yields at different levels, with Alternatives 2 and 3 having the greatest change. Based on the stream channel types and landtype characteristics of Twomile Creek and Nuckols, Revenue, and Silverton Face subwatersheds, the estimated changes in peak flows, sediment yields and the potential increases in flows from a rain-on-snow event, would not affect stream channel morphology from any of the three action alternatives, and therefore would not change fish habitat. The dominant stream bank material is primarily composed of boulders, cobbles and bedrock outcrops that are not easily erodible. Plus, the channels are well confined and entrenched, which allow sediment and debris to be easily transported.

Stream survey data from 2002 (USDA Forest Service) indicates that woody debris recruitment levels are high, and that woody debris exists in the form of single pieces that were classified as relatively small in length and diameter or grouped as aggregates. These pool formative features can dissipate stream energy. A maximum increase in water yield of 7 %, and a peak flow of 8% over the existing condition would likely result in some elevated flows in the headwaters, but would be undetectable in South Fork Coeur d'Alene River. Changes in the magnitude, intensity or duration of peak flows and sediment yields have the potential to change stream channel characteristics. 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 et al. 1991; PF Doc. AQ-34; Rosgen 1996; PF Doc. AQ-33). Stream channels where the substrate is composed of bedrock and boulders that have a good portion of large woody debris jams and are more confined within the valley bottom, are more stable with respect to fluctuations in flow and sediment yields (Chamberlin et al 1991; PF Doc. AQ-34; Rosgen 1996; PF Doc. AQ-33).

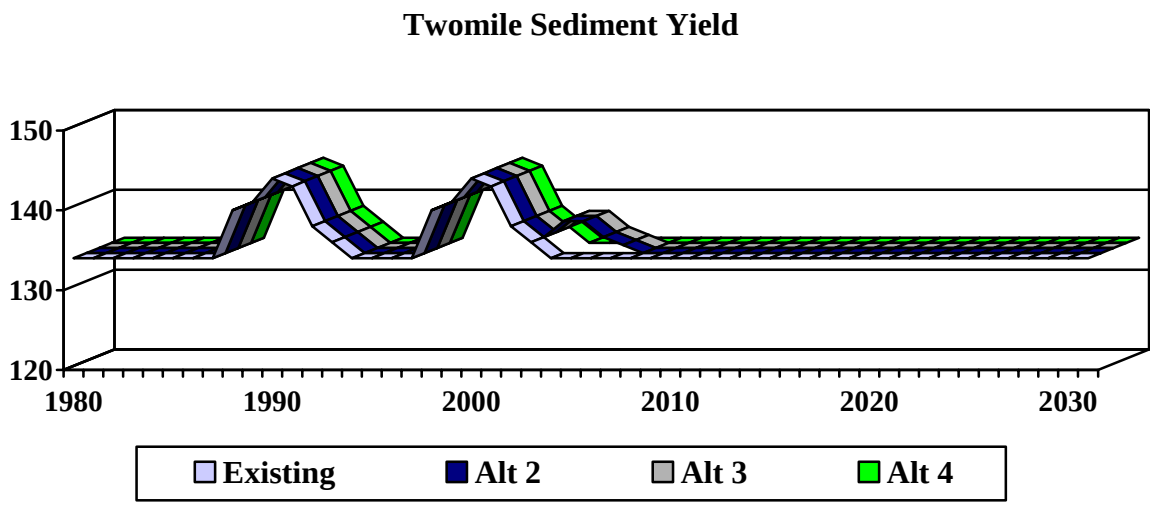
All action alternatives modify the magnitude, intensity and duration of peak flows and sediment yields at different levels, with Alternative 3 having only a slightly greater (unmeasurable) increase. The difference is only 0.7% more with Alternative 3 and only in Nuckols Gulch is there a difference between these alternatives. Alternative 2 and 3 have no differences in water yield and sediment yield in Twomile subwatershed and Nuckols subwatershed. Based on the stream channel types and landtype characteristics of Twomile Creek and Nuckols and Revenue Gulch's, the estimated changes in peak flows, sediment yields and the potential increases in flows from a rain-on-snow event, would not affect stream channel morphology from any of the three action alternatives, and therefore would not change fish habitat. The dominant stream bank material is primarily composed of boulders, cobbles and bedrock outcrops that are not easily erodible. Plus, the channels are well confined and entrenched, which allow sediment and debris to be easily transported.

Forest Service stream survey data from 2002 indicates that woody debris recruitment levels are high, and that woody debris in exists in the form of single pieces that were classified as relatively small in length and diameter or grouped as aggregates. These pool formative features can dissipate stream energy. A maximum

increase in water yield of 7% over the existing condition would likely result in some elevated flows in each of the subwatersheds, but would be undetectable in South Fork Coeur d'Alene River.

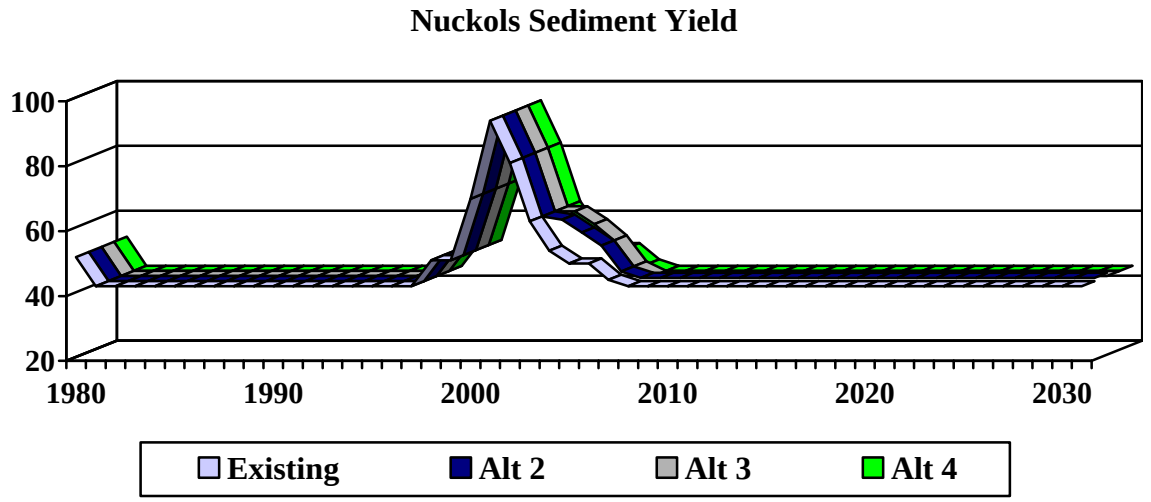
**Direct and Indirect Effects to Water Quality (Sediment Yield) Under the Action Alternatives:** Sediment yield is variable by alternative as modeled with WATSED. Figures 3-AQ-9 through 3-AQ-11 display the differences in sediment yield increases resulting only from vegetative treatments and associated road construction/reconstruction. Following is a comparison of effects of the same activities both with and without aquatic restoration. All results assume that every treatment in every unit would be implemented in 2004.

***Figure 3-AQ-9. Comparisons of Sediment Yield increases within the Twomile Creek Subwatershed.***



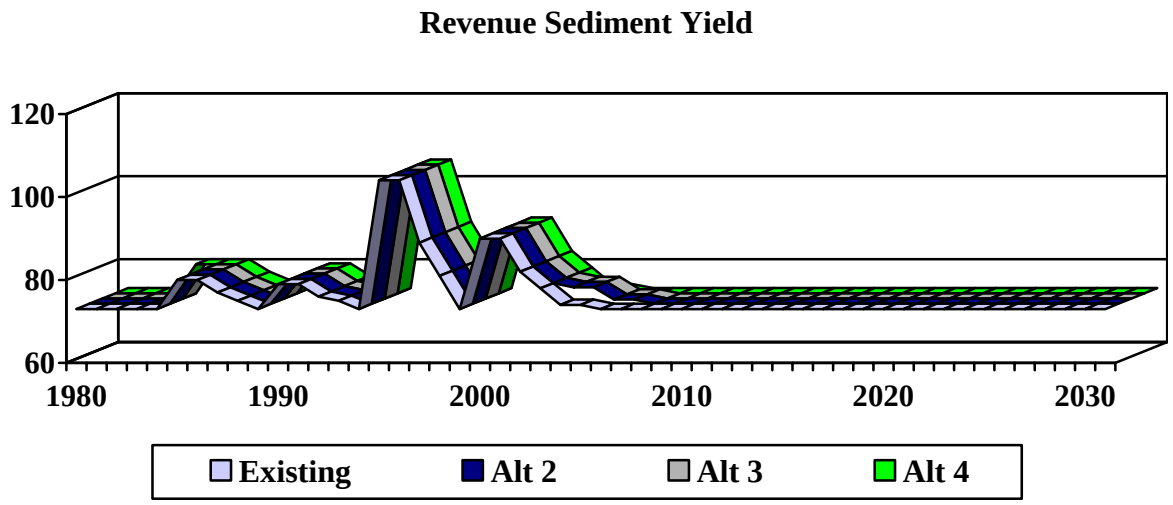

There would no differences between Alternatives 2 and 3. Sediment yield would increase by 4% over existing. The sediment yield increase under Alternatives 2 and 3 would not be measurable in lower Twomile Creek. Alternative 4 would have the same sediment yield as the existing condition due to no new roads, no commercial harvest, and only cool understory burns with no soil disturbance.

***Figure 3-AQ-10. Comparison of Sediment Yield Increases within the Nuckols Gulch Subwatershed.***



Alternative 4 would have the same sediment yield as the existing condition, due to no new roads, no commercial harvest, and only cool under story burns with no soil disturbance. There are only minor differences between Alternatives 2 and 3. Alternative 3 would have 1% more increase in sediment yield in the years 2004 and 2005 (first and second year of activity). This difference between these two alternatives would not be measurable. There is a slight chance of measurable change in sediment because the increase is predicted to be 8% and 9% above existing (Alt 2 and Alt 3 respectively). This potential exists in Nuckols Creek because the increase is near the upper limit of non-detectable changes. There could be a slight potential for sediment delivery in isolated segments of intermittent stream channels near road reconstruction activities. Harvest units would have INFS buffers applied so that there would be sufficient filtering of any sediment that may be generated from ground disturbance. Any sediment increases downstream near the mouth of Nuckols Gulch would have a low risk of being detectable and the overall recovery of the Nuckols subwatershed recovery would be delayed by 2 to 3 years.

***Figure 3-AQ-11. Comparison of Sediment Yield increases within the Revenue Gulch Subwatershed.***




There would be no differences between Alternatives 2 and 3. Alternative 4 has the same sediment yield as the existing condition, due to no new roads, no commercial harvest, and only cool understory burns with no soil disturbance.

***Table 3-AQ-5. Comparison of Sediment Yield changes by alternative for the Twomile Resource Area***

| Indicator | Alternative 1, No Action | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|
| **SEDIMENT YIELD**<br>Effects of commercial harvest, and road activity on % increase in sediment yield.<br><br>**(% increase over existing)** | Twomile Creek, Nuckols Gulch, and Revenue Gulch watersheds would all have a **0% increase** in sediment yield due to no ground disturbance associated with timber harvest. | Twomile **4%**<br>Nuckols **8%**<br>Revenue **3%**<br><br>**Range = 3 to 8%**<br>**Mean = 5.0%** | Twomile **4%**<br>Nuckols **9%**<br>Revenue **3%**<br><br>**Range = 3 to 9%**<br>**Mean = 5.3%** | Twomile Creek, Nuckols Gulch, and Revenue Gulch watersheds would all have a **0% increase** in sediment yield due to no ground disturbance. Thinning and burning understory would not cause measurable increases in sediment. |

In summary, there would be only a slight difference in sediment yield increases between Alternatives 2 and 3 (Alternative 3 would exceed the increase predicted under Alternative 2) and only in the Nuckols Gulch subwatershed. The risk of measurable sediment under the action alternatives would be low for the entire

analysis area. If any sediment increase were to occur, it would be localized near road reconstruction activities in Nuckols Gulch, and sediment would not be measurable in lower reaches of this stream. The Silverton Face drainage would have a low risk of measurable increases with the action alternatives due to no new, temporary, or reconstructed roads proposed with the action alternatives in this drainage. Only 10 to 20 acres of treatment would occur in this 1,880-acre drainage, and no harvest in RHCA's would prevent sediment from being routed downstream or to the South Fork Coeur d'Alene River. Sediment yield increases under the action alternatives would not be sufficient enough to cause measurable effects to water quality or impair beneficial uses.

**Direct and Indirect Effects of Sediment Yield on Fisheries Under the Action Alternatives:** Increases in sediment delivery can affect fish habitat by filling in the interstitial spaces in spawning gravels. Resulting in decreased water flow through the gravels that is imperative for oxygen delivery and waste removal for incubating eggs. Filling of interstitial spaces can also displace macroinvertebrates, thereby reducing an important food source for fishes. High amounts of sediment can fill in pools and reduce rearing habitat for juvenile fishes. Since all ground disturbing activities (e.g. roading, skyline and helicopter logging; etc) would occur outside of RHCAs, the risk of any sediment generated by logging activities actually reaching a live channel is very low (Belt et al. 1992; PF Doc. AQ-42). By using timing restrictions (see Fisheries BA/BE), onsite direction, and BMPs, sediment delivery to occupied fish habitat associated with culvert removals and upgrades would be minimized and risk of failure removed/reduced.

The identified culvert removals and upgrades are located throughout the drainage (i.e. two within fish bearing waterways). Sediment yield during road decommissioning or reconstruction or roads into stream courses would likely be transported into large woody debris depositional zones and/or the lowest reaches of Twomile Creek and Nuckols and Revenue Gulch watersheds is relatively low when implementing BMPs and INFS (1995; PF Doc. AQ-9) standards and guidelines. The higher-gradient channel types present in the headwaters of these drainages would likely route any sediment to the nearest low gradient stream reaches where it would settle out. Given the amount of large woody debris component found in the project watersheds (USFS-Stream Surveys 2002; PF Doc. AQ-43), the predicted increase in sediment delivery would likely be transported or stored within the system. During high flows, silts would likely stay suspended, be carried through the system and be re-deposited in large woody debris sites or off-channel microsites (i.e. depositional zones) influenced by high flows.

**Direct and Indirect Effects of Aquatic Restoration (Road Decommissioning, Crossing Removals and Upgrades, and Helicopter Landing Rehab):** Roads that are no longer needed for long term transportation and have the greatest potential for chronic sediment, have been identified for decommissioning (Table 3-AQ-6). Road decommissioning would be implemented under all action alternatives. The only road decommissioning identified with this analysis would occur in the Twomile Creek subwatershed. No road decommissioning or stream crossing treatments would occur in Nuckols Gulch or Revenues Gulch.

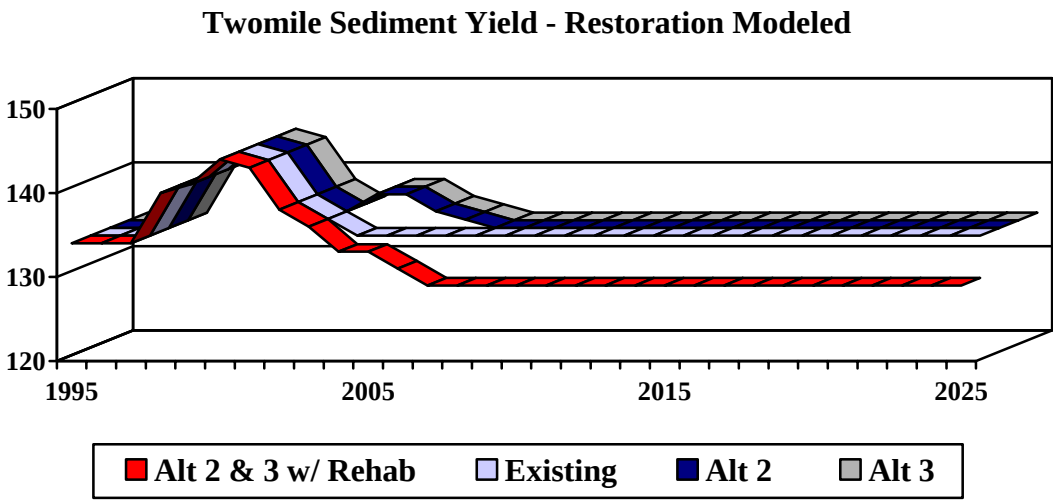
***Table 3-AQ-6: Miles of Road Decommissioning in the Twomile Subwatershed Under Alternatives 2,3, and 4.***

| Road | Miles | # stream crossings/ culverts removed | General Road Location and Comments |
|---|---|---|---|
| 271UB | 0.34 | 2 | Two Mile Spur UB, in lower East Fork of Twomile Creek. An encroaching Road, abandoned mine, and 2 crossings. |
| 271UBA | 0.84 | 5 | East Fork & Two Mile Spur BA. This road follows the upper East Fork of upper Twomile Creek. One abandoned mine with one failed culvert. |
| 271UF | 0.18 | 1 | Two Mile Spur UF, a spur road that connects to trail 102 and comes down to a stream crossing on upper Twomile Creek. Road is located on the east side of the creek. |
| 271UF | 0.57 | 1 | Two Mile Spur UF. The road that is located on the west side of upper Twomile Creek and upstream from the confluence of the East Fork of Twomile |
| 271UP | 0.39 | 1 | Two Mile Spur UK. A short road in lower Twomile Creek that leads to an abandoned mine adit. One stream crossing. |
| 424UP | 0.33 | 3 | Two Mile Saddle Spur UN The short piece of a spur road that connects to the main 271 near upper East Fork of Twomile Creek. |
| 424UP | 0.69 | 0 | Two Mile Saddle Spur UP. A Spur in the upper drainage of the East Fork of Twomile that connects 271-UBA to 424-UPA |
| **Totals** | **3.3** | **13** | |

The roads listed in table (Table 3-AQ-5) have small drainage crossings that have either under sized culverts or crossings with fills that are failing and routing sediment downstream. Brushed in road segments that are not causing any erosion or sediment would not be treated or altered. Only the road segments near drainages would be reshaped and stabilized. The beginning segments of roads to be decommissioned would be recontoured for about 200 feet to prevent motorized vehicle use from accessing these corridors. The recontouring and stream crossing treatments are the only sites that could potentially erode and create sediment that may move downstream during the construction phase. The short-term effects during the decommissioning activities would be a slight risk of erosion and sediment delivered downstream if a large precipitation event were to occur and through the first year after the activity while ground cover is being established. Planting, seeding, and mulching are effective BMPs when applied to these restoration sites, to reduce potential for short-term effects. The long-term gain from reduction of erosion and sediment delivery would be a benefit to water quality in the Twomile drainage.

The helicopter landing site once used for milling and explosives development would be rehabed as part of the action alternatives once the logging operations were completed. The stream would be reconstructed and put back in its original location. The soils would be stabilized, capped and revegetated after harvest activities so that the risk of contaminated soils eroding downstream would be eliminated. Full reclaimation would mimic as closely as possible natural site conditions at the completion of this project. Using BMPs during development and INFS standards and guidelines there is no expected direct or indirect impacts expected for the development and use of thes site. During retoration a slight risk of increased turbidity in the intermittant drainage could occur during reclaimation or if in the event of a large precipitation event were to occur in the first year after the restoration work was complete and ground cover was being established. Planting, seeding, and mulching are effective BMPs that would be applied to these restoration sites to reduce the potential for short term effects. The long-term gain from restoring this site is a full recovery from being detrementally impacted and restoring riparian and hydrological function to the intermittant stream corridor which would reduce erosion and sediment delivery, resulting in a benefit in water quality in the Twomile drainage.

***Figure 3-AQ-12. Comparison of Sediment Yield Increases in the Twomile Creek Subwatershed (With and Without Aquatic Restoration).***




This WATSED modeling was based on the assumption that under each of the action alternatives, all 3.3 miles of roads would be decommissioned in the Twomile Creek subwatershed in 2004, the same year of the harvest activity. Short-term sediment may increase during the restoration work or up to 2 years after treatment. The

long-term effects would be a reduction in sediment yield due to fewer roads present in and near riparian areas and the elimination of chronic sediment production at specific sites along these roads.

**Effects to Sediment Risk Associated with Treating Drainage Structures Under the Action Alternatives:** There are 16 inventoried road-stream crossings that have either culverts or fill within the drainage bottom (Table 3-AQ-7). Thirteen of these crossings are at risk for failure because they have either undersized culverts, no culverts, only fill that can easily erode and be transported downstream in a flood event. These crossings would be removed, reshaped and stabilized so there is no more risk of sediment moving downstream. Three of these crossing have undersized culverts and would be upgraded to a size that meets a 100-year flood event. The treatment of these crossings would have short term and temporary risk of sediment delivery to streams during the construction period lasting several days to several months. If a heavy rain event were to occur during construction, erosion and sediment transport could occur. After one growing season and after vegetation is established at the rehabilitated crossing sites, there would be a permanent reduction in the risk of sedimentation delivery downstream. This would be a long-term beneficial restoration measure to help improve water quality and reduce sediment if the restoration was accompanied with the timber harvest, thinning, roading, and burning activities proposed with the action alternatives.

***Table 3-AQ-7. Reduction in Sediment through Stream Crossing Treatment Under the Action Alternatives.***

| Watershed | # of Crossings Treated | Existing Sediment Risk (Tons/Yr) | Reduction in Sediment (Tons/Yr) |
|---|---|---|---|
| Twomile Creek | 13 removed, 3 upgraded | 36 | 30 |
| Nuckols Gulch | 0 | 0 | 0 |
| Revenue Gulch | 0 | 0 | 0 |
| **Total** | **16 crossings** | **36 tons/yr** | **30 tons/yr** |

**Direct and Indirect Effects of Aquatic Restoration on Fisheries Under the Action Alternatives:** Roads that are no longer needed for long-term transportation and have the greatest potential for chronic sediment delivery to stream courses, and have been identified for decommissioning (Table 3-AQ-6). Road decommissioning would be implemented with the action Alternatives 2, 3, and 4. All road-decommissioning activities are proposed in the Twomile subwatershed. Although Nuckols Gulch and Revenue Gulch have high road densities (mostly on private ownership), there no road decommissioning would occur in these drainages under the action alternatives.

In summary, the findings of the WATSED model and conclusions made as a result of the watershed analysis indicate that at sites where drainage recontouring and pipe removal is proposed, is there potential for sediment delivery to a live waterway. Therefore, short-term effects during the decommissioning activities would be a slight risk of increased turbidity at live water sources during decommissioning or if a large precipitation event were to occur in the first year after the restoration work was complete and ground cover was being established. Planting, seeding, and mulching are effective BMPs when applied to these restoration sites, to reduce potential for short-term effects. The long-term gain from restoration activities would be reduction of roads near riparian areas that would reduce water and sediment yields and reduce erosion and sediment delivery, resulting in a benefit in water quality in the Twomile drainage.

Most landings would be outside of RHCAs, with the exception of the landing in the lowermost portion of the Twomile drainage. This site was once used for milling and explosives development for mining in the mid-1900s. The site is detrementally impacted where an intermittant channel was re-routed and is now incised; soils highly compacted; and little to no vegetative growth. Under the action alternatives, the site would be used as a helsipot and then fully reclaimed to mimic as closely as possible natural site conditions. Using BMPs during development and INFS standards and guidelines, there is no expected direct or indirect impacts expected for the development and use of thes site. However, during retoration a slight risk of increased turbidity in the intermittant drainage could occur during decommissioning or if in the event of a large precipitation event were to occur in the first year after the restoration work was complete and ground cover was being established. Planting, seeding, and mulching are effective BMP's that would be applied to reduce potential for short term effects. The long-term gain from restoring this site would be a full recovery from

being detrementally impacted and restoring riparian and hydrological function to the intermittant stream corridor which would reduce erosion and sediment delivery, resulting in a benefit in water quality in the Twomile drainage.

As a consequence, these road-decommissioning activities would benefit fisheries in that the risk of sediment delivery would be immediately reduced when, near riparian road erosional sources are restored and high-risk-to-fail culvert crossings are removed when road-decommissioning activities were implemented. Though short-term sediment increases would be expected during restoration activities (i.e. culvert removal). Modeling indicates that sediment levels would trend back toward or below current baseline conditions in the long term with watershed restoration in the action alternatives, which by sediment risk being reduced and water quality improved, directly and indirectly benefits fisheries resources (Figures 3-AQ-12).

**Cumulative Effects of Proposed Activities**

**Cumulative Effects to Sediment Yield:** The combination of direct and indirect effects of the proposed alternatives with past, present and reasonably foreseeable activities, will result in an overall net decrease in sediment yield to the Twomile subwatershed. Nuckols Gulch would have the greatest sediment yield of all the subwatersheds (8% Alternative 2 and 9% Alternative 3). Revenue and Silverton Face would have a slight increase in sediment yield (3% under both Alternatives 2 and 3). Table 3-AQ-7 summarizes sediment inputs and reductions within the three subwatersheds.

Alternative 4 would result in the largest net reduction in sediment by 30 tons per year. The greatest sediment reduction activities within the watershed are from the proposed removal and upgrades of the at-risk culverts and road decommissioning.

The improvement and removal of the high-risk culverts will reduce the net associated risk of sediment delivery by at least 30 tons per year. The decommissioning of 3.3 miles of existing roads would also reduce sediment yields over the long term. Differences in sediment yields between the action alternatives are tied to the construction of new roads, vegetation treatments and harvest methods. Of the three action alternatives, Alternative 4 would provide the least amount of risk in sediment yields since no temporary roads are constructed and it treats the greatest amount of acres. Alternative 2 and 3 are almost identical in increases in sediment yield and even though model results are only about 1% different, there would not be measurable differences in sediment yield between these alternatives.

Studies have discussed that when disturbance patterns created by timber harvesting are used to achieve some of the benefits of natural disturbances, activities should be concentrated in a drainage rather than dispersed, that riparian areas need protection, and that harvest rotations should require longer intervals (Reeves et al 1995; PF Doc. AQ-46). Alternative 4 would best address these criteria because no roading or harvest activity would occur. The thinning activities under Alternative 4 would not impact soils or cause any delay in recovery from past activities and the aquatic restoration would still be accomplished.

***Table 3-AQ-8. Summary of estimated sediment delivery and reduction within the Twomile Resource Area.***

| Issue Indicator | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Comments |
|---|---|---|---|---|---|
| Estimated sediment **delivery** (tons) under the Twomile Resource (all sediments sources from inventories data only in Twomile Creek) | 36 | 36 | 36 | 36 | Estimated delivery over the life of the project. Values include timber harvesting, temporary road construction, road maintenance, temporary road decommissioning, and post-harvest activities are modeled. |
| Estimated Sediment **Reduction** (tons) in the Twomile Subwatershed | 0.0 | 30 | 30 | 30 | Sediment reduction is based on removal of road fill material from the crossing with culverts “at risk” for failing. Indirectly reflects aquatic restoration activities. |

Within the Twomile Resource Area, the ongoing activities and reasonably foreseeable projects (such as development of motorized trail and non-motorized trails away from riparian areas and repair and maintenance of existing roads and trails) would greatly reduce the majority of sediment that is contributed to Twomile Creek. The estimated sediment increases from the activities proposed with Alternatives 2, 3 and 4 in the Twomile Resource Area would result in a net decrease in sediment delivery. Therefore, this project would not impair beneficial uses within Twomile Resource Area or downstream in the South Fork of the Coeur d'Alene River. Alternative 4 would provide the greatest cumulative benefit in reducing short and long-term sediment yields, since no new or temporary roads are constructed and it treats the acres without mechanic disturbance.

**Cumulative Effects to Water Yield - Increases in Peak Flows:** With any of the action alternatives, the direct and indirect effects of increased peak flows combined with the effects from past, present and reasonably foreseeable activities, would not result in any cumulative effects to subwatershed in the Twomile Resource Area. Estimated water yield increases are within the historic range of variability for magnitude, intensity and duration when compared with estimates for past natural events. The effects of Alternatives 4 are more consistent with what likely occurred with natural events (Table 3 AQ-4) than Alternative 2 and 3 where water yield increases are a low risk of being great enough to be measurable. The proposed activities would not increase peak flows in Twomile, Nuckols, Revenue and Silverton Face drainages by more than 8%. Based on the historic fires in the Resource area it can be assumed that the magnitude, intensity and duration of the peak flows were very similar if not greater that what is predicted with the action alternatives. Since the proposed treatment reduces canopy in only 16% of the total area within the Twomile Resource Area and the reasonably foreseeable activities would not significantly increase peak flows, the increases in flows for the proposed activities would be within the historic range of variability.

**Cumulative Effects to Water Yield - Peak Flows from Rain-On-Snow Events:** In the event of a rain-on-snow event, peak flow increases would not cause any cumulative effects to the subwatersheds of the resource area. These events are natural processes that occur episodically in time and space. Vegetation prescriptions would trend vegetation towards conditions and patterns, which would be similar to those formed by past disturbance events. As discussed in the Affected Environment section, the greatest impacts observed from rain-on-snow events occur when culverts become plugged from resulting floods and debris flows. The activities proposed with all the action alternatives are not expected to open canopy enough to have any affect on runoff and flooding from rain-on-snow events. All future activities are stand thinning type activities similar to what is proposed in Alternatives 4, with no canopy opening of any size to be effected by rain-on-snow events.

**Cumulative Effects to Stream Channel Morphology:** Estimated peak flow increases would also not effect channel incision nor stream bank erosion. Since the estimated increases in peak flows are within the historic range of variation, there would not be any cumulative effects to changes in stream channel morphology. The existing condition in the streams of the Resource area are such that they are well armored with mixed substrate and large woody debris, have good to excellent stream vegetation, and are stable and resilient (existing condition section). The estimated short-term increases in sediment yield associated with this project, pipe upgrades and removal and road decommissioning are expected to be routed through the stream channel and would not be of a magnitude that would cause changes to stream channel morphology (e.g., migration, braiding, and widening of channels). Overall, stream channel morphology Twomile Creek, Nuckols Gulch, and Revenue Gulch would be maintained and improved since known sediment delivery sources are being rehabilitated. This includes: 1) the reduction (via removal) and upgrade of at-risk culverts; 2) near channel and in-channel restoration work in lower Twomile Creek and the East Fork of Twomile Creek; and 3) road maintenance/reconstruction work along primary travel roads in project watersheds.

**Cumulative Effects to Fisheries:** In consideration of the influences from direct and indirect effects associated with the proposed project, the cumulative effects are not expected to change the existing condition trend for fisheries resources. In general, there would be long-term benefits to fisheries if the proposed fuels reduction work is implemented under the action alternatives. Specifically, non-commercial thinning within some units in the RHCA's (i.e. Unit 34) will meet INFS (1995; PF Doc. AQ-9) standards and guidelines. The

non-commercial (i.e. ladder fuel reduction) treatments were deemed necessary in order to reduce fuel hazards and loading adjacent to private homes that are threatened if a wildland urban interface fire became ignited. This form of activity would meet the intent of silvicultural practices that would not retard RMOs (INFS: TM-1) and avoid adverse cumulative effects to inland native fish (see Fire/Fuels) by preventing long-term RMO damage or reduction from severe fire.

The Twomile Resource Area roadwork, in conjunction with reasonably foreseeable actions, would result in a net increase in sediment and water yield in the short term, and an overall reduction in sediment risk in the long term with the stand treatments and implementation of restoration activities. Based on the direct and indirect effects discussed above, the cumulative effects risk of any sediment delivery actually reaching a live channel is relatively low. The modeled short-term increase in sediment yield (36 tons in the Twomile subwatershed) directly associated with the Twomile Resource Area compared to the overall reduction in sediment yield (30 tons in the Twomile subwatershed) and risk of sediment delivery resulting from the culvert upgrades/removals (3/13-culverts, respectively) and road decommissioning (3.4 miles). The predicted increase in water yield (mean = 4.3%; range 2-7%) would be localized and would likely not be measurable in fish-bearing channels. The potential short-term increase in sediment may affect individual westslope cutthroat trout and torrent sculpin, but would not lead toward a trend in federal listing. In the long term, the reduction in sediment yield is expected to benefit survival of individuals and habitat.

The cumulative effects from road decommissioning show that planting, seeding, and mulching are effective BMP's when applied to these restoration sites, to reduce potential for short-term effects. The long-term gain from restoration activities would be reduction of roads near riparian areas that would reduce water and sediment yields and reduce erosion and sediment delivery, resulting in a benefit in water quality in the Twomile drainage. As a consequence these road-decommissioning activities benefit fisheries in that the risk of sediment delivery would be immediately reduced when, near riparian road erosional sources are restored and high-risk-to-fail culvert crossings are removed.

Restoration of the lowermost helispot landing will be fully reclaimed to mimic as closely as possible natural site conditions at the completion of this project. The use of BMP's during development and INFS standards and guidelines there is no expected cumulative impacts expected for the development and use of thes site. However, during retoration a slight risk of increased turbidity in the intermittant drainage could occur during rehabilitation or if in the event of a large precipitation event were to occur in the first year after the restoration work was complete and ground cover was being established. Planting, seeding, and mulching are effective BMP's will be applied to these restoration site, to reduce potential for short term effects. The long-term cumulative gain from restoring this site is a full recovery from being detrementally impacted and restoring riparian and hydrological function to the intermittant stream corridor which would reduce erosion and sediment delivery, resulting in a benefit in water quality in the Twomile drainage.

Primary and secondary contact recreation (also see summary of Executive Order 12962 – Recreational Fishing under section 3.12d); all action alternatives are consistent with this executive order regarding aquatic systems and recreational fisheries. Short-term effects of this project may affect westslope cutthroat trout individuals, but would not lead toward a trend in federal listing. Long-term effects (i.e., net reduction in sediment) are expected to benefit westslope cutthroat trout survival and habitat.

**Cumulative Effects of Ongoing and Reasonably Foreseeable Actions on Aquatic Resources**

The following is a description of past, ongoing and reasonably foreseeable actions, to establish the appropriate geographic and time boundaries for the cumulative effects analysis. Activities identified below were ones that are relevant to the watershed and fisheries cumulative effects analysis. Other activities listed in Chapter 1 are not discussed here because there is no soil or watershed disturbance created by these activities. These include tree planting, firewood gathering, hunting, and helispot maintenance.

**Cumulative Effects of Past Wildfires:** Historically, the greatest natural agent of disturbance in the Twomile Resource Area was wildfire. Fire history of the area is explained in detail in the Fire/Fuels section of Chapter 3.3. Generally speaking, frequent, low-intensity fires were common on the dry aspects of the watershed,

occurring on average once every 20 to 30 years. Throughout the entire area, including the moist sites, Zack and Morgan (1994***;*** PF Doc. FF-18) established a historic fire return interval of 54 years for all types of fires (mixed and lethal severity). 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.

**Cumulative Effects of Roads:** Road construction within the Twomile Resource Area has been extensive because of the access needs required for past projects. Many of the roads up the drainages were constructed first in the early 1900s when for mining purposes. The Forest Service to access areas for vegetation management and some exploratory mining then built more roads in the 1950s. In all, there are approximately 150 miles of road; of these most are brushed in and closed. Small portions of these roads have been opened up by motorized recreation use. The Twomile Creek subwatersheds have the highest density or roads based on drainage size in the Twomile Resource Area (approx. 4.8 mi/mi$^2$).

**Cumulative Effects of Mining:** Road 271 in the Twomile drainage was initially used in 1885 as a freight route from Osburn to Murray. Mining in the Twomile Resource Area began shortly after 1889, when a stand replacing fire burned nearly one-half of the area, and exploratory mining continued until the early 1900's. Common to the type of mining exploration in the Silver Valley area, Twomile Resource area had exploratory tunnels, jammer roads at mid-elevation and headwater areas for core testing; and adits built during the turn of the 20$^{th}$ century. The most current adit entered that was originally abandoned in the early 1900's was the Hudlow Adit that is currently gated in the mid-headwater area of Twomile Creek. It and three other adits were reopened in the early 1980's and then closed and gated after exploration. In the East Fork Twomile Creek there were roads into adits in the drainage, the most notably of both activities in the lower drainage that though inert, are both showing erosional hazard into the channel (see Aquatic Features/Mitigation/ Opportunities – Chapter 2). There are no current mining requests or permits within the Twomile Resource Area.

**Cumulative Effects of Fish 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 Twomile Resource Area, high gradient stream reaches in headwater locations are the predominant form of natural barriers. There are two human-caused fish barriers in the Twomile Resource Area, both in the Twomile Creek watershed on Road 271 (Figures 3-AQ-4 and 3-AQ-5). A third barrier likely exists at a seasonal level in East Fork Twomile as a result of bedload aggradation. Effects analysis for work related activities to upgrade, replace, and improve culverts for fish passage including instream channel work will be covered in this analysis for aquatics.

**Cumulative Effects of Sediment Production and Delivery:** Surface erosion and, to a much lesser extent, mass erosion are part of the natural reference conditions for sediment production and delivery of the streams within the Twomile Resource Area. Prior to fire suppression, wildfire frequently altered the structure and composition of forest stands within the assessment area. At times site conditions following fires would coincide with wet climatic conditions in a season, year, or period of years that would trigger landslides or surface erosion. Other than topographic characteristics such as slope shape and drainage networks, there were no features such as roads on the landscape that would increase the potential for slope failures or surface erosion by intercepting, re-routing, and concentrating water. Other than hillslope rejuvenation caused by streams reaching a lower base elevation or channel migration, there was no major mechanism such as roads that could cause slope instabilities by undercutting or overburdening slopes.

**Cumulative Effects of Water Yield Increases:** Rain-on-snow events occur throughout much of northern Idaho when strong warm moist weather fronts from the Pacific Coast invade during the winter months. These relatively warm and moisture-laden air masses cause mid-winter snowmelt, thaws and rainfall. Snow packs generally between 3,000 to 4,500 feet in elevation accumulate substantial snow in the winter and are often found to achieve isothermal conditions following prolonged warm, moist storm periods. In the Twomile Resource Area area, approximately 75% of the drainages are within the elevation range that is most prone to rain-on-snow events (3,500 to 5,000 feet).

**Cumulative Effects of BLM Land Development and Timber Management:** These types of activities have been principally located in the lowermost portion of each watershed analyzed for within the Twomile Resource Area. Effects from these actions are variable depending on intensity and location of activities.

**Cumulative Effects of Private Land Development and Timber Management:** These types of activities have been principally located in the lowermost portion of each watershed analyzed for within the Twomile Resource Area. Effects from these actions are variable depending on intensity and location of activities.

**Cumulative Effects of Ongoing Activities on Aquatic Resources**

**Cumulative Effects of Fire suppression activities:** Over the last century, stands within the Twomile Resource Area have been allowed to progress towards climax vegetative condition. The current trend is toward more shade tolerant species that are not as long-lived and are more susceptible to insects and disease (Chapter 3, Vegetation). Since changes in water yield are associated with vegetation conditions, the existing and future trends would have an effect on water yield.

**Cumulative Effects of Restricted or Unauthorized Motor Vehicle Use on Roads**: Since motorize use is not as restricted as other areas on the district, the increasing popularity with the Silver Valley, motorcycles, ATVs and snowmobile use is increasing. This has forced additional needs in road and trail maintenance. The lack of road and trail maintenance causes increases in erosion and sediment delivery. Currently, road and trail maintenance has been limited due to budget constraints on the Coeur d'Alene River Ranger District. Development of system motorized trails and closure of other non-system trails will reduce erosion and sediment delivery (Chapter 3, Recreation).

**Cumulative Effects of Road Maintenance Activities**: These activities occur annually to some degree within the watershed, and include (but are not limited to) blading, brushing, and culvert cleaning. Maintenance activities typically improve drainage and decrease erosion from water channeling down the road surface. Culvert cleaning and associated maintenance lowers the associated risk of failure. Recent road maintenance in the Twomile drainages has occurred through past timber sales and after flooding in 1994 and 1996 (by Shoshone County). The lack of recent road maintenance does not help road surface runoff or reduce sediment delivery along this section of road since it would observe a greater frequency in road maintenance.

**Cumulative Effects of Activities on Private Lands within the Twomile Resource Area: -** Private land consists of approximately 25% in the subwatershed analysis areas. The private lands primarily in the subwatershed areas consist of homes and developed acreage. Some of the private roads accessing these homes and within riparian development have delivered sediment to streams in the resource area from road fill failures, road surface runoff, and immediate riparian activities. Sediment delivery levels from these private roads are based on the level of road maintenance activities. Land management on private land principally includes development through home construction and logging practices. A review of permit requests to the Idaho Department of Lands indicates that approximately 262 acres (approximately 4.2 % of the cumulative effects project area) have been or are planned for harvest on private lands based on requests processed from 2001-03.

**Cumulative Effects of Bureau of Land Management Land Development and Timber Management:** These types of activities are principally located in the lowermost portion of each watershed analyzed for within this document and will continue to occur with or without the implementation of this project. Planned future activities on BLM Lands are expected to be similar to USDA Forest Service activities, but not implemented until sometime in the future.

**Cumulative Effects of Noxious Weeds Monitoring and Treatment:** This activity would follow guidelines established in the Coeur d'Alene Noxious Weeds FEIS (USDA 2000; PF Doc. AQ-44). Effects to aquatic resources were analyzed in that document and its adaptive strategy. No additional effects to watershed or fisheries are expected to occur.

**Cumulative Effects of Timber Stand Improvement:** This activity would occur outside Riparian Habitat Conservation Areas (RHCAs) except potentially where it would improve riparian habitat from a non-commercial thinning associated activity. No ground disturbance would occur and timing restrictions would be enacted as prescribed through either contract clauses based on BMPs, INFS standards and guidelines, and the Fisheries BA/BE.

**Cumulative Effects of Fire Suppression Activities:** Successful fire suppression activities within the Twomile Resource Area will continue to allow stands to progress towards climax vegetation conditions where stands are not treated. As this occurs, water yield values will stay stagnant in the Twomile Creek drainage and decrease by approximately 0.5 % per year in the other areas. Fire suppression activities would not deter any entrainment and sorting of sediments or delivery and transport of large woody debris from natural events. The streams in the Twomile Resource Area will continue storing sediment in the channel in areas of deposition until an episodic event increases peak flows high enough to flush and entrain sediments (Benda and Dunne 1997; PF Doc. AQ-45).

## 3.4.4. Consistency with the Forest Plan and Other Regulations

### Consistency With the Forest Plan

All alternatives would meet the requirements of the Forest Plan for water resources and fisheries. Specific requirements and how this project meets them are listed in Appendix A – BMPs (watershed) and Appendix B INFS (fisheries). Alternative 1 would not change riparian habitat conditions, except for a steady increase in the risk of a stand replacement fire over time and the potential for road drainage failures from high-risk culverts. The action alternatives also meet the requirements for fisheries resources in the Forest Plan, as amended by the Inland Native Fish Strategy (see Appendix B). The following are the water and fish standards to the Forest Plan and responses on each (USDA 1987, pp II 29-31; PF Doc. AQ-24).

***Consistency With Forest Plan Water Standards***

**Water Standard 1: Management activities on Forest Lands will not significantly impair the long-term productivity of the water resource and ensure that state water quality standards will be met or exceeded.**

Idaho State Best Management Practices (BMPs) are designed to protect the long-term productivity of the water resource and ensure state water quality standards will be met. The Twomile Resource Area will meet standard BMPs. Site-specific BMPs were also included with this project as mitigation measures to improve water quality.

**Water Standard 2: Maintain concentrations of total sediment or chemical constituents within state standards.**

The net production and delivery of sediment would be a maximum of 9% above existing conditions in Nuckols Gulch and an average of 5% for all the subwatersheds as modeled by WATSED. This increase in sediment will not further degrade water quality in streams of the resource area or downstream in the South Fork of the Coeur d'Alene River. The proposed activities in conjunction with past and foreseeable actions would not impair beneficial uses. Implementation of the aquatic restoration would reduce the risk of further sediment delivery from the treatment of 16 stream crossings by at least 30 tons per year. Decommissioning of roads not needed for long-term use will further reduce chronic sediment sources in the Twomile Creek Drainage. The action alternatives would likely meet State standards for chemical constituents given that "Required Design Criteria for All Action Alternatives," State and site-specific BMPs, and INFS standards would be applied if an action alternative is selected.

**Water Standard 3: Implement project level standards and guidelines for water quality contained in the Best Management Practices (IPNF Forest Plan - Appendix S), including those defined by State**

**regulation and agreement between the State and Forest Service such as: Idaho Forest Practices Rules, Rules and Regulations and Minimum Standards for Stream Channel Alterations, and Best Management Practices for Road Activities.**

Specific road maintenance and repair is needed for Alternative 1 to be consistent with Idaho Forest Practices Rules. The action alternatives are consistent with this criterion. In addition to standard State BMPs, other soil and water conservation practices that are approved BMPs are built into the timber sale contract. Site-specific BMPs are specified and are listed in the BMP portion of this appendix. Soil and water conservation principles were used during alternative design to determine the location and types of treatments including which areas should be avoided or restored. The specified and designed measures surpass those required by the State Forest Practices Act and are consistent with Forest Service standards.

**Water Standard 4: Cooperate with the states to determine necessary instream flows for various uses. Instream flows should be maintained by acquiring water rights or reservations.**

Instream flows are not an issue with any portion of the proposed project. Therefore, this Standard is not applicable to any alternative.

**Water Standard 5: Manage public water system plans for multiple uses by balancing present and future resources with public water supply needs. Water users and the State will review project plans for activities in public water systems. Streams not defined as public water systems, but used by individuals for such purposes, will be managed to standards established by the state's forest practices rules and/or the National Forests' BMPs or to the INFS standards and guidelines whichever is applicable**

Streams within the Twomile Resource Area are not defined as public water system.

**Water Standard 6: Activities within non-fishery drainages, including first and second order streams, will be planned and executed to maintain existing biota. Maintenance of existing biota will be defined as maintaining the physical integrity of these streams. Best Management Practices (Appendix S), Appendix 0, and riparian guidelines will be used to accomplish this objective.**

The existing biota will be maintained in first and second order streams through standard and site specific BMPs and the application of INFS standards and guidelines. Site Specific BMPs and applicable INFS standards and guidelines are listed and described in the BMP portion of this appendix and Appendix B.

**Water Standard 7: It is the intent of this plan that models be used as a tool to approximate the effects of National Forest activities on water quality values. The models will be used in conjunction with field data, monitoring results, continuing research and professional judgment, to further refine estimated effects and to make recommendations.**

All alternatives meet this standard. The WATSED model was used to predict water and sediment yield changes. Road drainage crossings were inventoried to assess erosional hazards and risks to aquatic ecosystems, using the "Methods for Inventory and Environmental Risk Assessment of Road Drainage Crossings" (Flanagan et al 1998; PF Doc. AQ-52). This method gathered information on road-stream crossings that included fill volumes, culvert sizes, erosional features, and other variables, then ranked each crossing for treatment (project file).

***Consistency With Forest Plan Fish Standards***

**Fish Standard 1: Activities on National Forest lands will be planned and executed to maintain existing water uses. Maintain is defined as "limiting effects from National Forest activities to maintain at least 80 percent of fry emergence success in identified fishery streams." The percent is measured from pristine conditions. Current methodology will not detect an impact of less than 20 percent. During the**

**life of the plan, new technologies may permit more precise assessments; however, the goal of this standard will remain as "to maintain 80 percent of fry emergence success.**

**and**

**Fish Standard 2: Streams providing spawning and rearing habitat, which are considered critical to the maintenance of river and resident populations of special concern *["high value streams"],* will be managed at a standard higher than the 80 percent standard. Monitoring will be needed to detect this higher standard.**

The IPNF Forest Plan contains standards for fry emergence that are no longer valid since the Inland Native Fish Strategy (INFS 1995; PF Doc. AQ-9) was developed. This section explains why.

The objectives for fisheries in the Forest Plan state that the forest "will be managed to maintain and improve fish habitat capacities in order to achieve cooperative goals with the State Fish and Game Department and to comply with state water quality standards. Sediment arising from land management activities will be managed so that in forest fisheries streams the objective is to maintain 80 percent fry emergence success as measured from pristine condition" (II-7). The first two standards for fish use similar language (II-29). The Fishery/Watershed Analysis to determine effects of land management activities on fry emergence is described in the Forest Plan in Appendix I (I-1, 2).

Appendix I requires that if, during the environmental assessment process, cumulative effects of the proposed and past activities on stream sedimentation are projected to result in greater than 20% reduction in fry emergence, then additional detailed analysis will be undertaken. The analysis is then used to determine the significance of the project on water resources. If the project is judged to have a "significantly negative effect" on water resources, it will be reviewed by the State for conformance with water quality standards prior to the final decision.

At the time the Forest Plan was written, models determining fry emergence (e.g., Stowell et al. 1983; PF Doc. AQ-47) were popular. These empirical models were later found to have limited application and were unreliable outside of where they were developed (Kershner 2001 personal communication; PF Doc. AQ-48). In addition, the use of fry emergence survival (regardless of the threshold) as a surrogate for viability came into question, primarily for two reasons:

- *First, fry emergence is highly variable. This can be due to changing natural conditions (e.g., floods, temperature regimes, geology) or human-induced causes (e.g., increased sediment input, chemical spills). Both agents are at work in most cases so it is difficult to determine what proportion of egg-to-fry mortality is due to each cause. As a result the underlying relationship between sediment in redds and survival is difficult to predict (Chapman 1988; PF Doc. AQ-49).*
- *Second, and more important, egg-to-fry mortality is usually density-independent (i.e., a percentage of fry will survive regardless of the number of eggs). This means that in most cases there are enough fry to inhabit all available habitat within a stream. Therefore fry-to-smolt (sub-adult) survival, where density dependent mortality plays a significant role, is a more effective and appropriate predictor of population viability than egg-to-fry survival (for a review of these concepts see Hilborn and Walters 1992; PF Doc. AQ-50). Currently the indicator used as a surrogate of fry-to-smolt survival is stream habitat characteristics.*

The 1989 Forest Plan Evaluation and Monitoring Report (PF Doc. AQ-51) documents the change away from use of the fry emergence standard (Item G-1, pages C-1 and C-2). The findings were that it was not a good monitoring tool to report stream health. G-1 was combined with item G-3, which includes a comprehensive array of fisheries and hydrology parameters.

The Inland Native Fish Strategy (INFS 1995; PF-Doc. AQ-9) amended the Forest Plans "…except where existing Plan direction would provide more protection" for inland native fish habitat (page 4). All INFS standards and guidelines are intended to either make progress toward Riparian Management Objectives (which describe "good" fish habitat within the context of what is capable of the watershed) or to ensure that

activities will not retard the natural rate of recovery of RMOs in a watershed (USDA 1995, A6-A16). In addition, the strategy states that actions that reduce habitat quality, whether existing conditions are better or worse than objective values, are not consistent with INFS direction (USDA 1995, A-3; PF-Doc. AQ-9).

INFS (1995; PF-Doc. AQ-9) supersedes the original IPNF Forest Plan direction because it offers far more protection to inland native fish habitat for the following reasons:

- *INFS (1995; PF-Doc. AQ-9) directs the establishment of Riparian Habitat Conservation Areas (RHCAs) and only allows activities within RHCAs that maintain or improve, and do not retard, the attainment of the RMOs. The original Forest Plan direction actually permitted degradation of water resources at the discretion of the line officer, and allowed "significant" degradation after review by the State.*
- *Activities that reduce habitat quality to any extent are contrary to INFS direction, regardless of whether RMOs have been attained. The original Forest Plan direction allowed for apparent degradation of fish habitat by permitting up to a 20 percent reduction of potential fry emergence.*

In The Lands Council v. Vaught the U. S. District Court for the Eastern District of Washington, in its reading of the plain language of the INFS documents and giving deference to the Forest Service's expertise in interpreting its Forest Plans, concluded that INFS does supersede the Forest Plan in all areas where RHCA guidelines and standards apply (i.e., where delivery of sediment to streams is the identified threat that proposed project activities pose to fish habitat). The Forest Plan standards remain in effect in all other areas.

In conclusion, this project complies with original Forest Plan direction because, although fry emergence was not computed, a detailed analysis of the effects to fish habitat and water resources was developed as required in Appendix I; and the project has been determined to be fully consistent with the INFS Forest Plan amendment and state water quality standards for supporting beneficial uses.

**Fish Standard 3: The stream and river segments (if listed) will be managed as low access fishing opportunities to maintain a diversity of fishing experiences for the public and to protect sensitive fish populations. Special road management provisions will be used to accomplish this objective.**

Forest Plan standard 3 is not applicable to this analysis because no streams in the Twomile Resource Area are listed as "low access fishing streams."

**Fish Standard 4: Provide fish passage to suitable habitat areas, by designing road crossings of streams to allow fish passage or removing in-stream migration barriers.**

Within the Twomile Resource Area, known fish barriers were identified through surveys and planned activities include the removal and of known barriers with culverts that do not intrude fish passage. This objective does apply to the Twomile Resource Area.

**Fish Standard 5: 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 projects to improve habitat carrying capacities on selected streams.**

As stated in Chapter 3, information was utilized from stream inventories, field reviews, historical records, aerial photographs, analysis of watershed conditions, published scientific literature, discussions with Fisheries Biologists and electrofishing/stocking data from the Idaho Department of Fish and Game, and the U.S. Fish and Wildlife Service.

**Fish Standard 6: Coordinate management activities with water resource concerns as described in MA 16, Appendix I, and Appendix O.**

Water resource concerns are protected in Management Area 16 through INFS standards and guidelines.

***Consistency with the State of Idaho Governor's Bull Trout Plan***

The mission of the Governors Bull Trout Plan (1996; PF Doc. AQ-11) is to "…maintain and or restore complex interacting groups of bull trout populations throughout their native range in Idaho." Bull trout in the South Fork Coeur d'Alene River system are not known to currently persist based on all the information available at the time of this developed document. In the Plan the Coeur d'Alene River basin is defined as a drainage area that is a key watershed for a bull trout metapopulation, however no map is provided to explain watershed boundary and scope.

***Consistency With the Endangered Species Act***

All alternatives meet requirements of the Endangered Species Act. The project will have no effect on threatened bull trout. Critical habitat has been proposed for bull trout in the Coeur d'Alene River basin, but does not include the South Fork Coeur d'Alene River or its tributaries.

***Consistency With the National Forests Management Act – Species Viability***

Fish species that may be affected by the project (westslope cutthroat trout and rainbow trout) are also distributed across the Forest. For example, westslope cutthroat and rainbow trout are found in 13 of 13 (100 %) of 4th code HUC watersheds (i.e., large watersheds, such as Couer d'Alene River) on the IPNF. There is possible connectivity between the Coeur d'Alene River basin (which includes Twomile Creek) and one of the twelve other 4th code HUC watersheds on the Forest (i.e. St. Joe River).

At the smaller watershed scale, westslope cutthroat and rainbow are known to inhabit Twomile Creek (a 7$^{th}$ Code HUC watershed). Based on the distribution of species across the Forest, the lack of connectivity between large watersheds, and the limited cumulative effects area (i.e. Twomile Creek and Nuckols and Revenue Gulch), the Twomile Resource Area will not affect viability of any threatened, endangered, sensitive, or MIS fish species on the IPNF.

***Consistency With the Clean Water Act (Including State of Idaho Implementation)***

All alternatives would be consistent with the requirements of the Clean Water Act, 33 U.S.C. §1251. Sediment and metals, the pollutants of concern, would not increase in the water quality limited South Fork of the Coeur d'Alene River segment from Placer Creek to Big Creek. Risks to beneficial uses in all streams of the Twomile Resource area would not be changed by this project. In compliance with the current draft TMDL implementation plan for the South Fork of the Coeur d'Alene River, there would be no net increase in sediment or metals into the South Fork of the Coeur d'Alene River through the proposed management activities.

***Consistency With the Idaho Forest Practices Act***

Best Management Practices or Soil and Water Conservation Practices (PF Doc. AQ-53) would be applied under all alternatives, and all activities are in compliance with the guidelines in the Soil and Water Conservation Handbook.

***Consistency With Executive Order 12962 – Recreational Fishing***

All alternatives are consistent with this executive order regarding aquatic systems and recreational fisheries. Short-term effects of this project may affect westslope cutthroat trout individuals, but would not lead toward a trend in federal listing. Long-term effects (i.e., net reduction in sediment) are expected to benefit westslope cutthroat trout survival and habitat.

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# 3.5 SOIL PRODUCTIVITY

## 3.5.1 Regulatory Framework for Soil Productivity

The regulatory framework providing direction for protecting a site's inherent capacity to grow vegetation comes from the following principle sources:

- *The Multiple Use-Sustained Yield Act of 1960,*
- *The National Forest Management Act of 1976 (NFMA),*
- *The Code of Federal Regulations for Forest Planning (36, CFR 200.1),*
- *The Forest Plan and Regional Soil Quality standards (FSH 2509.18)*

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.

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 that followed NFMA requires the Forest Service to measure effects of prescriptions, including "without impairment of the productivity of the land" (Code of Federal Regulations 36, CFR Part 219.7, 2003; PF Doc. SOIL-28).

To comply with NFMA, the Chief of the Forest Service has charged each Forest Service Region with developing soil quality standards for detecting soil disturbance and indicating a loss in long-term productive potential. These standards and guidelines are built into Forest Plans.

Forest Plan direction (Forest Plan, p. II-2; PF Doc. SOIL-45) is to manage the soil resource to maintain long-term productivity. The objective is that management activities on forestlands will not significantly impair the long-term productivity of the soil or produce unacceptable levels of sedimentation resulting from soil erosion. Forest plan standards (pp. II-32 and 33; PF Doc. SOIL-45) include:

> *(1) Soil-disturbing management practices will strive to maintain at least 80 percent of the activity area in a condition of acceptable productivity potential for trees and other managed vegetation. Unacceptable productivity potential exists when soil has been detrimentally compacted, displaced, puddled or severely burned.*
>
> *(2) Projects should strive to maintain sufficient large woody debris to maintain site productivity.*
>
> *(3) In the event of whole tree yarding, provisions for maintenance of sufficient nutrient capital should be made in the project analysis.*

The Regional Soil Quality standards were revised in November 1999. Under Forest Plan Standard (1) as discussed above, detrimental soil disturbance includes the effects of compaction, displacement, rutting, severe burning, surface erosion, loss of surface organic matter and soil mass movement. The revised standard specifies that 85 percent of an activity area (cutting unit) must have soil that is in satisfactory condition. In areas where more than 15 percent 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 mines, developed recreation sites, administrative sites and permanent roads or landings.

These standards are based on the lowest magnitude of adverse change detectable, given the current monitoring technology (Powers 1990; PF Doc. SOIL-43).

## 3.5.2 Methodology Used for the Soil Productivity Analysis

### *A. Methodology Used to Describe Existing Soil Productivity*

Analysis of the soil resource was carried out utilizing a landtype map that displays the entire analysis area. Each action alternative was analyzed to allow for the various harvest unit proposals and to identify those units that would require design modifications to achieve the Forest Plan standard. A systematic procedure was established to identify the existing condition of each proposed unit in terms of highly disturbed soils, low potassium and units that do not meet the standard.

Data lists were developed for all the proposed treatment units in each alternative; the existing condition for those units, including acres of constructed or designated trails, roads (permanent/temporary) within or adjacent to harvest units and logging systems. The activities were compiled into lists from aerial photos, timber stand and road databases. On-the-ground reviews were conducted to assess existing conditions within the proposed activity areas (PF Doc. SOIL-17). Calculations were performed utilizing the data sheets to determine the disturbance factor for each activity area. The disturbance factors represent an average percentage of detrimentally disturbed soils, which was obtained through past monitoring methodology on existing harvest units (Forest Plan Monitoring and Evaluation Reports, 1988, 1991, 1993, 1997, and 1999; PF Doc. SOIL-46 through SOIL-50).

All of the proposed activities related to harvest (including specific features designed to protect soils, as described in Chapter 2) were compared to the existing conditions as a rough evaluation for each unit and their relation to the Forest Plan Standards.

There is a natural deficiency of potassium associated with the Prichard and Lower Wallace geologic formations. The Intermountain Forest Tree Nutrition Cooperative (IFTNC) is researching the relationship of potassium feldspars to the underlying bedrock (see Table 3-SOIL-3). Geologic formations and their descriptions within the Resource Area are taken from Hobbs et al, (1965; PF Doc. SOIL-34). The following three design and management criteria relate to soil productivity in the Twomile Resource Area.

#### 1. Detrimentally disturbed soils within activity areas (harvest units).

The soils in an activity area are considered detrimentally disturbed when the following soil conditions exist as a result of Forest practices.

a. *Soil displacement results in the loss of either one inch of or half of the humus-enriched surface layer (A-soil horizon), whichever is less. The loss of the litter layer alone could be detrimental on some marginal sites. Displacement removes the most productive part of the soil resource. Roading, ground-based yarding, dozer piling and cable corridors are the major contributors to displacement.*

b. *Soil compaction that results in a 20 percent or more increase in bulk density, or a 50% reduction in water infiltration rates typical for volcanic ash influenced surface soils. Soil compaction reduces the supply of air, water and nutrients to plants. Roading, ground based yarding and piling are the major contributors to compaction.*

c. *Fire consumes most woody debris and the entire duff and litter layer, exposing mineral soil. Burn ash that is white or reddish color, indicates that much of the carbon was oxidized by fire (Burned-Area Emergency Rehabilitation Handbook FSH 2509.13). Burns that create very high temperatures at the soil surface when soil moisture content is low result in almost complete loss of surface and upper soil horizon organics. Many of the nutrients stored in these organics can be lost to the atmosphere through volatilization and removed from the site in fly-ash (Garrison and Moore, 1998; PF Doc. SOIL-30).*

**2. Low Potassium Sites - Sites containing geologic formations that are naturally deficient in potassium bearing minerals.**

This criterion relates to the natural deficiency of potassium (K) in the Prichard and Lower Wallace geologic formations. The Prichard and Lower Wallace Formations contain only traces of potassium feldspars. The other geologic formations that occur as part of the Belt metasedimentary structure have percentages of potassium feldspar within their mineral composition, that range from 2 to 12 percent (Harrison and Campbell, 1963; PF Doc. SOIL-33). The Twomile Resource Area is mostly underlain with Belt metasedimentary rock. Unlike many other soil nutrients, potassium is derived almost entirely from the underlying rock formations. On some sites 45 percent of the potassium is held in trees, with the remainder being held in subordinate vegetation, forest floor and soil pools. Within the trees, about 85 percent of the potassium is held in the branches, twigs and foliage (Garrison and Moore, 1998; PF Doc. SOIL-30). In most natural circumstance the potassium returns to the soil when the tree dies. If potassium is removed from the site, the loss is long-term. Whole tree yarding, removal of treetops and grapple piling lead to the direct loss of potassium (Morris and Miller, 1994; PF Doc. SOIL-39). Some geological formations have been found to have a natural deficiency of potassium, including the Pritchard and Lower Wallace formations. The Pritchard formation occurs across the southwestern half of the Resource Area, covering 43 percent. Most of the northeastern half is underlayed by the Burke formation and encompasses 56 percent. A granitic intrusion to the northwest of Dago Peak makes up the remaining 1 percent (Resource Area Geology Map, PF Doc. SOIL-19).

Some very preliminary research being done by the Intermountain Forest Tree Nutrition Cooperative (IFTNC) is showing a possible link to potassium deficiency and the lack of tree resistance to root disease.

First year results from the seedling establishment/nutrition experiment conducted by the Intermountain Forest Tree Nutrition Cooperative showed that potassium was non-limiting from a tree growth standpoint on the Flat Creek Belt Metasedimentary site, (Garrison and Moore, 1998; PF Doc. SOIL-30). This Belt metasedimentary site is on the Striped Peak Formation, and according to Harrison and Campbell contains about seven percent potassium feldspar in its mineral composition.

The Intermountain Forest Tree Nutrition Cooperative (IFTNC) is continuing to research potassium contents within tree species and different rock types in order to establish more definite minimum thresholds and effects on tree growth and resistance to root diseases. Until these minimum thresholds are developed through research, the Idaho Panhandle National Forests are using management recommendations from the IFTNC as a guideline for maintaining sufficient potassium on a site. In the winter of 2002, the Idaho Panhandle National Forests initiated tree foliar analysis with the Cooperative in order to gather more information on forest potassium levels. Additional sampling is planned for the winter of 2003. Information gained from these samplings will be used to obtain baseline data pertaining to soil nutrient levels and its effect on tree growth and health.

The IFTNC has made the following management recommendations to retain the maximum partible potassium on site after logging:

a. *Practice conventional removal (lop and scatter) rather than whole-tree removal. The lop and scatter technique should be used during intermediate as well as final harvest operations.*

b. *Let slash remain on site over winter so mobile nutrients such as potassium can leach from fine materials back to the soil.*

c. *Light broadcast burn or underburn for release of potassium and other nutrients.*

d. *Avoid mechanical site preparation.*

e. *Plant species appropriate to site.*

### 3. Maintenance of large woody debris and organic matter.

The third soil productivity criteria relates to the management of coarse woody debris and organic matter which would follow the research guidelines contained in Graham et al., (1994; PF Doc. SOIL-32). The optimum level of fine organic matter is 21 to 30 percent; this equates to 1 to 2 inches of surface litter and humus. Optimum levels of fine organic matter relate to ectomycorrhizae fungus, which form a strong and positive relationship. Ectomycorrhizae is a good indicator of healthy forest soil. In moist western hemlock and cedar habitat types strong levels of ectomycorrhizae exists when organic levels exceed 30 percent. Soil survey data indicates that most forest sites have adequate organic matter levels to support strong ectomycorrhizae populations.

This soil productivity criterion is addressed as a guideline and is not part of the alternative evaluations because project alternatives are designed to meet the large woody debris guidelines as referred to in Graham et al., 1994; (PF Doc. SOIL-32) and silvicultural prescriptions.

## *B. Methodology Used to Analyze Effects to Soil Productivity*

**Introduction to Methodology Used to Analyze Effects to Soil Productivity**

This analysis includes potential effects from proposed logging systems, permanent and temporary roads, landings and fuel treatments on soils. To determine whether proposed activities would detrimentally impact or have cumulative effects on soils, the IPNF Soil NEPA Analysis Process (Niehoff 2002; PF Doc. SOIL-41) was used. For each alternative the detrimentally disturbed acres were calculated using coefficients based on past Forest soil monitoring data. The coefficients were developed as an average soil disturbance level equated to the harvest equipment used, the time of year it was used, the fuel treatment methods, the time of year fuel treatment took place and harvest units directional aspect. Since the coefficients are based on an average, areas that have had prior harvest activities could have soil disturbance levels lower or greater then the coefficient's average. This monitoring information is contained in Forest Plan Monitoring and Evaluation Reports and is summarized in the IPNF Soil NEPA Analysis Process. For direct and indirect effects the calculations incorporated the acres and types of proposed logging, burning and the acres of roads/landings constructed.

Based on past monitoring efforts (Niehoff 2002; PF Doc. SOIL-41), tractor logging prior to 1990 has had the most detrimental impacts to soils, which is between 24 and 42 percent. Since 1990, tractor logging methods and recommended protection measures have decreased most detrimental impacts to an average of 13 percent (Niehoff 2002; PF Doc. SOIL-41), which is two percent less than the maximum allowable criteria established by the Regional guidelines. Helicopter and skyline/cable logging systems tend to have between 0 and 2 percent detrimental effects (Niehoff 2002; Doc. SOIL-41; McIver and Starr 2000, pp. 11-16; PF Doc. SOIL-37). These logging systems have less impact than tractor systems because the equipment stays on the road and the logs are partially suspended over the ground. The usual impacts from skyline/cable logging are from the logs being drug over the ground (Krag 1991, PF Doc. SOIL-36; Seyedbagheri 1996 pp. 7-9, PF Doc. SOIL-44). Helicopter logging has minimal impacts as the logs are lifted into the air and transported to a landing site (Poff 1996; PF Doc. SOIL-42) and (McIver and Starr 2000, pp. 11-16; PF Doc. SOIL-37). The landing site is usually one acre in size and this area becomes the most impacted from the ground base equipment that processes and transports the logs.

**Methodology Used to Analyze Direct Effects to Soil Productivity**

The direct effects on soils from proposed activities were measured by analyzing the effects of compaction, and displacement on the soil surface. This is the most productive layer and also the easiest layer to disturb through activities. The potential for these effects would result from the type of logging system and fuel treatments used, and the construction of roads and landings. Compaction, displacement and severe burning can affect the soil's physical, chemical and biological properties, which indirectly can affect the growth and health of trees and other plants. Compaction reduces soil permeability and infiltration, which can cause soil erosion. Displacement reduces plant growth where topsoil and organic matter are removed. Tractor, skyline/cable and helicopter logging systems are included in different amounts for each action alternative.

Roads and landings constructed that are to remain on the landscape for future use cause irretrievable effects on productivity as those lands become dedicated to the permanent transportation system. Those roads that are temporarily needed for project work and are planned for decommissioning have detrimental effects initially, but rehabilitation efforts (ripping, recontouring) would initiate a long-term recovery sequence. Recovery time is approximately 30 to 40 years at which second growth timber becomes established with enough crown foliage to intercept moisture and evapotranspirate moisture.

Coefficients for road construction used 35-foot widths, which take into account a 14-foot wide running surface and includes the cut and fill slope disturbance. Log landing areas associated with new road construction are accounted for in the road calculations. Log landings that are proposed outside of any harvest units are each calculated as one acre. These areas would become dedicated lands and their effect is irretrievable. See Table 4-SOIL-2.

**Acres of detrimental disturbance were calculated by multiplying the areas of activity disturbance by the disturbance coefficient derived from monitoring reports. Coefficients used for proposed logging systems are:**

***Tractor Logging***
*Spring burning or grapple piling*
= ***13 percent*** *(>25 percent soil moisture)*
*Fall burning, no grapple piling*
= ***15 percent*** *(>25 percent soil moisture)*

***Skyline/Cable and Aerial Logging***
*Spring burning*
= ***1 percent*** *(>25 percent soil moisture)*
*Fall burning on south/southwest aspects*
= ***3 percent*** *(>25 percent soil moisture)*

**Methodology Used to Analyze Indirect Effects to Soil Productivity**

Indirect effects include the loss of site productivity due to the removal of large woody debris and potassium. Large woody debris is essential for maintenance of sufficient microorganism populations. Research has indicated that potassium is an important element for site productivity. Mitigation measures are designed to meet the management of large woody debris and organic matter as detailed in the research guidelines contained in Graham et al (1994, PF Doc. SOIL-32). These recommendations emphasize tons/per acre and are not dependent on specific diameter size classes of material. On potassium limited sites, tree tops, foliage and branches would be left to over winter, which allows potassium to leach out of these materials (Garrison and Moore 1998; PF Doc. SOIL-30). The reduction of available potassium back into the soil profile could affect tree growth.

**Methodology Used to Analyze Cumulative Effects to Soil Productivity**

Cumulative effects include the combination of direct and indirect effects from past, present and reasonably foreseeable activities. Since direct and indirect effects from soils are measured within activity areas, the cumulative effects analysis area for the soil's resource consists of those activity areas proposed for soil disturbing activities within the Resource Area. Future foreseeable actions, primarily road construction and timber harvesting would continue to affect the soil. As an aggregate these activities would be analyzed as a new NEPA proposal and would be required to meet standards and guidelines. Existing roads and landings designated as classified on the National Forest transportation system are considered dedicated lands. The loss of soil productivity on these sites occurred when the roads and landings were constructed and are an irretrievable effect. These lands are not considered a part of the cumulative effects because they are now included as part of the permanent transportation system.

## 3.5.3 Existing Soil Productivity Conditions

## *A. Soil Productivity*

Soil productivity is the output of a specified plant or group of plants under a defined set of management practices, or the total plant mass that is produced annually per unit area.

The most productive part of the Resource Area's soil occurs near the surface at the contact between the forest litter and the mineral soil. Here the litter has been highly decomposed into dark colored amorphous material, which is the richest and most productive part of the soil. This layer is frequently only a few inches thick but its presence is much more important than its thickness would indicate. The rich organic matter layer contains most of the soil nitrogen, potassium and mycorrhizae that must be present for a site to be productive.

Below the soil's organic horizon is volcanic ash, which occurs at the surface layer of the mineral soil. In north Idaho, the ash layer is typically 16 inches thick, ranging between 7 and 24 inches on most sites. See pedon descriptions (PF Doc. SOIL-17). The top part of the ash is usually enriched in organic matter, which also contributes nitrogen, potassium and mycorrhizae to this part of the soil. The lower part of the volcanic ash has less organic matter and is not as fertile as the upper part. The ash has a high water holding capacity and nutrient-holding capacity, both of which are important for soil productivity.

Below the volcanic ash, the subsoil and substratum tend to be medium textured in the Belt, metasedimentary soils. These subsoil and substratum materials are very weakly weathered. They tend to have a high component of rock fragments, although this can be quite variable, particularly in the alluvial bottoms and outwash materials (PF Doc. SOIL-17 and SOIL-51).

Most of the productivity of all Resource Area soils is found near the soil surface. This is also the part of the soil that is most easily disturbed by management activities. Retaining large woody debris and organic matter is important to maintaining this productive layer (Graham et al., 1994; PF Doc. SOIL-32).

## *B. Past Logging Activities*

Past management activities within the proposed treatment areas were queried from the District's Timber Stand Management Record System (TSMRS) database and checked against timber maps, aerial photographs, and ground surveys. Out of a total of 32 proposed treatment areas one unit has had previous harvest treatments. Unit 11 was commercially thinned as a seed production site using a skyline with no substantial impacts. Cable logging systems have been shown to produce minor (2%) detrimental impacts (Niehoff, 2002; PF Doc. SOIL-41) and (McIver and Star 2000, pp.11-16; PF Doc. SOIL-37). The unit is proposed for only underburning to reduce brush and improve browse. Other logging activities have occurred in the resource area, but are not associated with any of the proposed treatment sites. These treatments total 158 acres and were either shelterwood or commercial thins using skyline or cable yarding systems.

Logging has occurred on private lands within the Twomile Resource Area. The typical practice on these lands is to leave submerchantable stands after being logged by either tractor, cable or helicopter methods. There have been no regeneration harvest treatments.

## *C. Existing Roads*

The present road system that is designated as "classified" on the National Forest transportation system are considered dedicated lands and total 8.6 miles within the resource area. There are approximately 21 miles of unclassified roads, the majority of which were created during bulldozer mineral exploration activities. On the private lands there are approximately 6 miles of roads. Roads are classified as either dedicated (under the area transportation plan) or non-dedicated (unclassified roads that are not considered necessary for long-term forest management objectives). In both cases the loss of soil productivity on transportation routes and unclassified roads is considered irretrievable.

## *D. Potassium Limitations*

Potassium limited areas attributed to soils that have developed over Belt Series bedrock of the Prichard and Lower Wallace formations may limit tree growth and increase susceptibility to root disease (Garrison-Johnston, Moore and Niehoff, 2001; PF Doc. SOIL-31). Pockets of root disease occur throughout the Resource Area, but a correlation between specific geologic formations and the extent of root disease is difficult to support. Approximately 43 percent of the Resource Area is underlain by the Prichard formation, which encompasses the area's southwestern half. The northeastern half displays the Burke formation which contains higher levels of potassium feldspar. The recommendation for all fuels reduction management is to allow the slash to over winter before the unit is burned. In harvest treatment areas treetops are to be lopped/scattered and allowed to over winter before underburning occurs (Chapter 2, Features Designed to Protect Soils Productivity). This would allow most of the foliar potassium to leach from the fine vegetative debris and reduces potassium volatilization (Garrison and Moore, 1998; PF Doc. SOIL-30).

## *E. Potential for Erosion*

The potential for soil erosion concerns on the Coeur d'Alene River Ranger District is not so much associated with harvest treatments, but with existing roads (Cacek, 1998; PF Doc. SOIL-27). Landtypes within the Resource Area have a predominately low to moderate erosion hazard potential, as displayed in the table below.

***Table 3-SOIL-1. Percentage of sensitive landtypes in the Twomile Resource Area, and their potential for erosion hazards. Includes lands under private or other ownership.***

| Surface Erosion Potential | | | Sediment Yield Potential | | | Mass Failure Potential | | |
|---|---|---|---|---|---|---|---|---|
| Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| 100 | 0 | 0 | 52 | 12 | 36 | 52 | 4 | 8 |

Under Alternatives 2 and 3, Activity Areas (Units) 7, 21, 30, 31, 37c, 37d and 37e each have portions that rate high in sediment yield and mass failure potential (Map, PF Doc. Soil-22). The proposed harvest treatment is commercial thinning with helicopter yarding in four activity areas and skyline yarding in the remaining three areas. These yarding techniques result in minimal soil disturbance. The silvicultural thinning treatments would retain a stocked stand, which will maintain rooting strength and evapotranspiration across the activity areas (please refer to Chapter 2, Tables 2-7 and 2-8 for percent of tree canopy retained). In this manner soil strength would continue with no concerns from mass failure or sediment yields (Megaham, 1990; PF Doc. SOIL-38).

A portion of Activity Area (Unit) 5 under Alternatives 2 and 3 rates high in sediment yield. Because skyline yarding is proposed for the activity area there would be minimal effects to the surface organic layer. There would be no erosion or mass failure concerns in any of the proposed activity areas.

### 3.5.4 Environmental Consequences to Soil Productivity

## *A. Effects to Soil Productivity Common to All Alternatives*

Given the decades of fire suppression that have occurred in the Resource Area, the chance of a lethal wildfire occurring could be high if an ignition starts in an untreated area during extreme, dry weather conditions. As stated in the Fire and Fuels section, the proposed vegetation and fuels treatment in the Resource Area would not necessarily prevent lethal wildfires from occurring, but would increase the ability to suppress such a fire should the ignition occur in the treated areas because potential fire intensities would decrease. Vegetation and fuels treatments would reduce the chance that a wildfire could have as severe an effect on the soils in treated areas as it could in untreated areas because there would be a reduction in the tons per acre of fuels on those treated sites.

If such a fire occurred that could not be safely suppressed, there would be a high potential for impacts to soils in severely burned areas. These areas increase the risk of soil damage, which detrimentally reduces the soil productivity. The risk of erosion increases proportionally to a fire's intensity (Megahan 1990, p. 146; PF Doc. SOIL-38). Where ashes have burned white or a reddish color give an indication that much of the organic carbon was oxidized and is no longer available to the soil. Other effects would include the loss of organics, loss of nutrients and a reduction of water infiltration (Wells et. al. 1979, p. 26; PF Doc. SOIL-50). When burns create high surface temperatures when the soil moisture content is low, the result is almost a complete loss of most woody debris and usually the entire organic layer, exposing mineral soil. Nutrients stored in the organic layer are lost through volatilization and as fly-ash (DeBano 1991, pp. 152-153; PF Doc. SOIL-29) and (Amaranthus et. al. 1989, p. 48; PF Doc. SOIL-25). Available potassium is also reduced as part of the fly-ash.

If hydrophobic soils resulted from severe fire, moderate surface erosion would occur but the potential for mass failures would be low because of the Twomile Resource Area's overall landtype characteristics. The areas of primary risk after a severe burn are the stream banks and possible debris flows. Following a severe

fire, rehabilitation efforts to mitigate the fire's effects on erosion and sediment delivery would be performed as funding became available. If completed in a timely manner rehabilitation work could negate most of the erosion concerns.

## *B. Effects to Soil Productivity Under Alternative 1 (No Action)*

No direct effects to the soil resource would occur in Alternative 1 since there would be no road construction, logging or fuel treatment activities. Throughout the silvicultural landscape tree mortality would continue as in the past from pathogens and weather events, which have a direct influence on the area's recycling of organic matter and changes in fuel loading. In moist habitat sites the increase in organic matter is a benefiting function to overall soil productivity. In dry habitat types increases of organic matter may result in a negative response. Soil damage risks could increase as fuel loading levels rise followed by a high severity fire. The effects of such a fire would result in a greater loss to the soil of organic matter, nutrient availability, and reduced water infiltration, which affects the soil's productivity. In addition the effects of such a fire followed by heavy storms could greatly increase surface erosion and sediment delivery.

## *C. Effects to Soil Productivity Under Alternatives 2 and 3*

Minor disturbances would occur on skyline and helicopter yarded harvest units and where hand line is constructed around specified units. Forest monitoring indicates these activities result in minor detrimental effects (USDA 1991; PF Doc. SOIL-47). Activity areas (harvest units) that propose tractor yarding, new roads and new helicopter landings would have the highest probability of detrimental effects to the soil resource units, whereas skyline and helicopter logging systems that are proposed in conjunction with spring underburning and no new road construction would have much lower detrimental effects (usually 1 to 3%), (Niehoff 2002; PF Doc. SOIL-41). See Table 3-SOIL-2.

**Effects of Road Construction:** The new road construction proposed under Alternatives 2 and 3 would result in an irreversible effect to site productivity due to compaction and displacement. Under either alternative, the new roads would be identified as a capital investment and added to the District's permanent transportation plan as National Forest system roads.

**Effects of Decommissioning Existing Roads:** Road decommissioning under Alternatives 2 and 3 would include front-end obliteration, ripping, recontouring the road prism, woody debris barriers and culvert removal. Fill slopes would be stabilized and stream channel crossings restored to their natural grade. Where necessary, grass seeding, fertilizing and additional woody debris would be applied across the disturbed areas. This method of rehabilitation would begin to reduce compaction of the soil and return a portion of the topsoil to the surface, which helps restore soil productivity and decreases hydrologic effects from road surface runoff. For additional information on road decommissioning, please refer to the RAPs document in the Project Files (Table 5.1, PF Doc. TRAN-1).

**Effects of Road Storage:** Road management under both Alternatives 2 and 3 would designate up to 12.6 miles of roads for storage once all project work is completed (storage means the road is closed to motorized traffic, and the roads are considered self-maintaining). As a stored road brushes in, erosion and sediment delivery decline over time and pose little to no resource risk (Beschta 1978, p. 1015; PF Doc. SOIL-26) and (FSH 5409.17-94-2). These roads can be reopened for future management if needed. These roads remain on the landscape as an irretrievable disturbance until such time that they are fully decommissioned. For additional information on road storage, please refer to the RAPs document in the Project Files (Table 5.3, PF Doc. TRAN-1).

**Effects of Road Maintenance:** No additional soil impacts would occur from proposed road maintenance activities such as blading, drainage improvements and surfacing on existing dedicated roads.

**Effects of Additional Trail for Motorized Use:** An additional 4.4 miles of ATV/motorcycle trails are proposed to be added to the existing motorized trail system in the Twomile Resource Area. The additions would be developed primarily on existing bulldozer mining exploration roads and would incorporate a segment of National Forest system road. These developments would have a minimal effect to the resource

area's soils. For additional information on these trails, please refer to the RAPs document in the Project Files (Table 5.1, PF Doc. TRAN-1).

**Effects of Harvest Treatments:** The analysis assumes that all proposed harvest treatments would occur during non-winter conditions when the disturbance potential would be the greatest. If some harvest units were logged during the winter months the effects from compaction and soil displacement could be reduced, which is not reflected in the present analysis (Krag 1991, p. 64; PF Doc. SOIL-36).

Under Alternatives 2 and 3, proposed management activities would increase detrimental soil disturbances (specifically related to soil compaction and displacement), especially where roads and landings are proposed. There would be no increase in detrimental impacts in the proposed burn-only units (see Chapter 2, Tables 2-7 and 2-8). For all of the proposed harvest treatments, 19 units have an average predicted detrimental effect of 2.3 percent, with the highest being 4.8 percent in unit 31. This higher percentage is primarily the result of past bulldozer mining exploratory roads within the unit. The highest harvest equipment related disturbance is associated with 6 acres of incidental tractor ground in unit 29 (34 acres) and will account for a 13 percent disturbance on the 6 acres.

Other than incidental tractor use on a portion of Unit 29, all proposed harvest units would have minor disturbance due to the predominant use of skyline and helicopter yarding. Forest monitoring indicates these activities result in minor detrimental effects (USDA 1991; PF Doc. SOIL-47).

The effects from four proposed helicopter log-landing sites have been calculated into the overall effects related to the proposed harvest treatments. Helicopter landings average one acre in size; disturbance to these sites from compaction, displacement and pile burning are considered irreversible effects. All of the proposed helicopter landings would become dedicated lands for future use at the end of project's activities. They are classified as a capital improvement in the same manner as a National Forest system road and not considered as part of the Resource Area's cumulative disturbance level.

On all proposed harvest sites, the logging slash would remain within the unit and be allowed to over winter one or two seasons before underburning. This would allow the foliage and branches to recycle onto the soil's organic layer for nutrient capital in the form of potassium and nitrogen.

The commercial thinning of Douglas-fir in association with leaving ponderosa pine would allow the release of stored foliar potassium from the Douglas-fir as a benefiting nutrient for up take by the ponderosa pine (Garrison and Moore 1998; PF Doc. SOIL-30). Ponderosa pines are more potassium efficient trees and would be planted throughout the units where ponderosa pine is a primary stand component. Where ponderosa pine is not a primary stand component white pine and larch would also be planted. Commercial thinning would not cause any soil compaction.

**Effects of Prescribed Burning and Slash Disposal:** Under Alternatives 2 and 3, all units after harvest/slash activities are complete would have underburning or hand piling except for unit 34, which would be chipped. The burning especially in the fuel reduction only units would reduce the fuel loadings to a manageable level. Slash would remain in each unit (instead of being whole-tree yarded to the landing). There would be some incidental piling of materials at landings as logs are processed for transport. In either case the residual tops, branches and foliage would be allowed to over winter, giving the leaching process enough time to recycle before the areas are ignited. Before ignition can take place, the soil moisture is to be 25 percent or greater, which would reduce the potential for soil resource damage. There is a risk that once the logging slash is allowed to cure and should it ignite with soil moistures below 25 percent and before the proposed fuel treatments are implemented there could be detrimental effects to the soil as a result of severe burning.

## *D. Effects to Soil Productivity Under Alternative 4*

This alternative is proposed as a reintroduction of fire to dry-site ecosystems by slashing and then underburning. No direct effects would occur from new road construction or logging activities. The only effect is from prescribed fuel treatments in the more drier timber stands to reduce hazardous fuel loadings that have built up over the past 70+ years. Timber stands with variable ponderosa pine components would have their understories treated for slash and then underburned. The underburning treatment would be carried out

on 11 proposed units that total 309 acres. Also proposed are 28 acres of hand piling/burning and 31 acres of chipping or lop/scatter with no burning.

So as not to be a consequence to the soil resource, all slash treated areas would be left to over winter, which allows the foliage, small branches and fine litter to leach out the foliar potassium (Garrison and Moore 1998; PF Doc. SOIL-30). Before the areas are burned all soil moistures must be >25 percent. This would maintain the soil's surface organic layer integrity and its capacity to infiltrate water. It also reduces the potential concerning severe burning to the soil resources (Niehoff 1985; PF Doc. SOIL-40). If these management concerns are followed there would be little to no effect on the soil resource concerning the proposed fuel treatments. The proposed hand slashing and precommercial thinning work would not contribute to additional soil compaction.

### *E. Effects of Ongoing and Reasonably Foreseeable Activities on Soil Productivity*

The ongoing and reasonably foreseeable activities applicable to the soil's analysis are fire suppression and native seeding. Helicopter landings and existing roads are dedicated lands for specific uses. Firewood gathering and hunting activities create no soil impacts. As more roads are closed to public access through the District's Access Management Plan the gathering of miscellaneous forest products, hunting activities and ATV use would decrease across the Resource Area. Noxious weed treatment and timber stand improvement would not be a concern to the soil resource, since large equipment or fire use is not required. Future salvage opportunities can occur, but they have to meet and are guided by specified soil protection guidelines.

Successful fire suppression activities would eliminate the chance of a severe wildfire that could impact soil productivity. When suppression activities are needed, light hand line work causes minor effects to the soil and in some cases forms a seedbed opportunity. The use of large ground-based machinery for firebreak construction would increase the cumulative soil effects within the Resource Area. Steps are taken during post-fire rehabilitation work to avoid or ameliorate detrimental soil effects.

On site large woody debris retention would increase as more areas are closed to public travel. Sediment yields attributed to open roads would decrease over time as additional roads are closed to motorized travel and they become grown in with vegetation.

### *F. Effects of Opportunities on Soil Productivity*

**Effects of Wildlife and Watershed Improvements:** Road decommissioning would begin restoration of soil productivity on those impacted sites by reducing decompaction of the soil and re-establishing some of the topsoil that was buried under the road fill during the initial construction.

**Effects of Noxious Weed Treatments:** This would have a positive affect on soil productivity by reducing or eliminating competing vegetation that interferes with native vegetation.

## 3.5.5 Consistency with Forest Policy and Legal Mandates

All alternatives would comply with Forest Plan Standards and Regional Soil Quality Standards (FSH 2509.18) related to detrimentally disturbed soils, maintaining or exceeding 85 percent of the area in a productive state. Soil disturbing management practices would not exceed 15 percent detrimental conditions and would maintain at least 85 percent of each activity area in a condition of acceptable productivity potential for trees and other managed vegetation. Large woody debris would follow the research guidelines of Graham et al. (1994), (PF Doc. SOIL-32) to insure the maintenance of site productivity. IFTNC guidelines would ensure the retention of the maximum amount of potassium on sites after treatments.

**Table 3-SOIL-2. Soil disturbance conditions by alternative.** Proposed units displayed are only those with existing detrimental conditions or proposed units that have conditions that could cause detirmental changes of 1% or greater. A complete list of units and their estimated disturbance levels are in the project file, soils section.

| Proposed Unit | Acres | | | Alternative 1 (Existing | | Alternative 2 (Proposed Action) | | | Alternative 3 (Mostly Helicopter Yard) | | | Alternative 4 (Only Prescribed Fire) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alt 2 | Alt 3 | Alt 4 | Ac. Disturbe | % Activit | Ac Disturbed | % Activity A | Cumulative I | Ac. Disturbed Sc | % Activity A | Cumulative E | Ac. Disturbe | % Activity A | Cumulative |
| 5 | 20 | 20 | 0 | 0.34 | 1.7 | 0.4 | 2 | 3.7 | 0.4 | 2 | 3.7 | N/A | N/A | N/A |
| 7 | 93 | 93 | 0 | 0.69 | 0.74 | 0.93 | 1 | 1.7 | 0.93 | 1 | 1.7 | N/A | N/A | N/A |
| 9 | 51 | 51 | 0 | 0.95 | 1.8 | 0.51 | 1 | 2.8 | 0.51 | 1 | 2.8 | N/A | N/A | N/A |
| 10 | 0 | 0 | 24 | 2.1 | 8.5 | N/A | N/A | N/A | N/A | N/A | N/A | 0 | 0 | 8.5 |
| 11 | 0 | 0 | 24 | 0.48 | 2 | N/A | N/A | N/A | N/A | N/A | N/A | 0 | 0 | 2 |
| 17 | 0 | 82 | 0 | 0.35 | 0.4 | N/A | N/A | N/A | 0.82 | 1 | 1.4 | N/A | N/A | N/A |
| 20 | 0 | 0 | 13 | 0.69 | 5 | N/A | N/A | N/A | N/A | N/A | N/A | 0 | 0 | 5 |
| 23 | 23 | 23 | 0 | 0.51 | 2.2 | 0.28 | 1.5 | 3.7 | 0.23 | 1 | 3.2 | N/A | N/A | N/A |
| 24 | 0 | 22 | 22 | 0.26 | 1.2 | N/A | N/A | N/A | 0.22 | 1 | 2.2 | 0 | 0 | 1.2 |
| 25 | 0 | 0 | 19 | 0.38 | 2 | N/A | N/A | N/A | N/A | N/A | N/A | 0 | 0 | 2 |
| 27 | 78 | 61 | 0 | 2.8 | 3.5 | 0.78 | 1 | 4.5 | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 34 | 34 | 0 | 0 | 0 | 1.1 | 3.1 | 3.1 | 0.34 | 1 | 1 | N/A | N/A | N/A |
| 30 | 58 | 58 | 0 | 0.38 | 0.65 | 0.58 | 1 | 1.65 | 0.58 | 1 | 1.65 | N/A | N/A | N/A |
| 31 | 63 | 63 | 0 | 2.4 | 3.8 | 0.63 | 1 | 4.8 | 0.63 | 1 | 4.8 | N/A | N/A | N/A |
| 34 | 0 | 0 | 9 | 0.95 | 10.5 | N/A | N/A | N/A | N/A | N/A | N/A | 0 | 0 | 10.5 |
| 36A | 36 | 0 | 0 | 0 | 0 | 0.72 | 2 | 0 | N/A | N/A | N/A | N/A | N/A | N/A |
| 37A | 10 | 0 | 0 | 0 | 0 | 0.19 | 2 | 0 | N/A | N/A | N/A | N/A | N/A | N/A |
| 37B | 25 | 0 | 0 | 0 | 0 | 0.51 | 2 | 0 | N/A | N/A | N/A | N/A | N/A | N/A |
| 37C | 17 | 0 | 0 | 0 | 0 | 0.34 | 2 | 0 | N/A | N/A | N/A | N/A | N/A | N/A |
| 37D | 16 | 0 | 0 | 0 | 0 | 0.32 | 2 | 0 | N/A | N/A | N/A | N/A | N/A | N/A |
| 37E | 10 | 0 | 0 | 0 | 0 | 0.2 | 2 | 0 | N/A | N/A | N/A | N/A | N/A | N/A |
| 1 AC. Helicopter Landings | | | | 0 | | 4 Landings = 4 AC Dedicated | | | 4 Landings = 4 AC Dedicated | | | 0 | | |
| New Road Construction<br>1 Mile = 4.5 AC | | | | 0 | | 1.9 Miles = 8.5 AC Dedicated | | | 1.0 Miles = 4.5 AC Dedicated | | | 0 | | |
| | | | | Acres of Proposed Dist.<br>0 | | Acres Harvested - 731<br>Acres Treated - 1103<br>Past Dist. Acres - 8.1<br>Proposed Dist. Acres - 8.6<br>Ave % Dist Per Unit - 2.4 | | | Acres Harvested - 804<br>Acres Treated - 1129<br>Past Dist. Acres - 5.9<br>Proposed Dist. Acres - 8.2<br>Ave % Dist Per Unit - 1.7 | | | Acres Harvested - 0<br>Acres Treated - 374<br>Past Dist. Acres - 4.9<br>Proposed Dist. Acres - 0<br>Ave % Dist Per Unit - 1.3 | | |

**Table 3 -SOIL-3. Geology Of Proposed Activity Areas And Possible Potassium Deficiencies, Twomile Resource Area.**

| Alternative 2 | | Possible Potassium Deficient Soils | Alternative 3 | | Possible Potassium Deficient Soils | Alternative 4 | | Possible Potassium Deficient Soils |
|---|---|---|---|---|---|---|---|---|
| Unit | Formation | | Unit | Formation | | Unit | Formation | |
| 1 | Burke | No | 1 | Burke | No | 1 | Burke | No |
| 2 | Burke | No | 2 | Burke | No | 2 | Burke | No |
| 3 | Burke | No | 3 | Burke | No | 3 | Burke | No |
| 5 | Burke 75%<br>Intrusive 25% | No | 5 | Burke 75%<br>Intrusive 25% | No | 6 | Burke | No |
| 6 | Burke | No | 6 | Burke | No | 10 | Prichard | Yes |
| 7 | Burke | No | 7 | Burke | No | 11 | Burke | No |
| 9 | Prichard | Yes | 9 | Prichard | Yes | 13 | Prichard | Yes |
| 10 | Prichard | Yes | 10 | Prichard | Yes | 20 | Prichard | Yes |
| 11 | Burke | No | 11 | Burke | No | 21 | Prichard | Yes |
| 12 | Prichard | Yes | 12 | Prichard | Yes | 22 | Prichard | Yes |
| 13 | Prichard | Yes | 13 | Prichard | Yes | 24 | Prichard | Yes |
| 20 | Prichard | Yes | 15 | Burke 85%<br>Prichard 15% | No 85%<br>Yes 15% | 25 | Prichard | Yes |
| 21 | Prichard | Yes | 16 | Burke 25%<br>Prichard 75% | No 25%<br>Yes 75% | 32 | Burke | No |
| 22 | Prichard | Yes | 17 | Prichard | Yes | 34 | Prichard | Yes |
| 23 | Prichard | Yes | 18 | Prichard | Yes | 35 | Prichard | Yes |
| 25 | Prichard | Yes | 19 | Prichard | Yes | | | |
| 27 | Prichard | Yes | 20 | Prichard | Yes | | | |
| 28 | Prichard | Yes | 21 | Prichard | Yes | | | |
| 29 | Prichard | Yes | 22 | Prichard | Yes | | | |
| 30 | Prichard | Yes | 23 | Prichard | Yes | | | |
| 31 | Burke 75%<br>Prichard 25% | No 75%<br>Yes 25% | 24 | Prichard | Yes | | | |
| 32 | Burke | No | 25 | Prichard | Yes | | | |
| 33 | Prichard | Yes | 27 | Prichard | Yes | | | |
| 34 | Prichard | Yes | 28 | Prichard | Yes | | | |
| 35 | Prichard | Yes | 29 | Prichard | Yes | | | |
| 36a | Prichard | Yes | 30 | Prichard | Yes | | | |
| 36b | Prichard | Yes | 31 | Burke 75%<br>Prichard 25% | No 75%<br>Yes 25% | | | |
| 37a | Burke | No | 32 | Burke | No | | | |
| 37b | Burke | No | 33 | Prichard | Yes | | | |
| 37c | Burke 66%<br>Prichard 34% | No 66%<br>Yes 34% | 34 | Prichard | Yes | | | |
| 37d | Burke 50%<br>Prichard 50% | No 50%<br>Yes 50% | 35 | Prichard | Yes | | | |
| 37e | Burke 50%<br>Prichard 50% | No 50%<br>Yes 50% | | | | | | |

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# 3.6 WILDLIFE

## 3.6.1. Regulatory Framework for Wildlife

Although a variety of sources are used to assess wildlife species and habitat (including historic records, current databases, large scale assessments, scientific studies and management recommendations), the regulatory framework providing direction for the protection and management of wildlife and habitat comes from the following principle sources:

- *Endangered species Act of 1973 (as amended)*: Section 7 of the Endangered species Act (ESA) directs that actions authorized, funded, or carried out by federal agencies do not jeopardize the continued existence of any threatened or endangered species, or result in the adverse modification of habitat critical to these species.
- *National Forest Management Act of 1976:* The National Forest Management Act (NFMA) provides for balanced consideration of all resources. It requires the Forest Service to plan for a diversity of plant and animal communities. Under its regulations the Forest Service is to manage for viable populations of existing and desired species, and to maintain and improve habitat of management indicator species.
- *Forest Plan:* The IPNF Forest Plan (1987), 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. Sensitive species are designated by each Region of the Forest Service as according to the occurrence of the species and its habitat within Regional boundaries. Region 1 sensitive species are evaluated in this document.
- *Migratory Bird Executive Order:* The Migratory Bird Executive Order (2001) describes the responsibilities of federal agencies to protect migratory bird species through a Memorandum of Understanding (MOU) with the Fish and Wildlife Service. The order directs federal agencies to consider these species in agency plans, and to evaluate the effects of proposed actions on migratory bird populations and their habitat, with emphasis on species of concern (PF Doc. WL-R67).

## 3.6.2. Methodology

### *A. Introduction*

USDA Forest Service policy (Forest Service Manual 2670.32) requires a documented review of Forest Service programs or activities in sufficient detail to determine how an action may affect threatened, endangered, candidate, or sensitive species. This environmental assessment serves as the primary **biological evaluation (BE)** for sensitive wildlife species. Effects to wildlife species listed under the Endangered Species Act are addressed separately in a **biological assessment (BA).** Consultation with the U.S. Fish & Wildlife Service has been ongoing throughout the planning and design of this project. The BA will be completed based on the alternative selected for implementation, with review and concurrence by the U.S. Fish & Wildlife Service. A copy of the Biological Assessment will be included in the Twomile Resource Area Decision Notice.

Much of the wildlife analysis is tiered to the following documents and information, which provide the primary direction and methods used to develop the analysis for potential effects on wildlife**:**

- *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin*
- *Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin*
- *The Road Analysis Process and the District Travel Plan*
- *Recorded species observations*
- *Suitable and potential habitat models*
- *Applicable scientific research, literature, management recommendations and conservation strategies*

The wildlife analysis is done at different levels (ranging from coarse filter to fine filter) as appropriate to address issues and concerns relative to each species. According to CEQ regulations, the level of analysis should be commensurate with the importance of the impact, the risk associated with the project, the species involved, and the current level of knowledge (CEQ 1502.15). Species for which it has been determined there would be no measurable effects are not analyzed in detail.

Direct, indirect, and cumulative effects are disclosed by alternative and by species (please refer to Chapter 2 for a list of ongoing and reasonably foreseeable projects). For each wildlife species analyzed, the cumulative effects analysis area has been identified based on the species' or guilds' relative home range size in relation to available habitat, topographic features that affect how species move and utilize their home range (such as watershed boundaries), and boundaries that represent the furthest extent of effects. Maps depicting wildlife habitat by species are provided in the project files (PF Docs. WL-7, 8, 44, 45, 46, 47, 48, 49, and 50).

Based on habitat relationships, appropriate indicators of habitat with a potential to be impacted by the proposed action have been measured. Queries of the Timber Stand Management Records System database (TSMRS) were used to identify capable and suitable habitat within each wildlife analysis area (PF Doc. WL-3, 18, 22, 24 and 30). Changes in habitat for each relevant species are disclosed with a discussion of the effects on species. Inadequacies in the database have been considered and queries designed to better reflect inadequacies. For example, canopy closure is not in the database; however, estimates of percent canopy closure can be made by using basal area, which is in the timber stand database (PF Doc. WL-26).

## *B. Wildlife Conservation Agreements and Strategies*

Conservation strategies and assessments are written to assist federal agencies in managing habitat for threatened and endangered species and other species of concern. They are most often joint efforts between participating agencies to increase awareness and knowledge of the species by describing life history strategies and habitat requirements. Conservation strategies usually present management recommendations and guidelines to assist in maintaining suitable habitat. This information, in conjunction with scientific literature, is used to assist in planning and in developing project design features that minimize or avoid effects to wildlife and wildlife habitat.

The Twomile Resource Area is not within a recovery area for any threatened or endangered species, and no critical habitat occurs within the Coeur d'Alene River Basin at this time. The Pacific Bald Eagle Recovery Plan, the Northern Rocky Mountain Wolf Recovery Plan, the Recovery Plan for Woodland Caribou in the Selkirk Mountains and the Grizzly Bear Recovery Plan provide requirements for habitat management for these species. In February of 2000, a Lynx Conservation Assessment and Strategy was released in an effort initiated by the Fish and Wildlife Service and in cooperation with the Forest Service and the Bureau of Land Management. The purpose of the Strategy is to provide a consistent and effective approach to avoid or reduce adverse effects resulting from management activities to the species or its habitat. The assessment is based partly on the delineation of Lynx Analysis Units (LAUs) where habitat is managed to provide for lynx denning and foraging habitat.

## *C. Geographic Scope of the Wildlife Analysis*

The geographic scope of analysis varies by species according to the appropriate methodology and level of analysis needed to determine potential effects. A number of variables define the level of analysis for each species including, but not limited to, species occurrence, presence of suitable or potential habitat, existing condition, the potential for impacts and the difference in effects between alternatives. Generally, the geographic scope is the Twomile Resource Area; however, due to species and habitat distribution, home range size, linkages between suitable habitats or between winter and summer range, distances of dispersal, the potential for immigration and emigration into a population, and other variables, the analysis may include an area as large as northern Idaho or an area smaller than the Twomile Resource Area.

Approximately one-third of the Twomile Resource Area consists of private lands. Detailed information is available only for National Forest System lands within the geographic areas considered in this analysis. Where

information on land outside of Forest Service jurisdiction would assist in the analysis of effects, a combination of visual evaluation, aerial photo interpretation and extrapolation from available data was used to estimate habitat components associated with those lands. Due to the lack of detailed information, and the unpredictability of future management on the adjacent non-Forest lands, effects from activities on these lands are difficult to quantify. Potential effects resulting from activities on these lands are therefore measured in more general terms than activities on National Forest lands.

## *D. Suitable and Potential Wildlife Habitat*

Of primary consideration in the wildlife analysis is the current and potential capability of the structure, composition, arrangement and patch size of the vegetation to provide the habitat components necessary to meet the life history requirements of a particular species.

Quantitative modeling to assess current habitat and potential effects are not always applicable due to a lack of available knowledge about many species and their habitat requirements, and limited amount of information regarding some key habitat components such as size and amount of down wood. Models are used when appropriate based on available information and applicability. When feasible, suitable and potential habitat is modeled using databases describing forest vegetation (TSMRS) and Geographic Information (mapping) Systems delineating variables such as slope, aspect, soils, road density and riparian habitats. This data is supported by species observation records, field verification, and field surveys for specific species and habitats. Acres displayed in this section should be considered approximate due to the way in which different habitat components are grouped and the detail of information available. Differences may occur in the values due to the scale at which the analysis is conducted, the level at which effects become apparent and the consequences of the action on different resource values. Detailed descriptions of the specific analysis method or modeling process used for each species can be found under the section of this chapter pertaining to that species and in the wildlife project files for this assessment.

***Suitable habitat*** defines wildlife habitat that has a combination of features meeting the habitat requirements of a given species at the present time.

***Potential habitat*** does not currently provide suitable habitat, but because of certain characteristics has the potential to provide suitable habitat in the future as stand conditions change. For example, changing stand conditions may include seral stage, cover type, stand density, tree size, stand age and stand condition.

## *E. Wildlife Species Relevancy Screen*

Wildlife species listed under the Endangered Species Act, sensitive species, management indicator species and species of special concern known to occur on the Idaho Panhandle National Forests were screened for their relevancy to the Coeur d'Alene River Basin and to the Twomile Resource Area by reviewing sighting records, planning documents, habitat suitability models and other sources such as historic records and scientific literature.

Relevancy is determined based on whether there is evidence of species or habitat present within the affected area, and whether any such species or habitat could potentially be affected by the action alternatives. Some habitat and species may occur within the Coeur d'Alene River Basin, but may not be applicable to the Twomile Resource Area or surrounding areas. A coarse filter screen was applied at the Coeur d'Alene River Basin scale, and then a finer screen was used to assess species relevancy at the watershed scale.

Recorded observations come from several sources including IPNF records, State Conservation Data Center information and from other organizations that collect recorded observations or conduct surveys for wildlife species in the area such as the Audubon Society. For each species in this analysis, modeling methods for suitable and potential habitat, field verification, current knowledge of species distribution, scientific studies and applicable management recommendations are discussed in detail.

The US Fish & Wildlife Service provided an updated list of ***Threatened, Endangered & Candidate Species*** that may occur in the IPNFs on June 4, 2003 (No. 1-9-03-SP-365; PF Doc. WL-R66).

***Sensitive species*** are designated by each Region of the Forest Service based upon regional variations in species and habitat occurrence. The analysis for Sensitive species serves as the primary biological evaluation for this project. A biological checklist with a summary of rationale and effects determinations is included in the wildlife project files (PF Doc. WL-52).

The Forest Plan (Appendix L-4; PF Doc. WL-R53) identified elk and moose as ***Big-game Management Indicator Species*** because they are a general forest species easily affected by management activities, particularly access management. Moose frequently use the bottomlands associated with the South Fork Coeur d'Alene River, but since elk are the primary big-game species using the area, this analysis focuses on elk. Elk are a priority big game species for Idaho Fish and Game, and elk hunting is a significant economic factor in Northern Idaho.

The Forest Plan also designated three ***Old-growth Management Indicator Species*** for the monitoring and management of old growth or late successional conditions: pine marten, pileated woodpecker, and northern goshawk. The status of these species indicates the ability of forest structure to support wildlife populations that inhabit older forests and use large diameter trees, snags and down wood for nesting and/or foraging. Old growth is discussed in more detail in the "Forest Vegetation" section of Chapter 3. The discussion of old growth habitats in this chapter tiers to that information. Goshawks have been placed on the list of sensitive species for Region 1 and are addressed under the sensitive species discussion.

***Nongame species*** are those not managed by Idaho Fish & Game as a hunted species., including many furbearers, raptors, amphibians, rodents and songbirds. Nongame species are often important prey for other furbearers and large predators like wolves, lynx and bears. Changes in vegetation composition and structure are used to assess effects to non-game species.

***Neotropical birds*** are those that breed and nest in one area and migrate to another area, usually of long distances, to reside for the winter months. These birds are impacted in a variety of ways including loss of habitat due to agriculture, logging, and urbanization. The Upper Columbia Basin Draft EIS (USDA et al., 1994; PF Doc. WL-R55) states that breeding bird surveys on National Forests found an increase of 10 species of neotropical birds and a decrease of 5 species. Often the increases in populations are of less desirable species such as the brown-headed cowbird (Collopy and Smith 1995 in Upper Columbia River Basin Draft EIS; PF Doc. WL-R10). It must be noted that there are many species of neotropical migrant birds for which there is very little population or habitat data available, and changes that may benefit one species may, at the same time, have undesirable effects on other species.

The probability of a specific species occurring in the Resource Area is based on records of species sightings, presence of suitable habitat and the potential of the area under consideration to provide suitable habitat in the future. The analysis is commensurate with the importance of the impact (CEQ 1502.15), the risk associated with the project, the species affected, and the level of knowledge already in hand (USDA Forest Service, 1992; PF Doc. WL-R65).

Some wildlife species or their habitat are present in the assessment area, but would not be measurably affected because they would either not be impacted by the proposed activities, the impacts would not be sufficient to influence their use or occurrence, or their needs can be adequately addressed through design of the project. No further discussion or analysis is necessary for such species. These species and the rationale for dismissing them from further consideration are described in Chapter 2 (Issues Not Addressed in Detail) and the Project Files (PF Doc. WL-51).

***No probability of occurrence***
No suitable habitat occurs in the area, and/or the area is outside the known range of the species, and there are no recorded observations in the area.

***Low probability of occurrence***
Marginally suitable habitat is limited, isolated, and there are no recorded observations of the species in the area.

***Moderate probability of occurrence***
Suitable habitat exists in the area and it is within the known range of the species, but there are no confirmed observations.

***High probability of occurrence***
Suitable habitat is present in the area and there have been confirmed observations of the species.

***Table 3-WL-1. Wildlife Presence and Level of Analysis.***

| Species Common Name | Species Scientific Name | Species or Habitat Present on District? | Probability of Occurrence in Resource Area? | Species or Habitat Potentially Affected? | Species Further Analyzed? |
|---|---|---|---|---|---|
| ***Threatened & Endangered*** | | | | | |
| B. Grey Wolf | *Canis Lupis* | Yes | Moderate | Yes | Yes |
| Bald eagle | *Haliateetus leucocephalus* | Yes | Low | No | No |
| Canada Lynx | *Lynx Canadensis* | Yes | Low | No | No |
| Grizzly Bear | *Ursus Horribilis* | Yes | Low | No | No |
| Woodland Caribou | *Rangifer tarandus* | No | None | No | No |
| ***Sensitive*** | | | | | |
| C. Northern goshawk | *Accipiter gentiles* | Yes | Moderate | Yes | Yes |
| D. Flammulated owl | *Otus flammeolus* | Yes | Moderate | Yes | Yes |
| D. White-headed woodpecker | *Picoides albolarvatus* | Yes | Low | Yes | Yes |
| E. Black-backed woodpecker | *Picoides arcticus* | Yes | Moderate | Yes | Yes |
| F. Fisher | *Martes pennanti* | Yes | Low | Yes | Yes |
| G. Wolverine | *Gulo gulo* | Yes | Moderate | Yes | Yes |
| H. Coeur d'Alene salamander | *Plethodon idahoensis* | Yes | Moderate | Yes | Yes |
| I. Townsend's big-eared bat | *Plecotus townsendii* | Yes | Low to moderate | Yes | Yes |
| Boreal toad | *Bufo boreas* | Yes | Low | No | No |
| Peregrine falcon | *Falco peregrinus anatum* | Yes | None | No | No |
| Common loon | *Gavia immer* | Yes | None | No | No |
| Harlequin duck | *Histrionicus histrionicus* | Yes | Low to none | No | No |
| Northern leopard frog | *Rana pipiens* | Yes | None | No | No |
| Northern bog lemming | *Synaptomys borealis* | Yes | None | No | No |
| ***Old Growth Management Indicator Species*** | | | | | |
| C. Northern goshawk | *Accipiter gentiles* | Yes | Moderate | Yes | Yes |
| J. Pileated woodpecker | *Dryocopus pileatus* | Yes | High | Yes | Yes |
| Pine marten | *Martes Americana* | Yes | Low to Moderate | Yes | No |
| ***Big Game Management Indicator Species*** | | | | | |
| K. Rocky Mountain elk | *Cervus elaphus* | Yes | High | Yes | Yes |
| Moose | *Alces alces* | Yes | Moderate | No | No |
| ***Other Species & Habitats*** | | | | | |
| Nongame | *N/A* | Yes | High | Yes | Yes |
| Neotropical (migrant) birds | *N/A* | Yes | High | Yes | No |

## 3.6.3. Affected Environment & Effects to Wildlife

This analysis reflects changes in habitat conditions (such as stand structure) resulting from past, present and reasonably foreseeable actions. **Except where specifically stated, it is assumed that private lands do not provide habitat,** in order to provide the most conservative ("worst case") assessment on these lands, since the Forest Service has not authority or information base concerning private lands.

## *A. Terrestrial Wildlife Habitat*

### Old and Mature Forests

Many wildlife species occurring on the IPNF prefer or occur only in mature and old forests. Stands with old and mature structure provide habitat for species that rely on large trees, snags, down logs and maximum structural diversity for nesting, foraging or raising young. Existing structurally immature stands could provide mature stands and old growth habitat over time if not disturbed, or if managed to maintain the large, old, dead and decaying structural components of the forest within the levels needed to provide suitable habitat. The IPNF requires maintenance of approximately 10 percent across the Forest in old growth to provide for viable populations of old-growth dependent species (Forest Plan, p. II-5; PF Doc. WL-41, WL-R53). For more information on old growth, please refer to the Forest Vegetation discussion in this chapter.

Old growth and mature trees have been reduced in amount and patch size across the Coeur d'Alene River Basin (please refer to the Forest Vegetation discussions related to old growth on pages 3-15 and 3-17). Many of the wildlife identified as sensitive or management indicator species by the Forest Service are associated with decreasing early seral habitats. Fragmentation has also affected old and mature stands across the Coeur d'Alene basin. Patch sizes, particularly of old forests, are greatly reduced from historical conditions. Many of the wildlife species associated with old and mature forests require large, continuous interior habitats in order to successfully reproduce. Potential effects to this habitat specific to the Twomile Resource Area are discussed in more detail for old growth Management Indicator Species such as pileated woodpeckers and fishers, as well as for Sensitive species such as goshawks and flammulated owls.

**Dry Forest Habitats**

Some wildlife species prefer open, dry forests with large trees, including flammulated owls, white-headed wood-peckers, Lewis' woodpeckers, pygmy nuthatches, and western bluebirds, just to name a few. Forests that have lost much of their larger structural component and developed a dense understory of shade-tolerant conifers are often no longer suitable for these species.

***Figure 3-WL-1. Dry site ponderosa pine in the Twomile Resource Area provides habitat for species such as flammulated owls and pygmy nuthatches.***

Dry forest habitats have evolved with frequent low or mixed intensity ground fires every 20 to 50 years, which leave large seral trees and decrease fuels in the understory (refer to Fire/Fuels discussion in this chapter). To protect human developments and future timber resources, fire suppression is ongoing in the Coeur d'Alene River Basin and has been practiced for an extended period of time. This practice allows the establishment of smaller shade-tolerant tree species under the canopy, changing the structure of dry site habitat from a relatively open-grown forest with a large diameter overstory into dense multi-canopy stands with many immature trees. Remaining stands are at higher risk for departure from normal non-lethal, mixed intensity fires to high intensity, stand-replacing fires and from high levels of insects and disease.

***Figure 3-WL-2. Tree cavities provide habitat for a number of wildlife species.***

Although dry forest habitats are found in only limited amounts on the Coeur d'Alene River Ranger District, the Twomile Resource Area provides some of the highest quality dry forest habitat found on the Coeur d'Alene River Ranger District (Figure 3-WL-1). Potential effects to dry forest habitats are discussed in more detail under species dependent on this type of forest, such as flammulated owls.

**Snag and Down Woody Habitat**

The amount of snags and down woody material present has been identified as a measure of forest integrity (Quigley et al. 1996; PF Doc. WL-R44). Dead trees, both standing and on the ground are critical habitat components for nearly all wildlife species as they depend on snags to differing degrees for nesting, forage and cover. Sensitive and management indicator species which nest in snags include pileated woodpeckers, black-backed woodpeckers, white-headed woodpeckers, flammulated owls and boreal owls. Some of these species cannot excavate cavities and depend on the other species to create cavities for nesting, denning or shelter. Retaining habitat for cavity excavators is vital to other wildlife dependent on snags.

Several studies have suggested the number of snags that should be made available or retained for snag-dependent species. This assessment uses the Region 1 Snag Protocol (USDA 2000; PF Doc. WL-R44) and Upper Columbia River Basin snag guidelines in Bull et al. 1997 (PF Doc. WL-R52, WL-41). The 1998 IPNF Forest Plan Monitoring Report summarizing 10 years of monitoring information found that on monitored plots, snag retention guidelines were met. In some areas of Region 1, monitoring has shown that snag retention may not be fully met following the many stages of project implementation (PF Doc. WL-R51). Several factors can impact snags during a project including inadequate marking of leave trees, inadequate contractual control, activities involved with felling and yarding, fuels treatment and woodcutting following logging. There would be little reduction in snags in the resource area as a result of project activities, since all existing snags would be retained unless they pose a threat to forest workers, but decreased canopy closure may result in less preferred overall snag habitat in these areas. Refer to discussions in this section under some of the snag dependent species such as flammulated owls and pileated woodpeckers for more information on snag habitat in the Twomile Resource Area.

Road construction or reconstruction may also result in the removal of snag habitat. Due to the frequency of various harvests and fuelwood cutting near roads, snag availability has been generally shown to be one-third less within 200 meters of a road. If road density is high, there are few areas outside this 200-meter radius having natural snag levels; therefore, higher road density greatly increases the impacts of roads on snag availability. Prescribed burns proposed in the Twomile Resource Area would likely create additional snags presently and into the future.

Insects and diseases are prevalent in the Twomile Resource Area and continue to produce recruitment snags. The high incidence of insects and disease in the resource area currently provides some snag habitat, but the large-diameter snags preferred by many wildlife species are limited. There are many large live trees, which at some point in the future will provide large snags.

*Snag and Down Woody Habitat at the Coeur d'Alene Basin Scale*

Selective harvest for seral species and salvage logging has occurred both historically and in the recent past, particularly on private lands, within the Twomile Resource Area. Fire suppression and road construction has been ongoing. These types of activities have resulted in the changes to snag habitat across the Coeur d'Alene River Ranger District and to a lesser extent in the Twomile Resource Area:

- *Old stands have shifted to mature or mid-aged resulting in a loss of large diameter, durable snags.*
- *Direct removal of large diameter snags and green trees has lead to decreased snag availability and loss of seed sources.*
- *Longer fire intervals have resulted in large diameter snag loss rather than frequent non-lethal, mixed severity fires important to snag recruitment. Longer fire intervals have resulted in an increase in non-seral species that are more prone to insects and disease and are less likely to live long enough to provide large snags*
- *Patch size has decreased.*

Recognizing changes in snag habitat has lead to management plans designed to provide an amount of snags and down wood shown to support viable populations of species that use these habitat components.

*Snag and Down Woody Habitat at the Twomile Resource Area Scale*

Within the Twomile Resource Area, large-diameter standing and dead trees are less abundant than historically, and the wildlife species associated with these habitat components are probably less abundant as well. Large diameter snags provide habitat for the greatest variety of wildlife and remain standing longer than smaller snags. Ponderosa pine and western larch tend to last longer than other snags. Even after falling to the ground, large diameter snags provide critical habitat. Down wood is essential in providing den sites, cover and foraging substrate for a variety of species including lynx, fishers, pine martens and other small mammals. Many birds that nest in snags promote forest health by controlling forest insect populations.

**Fragmentation and Road Density**

One of the main habitat components considered in this analysis is road density. Road density affects the degree to which a species is vulnerable to disturbance and the degree to which the habitat has the potential for providing species needs. Openings associated with roads may act as a barrier to some species. For other species, roads affect movement patterns and the ability for dispersal. Often roads are in preferred wildlife habitat such as riparian areas, ridge tops and flat benches, resulting in displacement or decreased habitat suitability (Figure 3-WL-3). Roads increase habitat fragmentation and add to edge effects. The access provided by roads can cause direct and indirect mortality to wildlife. Direct mortality may result from vehicle collisions, incidental trapping and random shooting. Indirect mortality is caused primarily by the level of disturbance and by alteration of habitat.

***Figure 3-WL-3. Illegal ATV trail pioneered along a ridge in the Twomile Resource Area.***

The primary causes of fragmentation on forestlands are roads and regeneration harvests (which were once typically 40-acre blocks). Roads and urban development have caused fragmentation on private lands.

The current level of open road density in the Twomile Resource Area is a problem for wildlife species that can be affected by disturbance (please refer to PF Doc. WL-10; the Chapter 2 Transportation discussion, and Table H-4 in to Appendix H for more on road densities). Open road density does not include roads that are closed according to the Travel Plan for the District, but whose barriers or gates have been breached by unauthorized motor vehicles. Motorized use can be high on some of these breached closures. The percentage of closed roads on the District that are experiencing regular unauthorized use is high. If these roads and trails were added to the miles of open road, road density on the District and within the resource area would be much greater.

All roads that are constructed, reconstructed, or reconditioned for this project would be closed during and following project activities. Reconstruction would re-open roads that have been brushed in, earth-barriered or front-end obliterated (PF Doc. WL-9, WL-10, WL-11). These roads would be gated during project activities, and then returned to their former state of closure (for example, replacing barriers or decommissioning the road) after all project activities are complete. Short-term disturbance would be moderate to high depending on how effective the gates are. Over the long term, wildlife security would be improved with the installation of

barriers that discourage unauthorized use of roads and with implementation of watershed improvement projects that remove undersized culverts and decommission roads. Following project activities, there would be no increase in open road density in the Twomile Resource Area, but constructed roads would provide increased access even with barriers in place. Continued implementation of the District Travel Plan under all alternatives (including the No-Action Alternative) will better identify roads closed to motorized use and improve enforcement of existing closures. For more information on fragmentation and road density refer to the management indicator species discussion.

*Idaho Fish & Game (www2.state.id.us/fishgame).*

## *B. Gray Wolf (Endangered Species)*

Wolves are not known to occur in the Twomile Resource Area. One wolf pack is thought to possibly use the northeast edge of the Coeur d'Alene River Ranger District. The pack has been documented outside Noxon, Montana across the Bitterroot Divide. The Twomile Resource Area is adjacent to urban development so does not provide preferred habitat for wolves. Although a transient individual could use the area, the last wolf observation in the area was over 10 years ago. Activities proposed under the action alternatives would benefit wolf prey species by improving forage palatability and nutrition on winter range. Therefore, activities under this project **may affect, but would not likely adversely affect** gray wolves or gray wolf populations. Viability of the species would be maintained, since the goal to have 30 breeding pairs well distributed throughout three states for three successive years has been met (2001 wolf recovery report; PF Doc. WL-41).

## *C. Northern Goshawk (Old Growth Management Indicator & Sensitive Species)*

**Life History**

Goshawks occupy coniferous and mixed forests throughout much of the northern hemisphere (Wattel 1981 in Warren 1990; PF Doc. WL-R61). Goshawks prefer to nest in mature to over-mature coniferous forests with large trees, and canopy coverages of 60 to 80% (Hayward 1983, PF Doc. WL-R24; Saunders 1982, PF Doc. WL-R47). Other characteristics include a stand size greater than 25 acres, gentle to moderate slopes and small, scattered openings (Hayward 1983; PF Doc. WL-R24). North-facing slopes are often preferred for nesting (Hennessey 1978, PF Doc. WL-R25; Reynolds et al 1982, PF Doc. WL-R46), although ridges and benches are often used in the Coeur d'Alene River Basin, probably due to a shortage of gentler slopes. The species prefers single-storied to multi-storied stands with open understories for hunting (Hayward 1983, PF Doc. WL-R24). Goshawks use snags for hunting and consuming their prey. Prey species include small mammals, songbirds, and game birds such as grouse and waterfowl (Hayward 1990 in Warren 1990; PF Doc. WL-R22). Preferred home ranges are about 5,000 acres of contiguous forest (Warren 1990; PF Doc. WL-22). Goshawks are sensitive to disturbance, and may leave a nest if prolonged activity occurs nearby.

*Photo by Mike Lane (www.nature-photography.co.uk)*

**Management Recommendations for Northern Goshawk**

Region 1 has defined viability for the goshawk as one pair every 10,000 acres (Warren 1990; PF Doc. WL-R22). Recommendations have been established for management of the Northern goshawk in the Southwestern United States (Reynolds et al. 1992; PF Doc. WL-R46). These recommendations suggest goshawk home ranges are about 6,000 acres in size and consist of a nesting area of 20-25 acres, a post-fledgling family area of 400 acres, and a foraging area approximately the size of the home range.

- *Nest Areas - Three suitable and three replacement nest areas (of 30 acres each for a total of 180 acres) are established for each known pair of nesting goshawks. Nest areas include the stand with an active nest. Other suitable nest stands include alternate or historic nests followed by the best remaining nearby suitable habitat. The three replacement nest areas are established near the stand they are intended to replace and are selected based on the condition of the effective or suitable nest stand and the likely time frame needed to provide for a replacement area.*
- *Post-fledgling Areas – Post-fledgling areas provide cover from predators and sufficient prey to develop hunting skills for newly fledged goshawks (Reynolds et al. 1992; PF Doc. WL-R46). They are described as being about 400 acres in size and correspond to the defended territory of a breeding pair of goshawks (Kennedy 1991; PF Doc. WL-R32).*
- *Foraging Areas – The Southwest Guidelines recommended a vegetative stand structure of 20% old forest; 40% mid-aged and mature forest; 30% seedling, sapling and young forest; and 10% grasslands, forbs and shrubs.*

***Although goshawk populations are thought to be stable in Idaho, they are low in many western states, increasing the importance of existing habitat in Idaho.***

**Reference Condition for Northern Goshawk**

Little historical information is available for goshawks. Urbanization, road construction and timber harvest have decreased the quality of mature forests and riparian habitat in the resource area and across the forest. Losses of nesting habitat and decreased variety and abundance of prey species often tied to riparian areas indicates that goshawks may have historically been more abundant than they are today. In the majority of the western states, goshawks are considered to be on a downward trend, although populations appear to be stable in Idaho (Maj 1996; PF Doc. WL-R36).

***Affected Environment for Northern Goshawk***

Northern goshawks occur throughout the western United States and in several northeastern states. Nesting pairs of goshawks have been documented in several areas of the Coeur d'Alene River Basin. Field reviews by wildlife biologists found the Twomile Resource Area to be low in quality goshawk nesting and foraging habitat. In general, the overstory is below the optimal 60-80% canopy required for the goshawk. Brush in much of the area is high and would interfere with goshawk foraging flights. Field review found snags to be in short supply throughout the Twomile basin, reflecting the dry forest types found there (Northern Region Snag Management Protocol 2000, pp. 6-7; PF Doc. WL-R54). Large diameter overstory trees (generally ponderosa pine) can be found across the landscape in the drainage. A portion of the area is comprised of south-facing slopes with brush or open-growing Douglas-fir. The brush component hinders goshawks during hunting. The Twomile Resource Area is low on the mid-aged, seedling sapling, and grass/forb habitat components that are important for goshawk foraging habitat. Specifically, the Resource Area lacks forage habitat for the goshawk. Much of the potential prey habitat is found on private lands outside of the National Forest boundary. Development in these areas has greatly reduced habitat for prey species, primarily due to loss of riparian habitat.

As displayed in the table below, habitat queries found no currently **suitable** goshawk nesting habitat within the Twomile Resource Area. There are 395 acres of **future** ("capable") nesting `habitat in the analysis area, based on forest structure and continuity (model runs for goshawks dated 10/28/2003; PF Doc. WL-24, WL-45). Additional **future** "capable" nesting habitat exists adjacent to the resource area. Capable habitats do not currently provide for the needs of the goshawk, but could over time**.** Foraging habitat of at least 5,000 acres

was mapped around future nesting habitat. One nesting territory was mapped within the resource area (PF Doc. WL-45).

A juvenile goshawk was sighted in the vicinity of the resource area in August 2003 (District sighting records, PF Doc. WL-32). Because the Twomile Resource Area lacks suitable habitat for the goshawk, it is likely the juvenile was migrating to its winter habitat. Calling surveys were conducted in the area in 2002 and 2003, but with no response by goshawks.

***Table 3-WL-2. Goshawk Nesting Habitat in the Twomile Resource Area.***

| | Estimated Acres | Current "Suitable" Nesting Habitat (Acres) | Future "Capable" Nesting Habitat (Acres) |
|---|---|---|---|
| National Forest lands | 4,705 | 0 | 395 |
| Private lands | 2,887 | 0 | No information |

***Table 3-WL-3. Vegetative Stand Structure in Goshawk Foraging Areas of the Twomile Resource Area.***

| Vegetative Stand Structure | Desired Composition | Existing Composition |
|---|---|---|
| Mature/Old | 40% | 89% |
| Mid-aged | 20% | 8% |
| Seedling/Sapling | 10% | 3% |
| Grass/Forb/Shrub | 10% | 0% |

## Environmental Consequences for Northern Goshawk

The following effects analysis for northern goshawks uses two methods of assessment; 1) comparison to the Southwest Guidelines (Reynolds et al 1992; PF Doc. WL-R46) desired condition for goshawk foraging areas, and 2) modeling to determine the abundance, distribution and characteristics of nesting habitat within each foraging area and show the changes that would occur in nesting habitat based on the alternative management actions evaluated.

***No-Action Alternative:*** No short-term effects or changes would result from the implementation of Alternative 1. Over the long term natural mortality would result in snag and downed log recruitment. Some mature stands would move towards old growth however, many mature stands would never achieve old growth qualities due to insects and disease. The Resource Area would continue to provide habitat for one nesting pair of goshawks at some point in the next 50 years.

***Action Alternatives:*** With the implementation of any of the action alternatives, the area would continue to lack nesting habitat for the goshawk. Under all alternatives, only precommercial thinning and brushing activities would occur in future "capable" nesting habitat. These activities would remove younger (noncommercial) Douglas-fir and may result in lower canopy closure in the future. However, the sites where this treatment would occur are harsh and not classic goshawk habitat, so the activities are not anticipated to reduce future value of nesting habitat. These stands would still provide suitable nesting habitat in 25-50 years. All alternatives would maintain mature/old structure above historic range (Table 3-WL-2, Table 3-WL-3). The Twomile Resource Area would continue to exceed the optimal amount of mature/old class structure for goshawks.

***Table 3-WL-4. Percent Change in Vegetative Stand Structure for each Goshawk Foraging Area After Implementation, by Alternative.***

| Age Class | Desired Vegetative Stand Structure | Alternatives 1 and 4 | Alternative 2 | Alternative 3 |
|---|---|---|---|---|
| Mature/Old | 40 | 89 | 75 | 74 |
| Mid | 20 | 8 | 7 | 7 |
| Seed/Sap | 10 | 3 | 18 | 19 |
| Grass/Forb/Shrub | 10 | 0 | 0 | 0 |

***Cumulative Effects to Northern Goshawk:*** Implementation of the District's new Travel Plan may increase security district-wide for the goshawk during critical nesting periods. Managing ATV use along specific corridors and eliminating other pioneered ATV trails could protect post fledgling habitat from disturbance.

Private lands within the analysis area were not considered as habitat for the goshawk during the analysis. These private lands probably do not provide nesting habitat, but may provide habitat for the prey of the goshawk.

Reasonably foreseeable precommercial thinning in the analysis area would promote a larger diameter tree and, in approximately 100 years, these areas could provide suitable nesting habitat for the goshawk.

Under all alternatives, habitat would continue to be both low in quantity and quality. The area would continue to provide some forage habitat and nesting habitat in the future (Goshawk Habitat Map, PF Doc. WL-45). Since no activities would affect suitable habitat and goshawks are not known to nest in the vicinity **all alternatives would impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or the species.** The Region 1 viability criteria of 1 goshawk nesting pair for each 10,000 (Warren 1990, PF Doc. WL-R61) acres would continue to be met with the implementation of all alternatives. Adhering to R1 snag protocol (which exceed IPNF Forest Plan), maintaining dry site old growth on the landscape, maintaining 10% old growth across the forest (USDA 2000, PF Doc. WL-R54, WL-41) (IPNF 1987, PF Doc. WL-R53, WL-41), and implementing the mitigation measures described in Chapter 2 (2.6.9 Mitigation, Mitigation to Reduce Effects to Wildlife) would ensure the viability of the goshawk within the Twomile Resource Area.

## *D. Flammulated Owls & White-headed Woodpeckers (Sensitive Species)*

Due to similar habitat requirements, flammulated owls and white-headed woodpeckers are addressed together. Both species inhabit the same open, old ponderosa pine stands as flammulated owls, and rely on large diameter ponderosa pine for foraging and for nesting in cavities.

*Flammulated Owl (Source: National Image Library - //images.fws.gov).*

**Life History of Flammulated Owls and White-Headed Woodpeckers**

Flammulated owls are a neotropical migratory species with a range that extends from the Canadian border through Mexico, including Washington, Wyoming, Idaho, California, Nevada, Utah, Colorado, New Mexico, Texas, and Arizona (Johnsgard 1988 in Atkinson 1990; PF Doc. WL-R68). This species is the only forest-dwelling owl in Idaho classified as a neotropical migrating long distances. White-headed woodpeckers migrate short distances locally.

Flammulated owls and white-headed woodpeckers seem to prefer old growth ponderosa pine habitats, sometimes mixed with Douglas-fir (Bergman, 1983**;** PF Doc. WL-R4). Bull (et.al) found that flammulated owls tended to nest in old growth ponderosa pine stands (1990; PF Doc. WL-R8). Moths make up the largest part of flammulated owl diets, with grasshoppers, beetles and other insects making up the rest (Bergman 1983; PF Doc. WL-R4). White-headed woodpeckers rely on insects as well. Hayward (1986; PF Doc. WL-R23) found that an incubating owl consumed about 22 insects per day.

*White-headed Woodpecker (Source: National Image Library - //images.fws.gov).*

White-headed woodpeckers are primary cavity nesters and excavate their own nesting structure. Flammulated owls are secondary cavity nesters relying on medium to large woodpecker species (such as flickers, sapsuckers and pileated woodpeckers) to excavate their nesting cavity (Reynolds et.al. 1987; PF Doc. WL-R45). As cavity nesters, these species are especially vulnerable to forest management and firewood cutting, which can eliminate snags (Bergman 1983; PF Doc. WL-R4).

***Figure 3-WL-4. A typical flammulated owl nest and surrounding habitat.***

**Management Recommendations for Flammulated Owls and White-headed Woodpeckers**

Excavated snags greater than 20 inches diameter are most commonly used by nesting flammulated owls (Goggans 1986, PF Doc. WL-R17; Hayward 1986, PF Doc. WL-R23; Bull et. al. 1990, PF Doc. WL-R8). Nearly all nesting occurs in mature or old growth stands dominated or co-dominated by ponderosa pine and Douglas-fir (Bull and Anderson 1978, PF Doc. WL-R6; Goggans 1986, PF Doc. WL-R17; Hayward 1986, PF Doc. WL-R23; Howie and Richie 1987, PF Doc. WL-R26). Reynolds and Linkhart (1987; PF Doc. WL-R45) found all but one nest site in forests with ponderosa pine at least present in the stand.

Nest sites commonly occur on ridge tops, benches, flats, mid-slopes or drainage bottoms with slopes less than 55 percent. Hayward found the owls nesting in ponderosa pine with 16 snags per acre, and 20 trees per acre greater than 20 inches diameter. Goggans (1986, PF Doc. WL-R17) found that nest site canopies had less than 55 percent canopy closure, and Hayward (1986, PF Doc. WL-R23) recommended a minimum canopy closure of 35 percent. Based on these studies, in order to maintain suitable flammulated owl habitat, silvicultural prescriptions should lead to the retention of old ponderosa pine with an average of 20 inches in diameter (minimum 17 inches) such that upper canopy closure ranges from 35 to 55 percent. Region 1 protocols for snag retention are used to maintain sufficient snag habitat in areas where forest management occurs (USDA 2000; PF Doc. WL-R54).

***Figure 3-WL-5. Fire scar on a ponderosa pine within flammulated owl habitat on the District.***

**Reference Condition for Flammulated Owls and White-headed Woodpeckers**

There are no historical records of these species specifically, but the Interior Columbia Basin Assessment (Quigly et.al. 1996; PF Doc. WL-R44) found that the amount of interior ponderosa pine forest maintained by frequent, low intensity

fires has declined by 80 percent. A regional study by the National Fire Plan Cohesive Strategy Team in Region 1 (2002; PF Doc. WL-R69) suggests that 12-18% of the historical pine stands currently exist.

The Geographic Assessment determined that historic amounts of dry-site large/mature and old growth ponderosa pine and large, old Douglas-fir were more common in the Coeur d'Alene River Basin than under current conditions. Records for the Coeur d'Alene Basin and the Twomile Resource Area indicate that open ponderosa pine stands had a larger distribution than today throughout the Resource Area and across the IPNF.

Historic photographs of the Rathdrum Prairie indicate much larger and continuous stands of ponderosa pine with a well-stocked larger diameter overstory was found at the lower elevations in the Coeurd'Alene basin.

***Figure 3-WL-6. Historic ponderosa pine stand on the Rathdrum Prairie.***

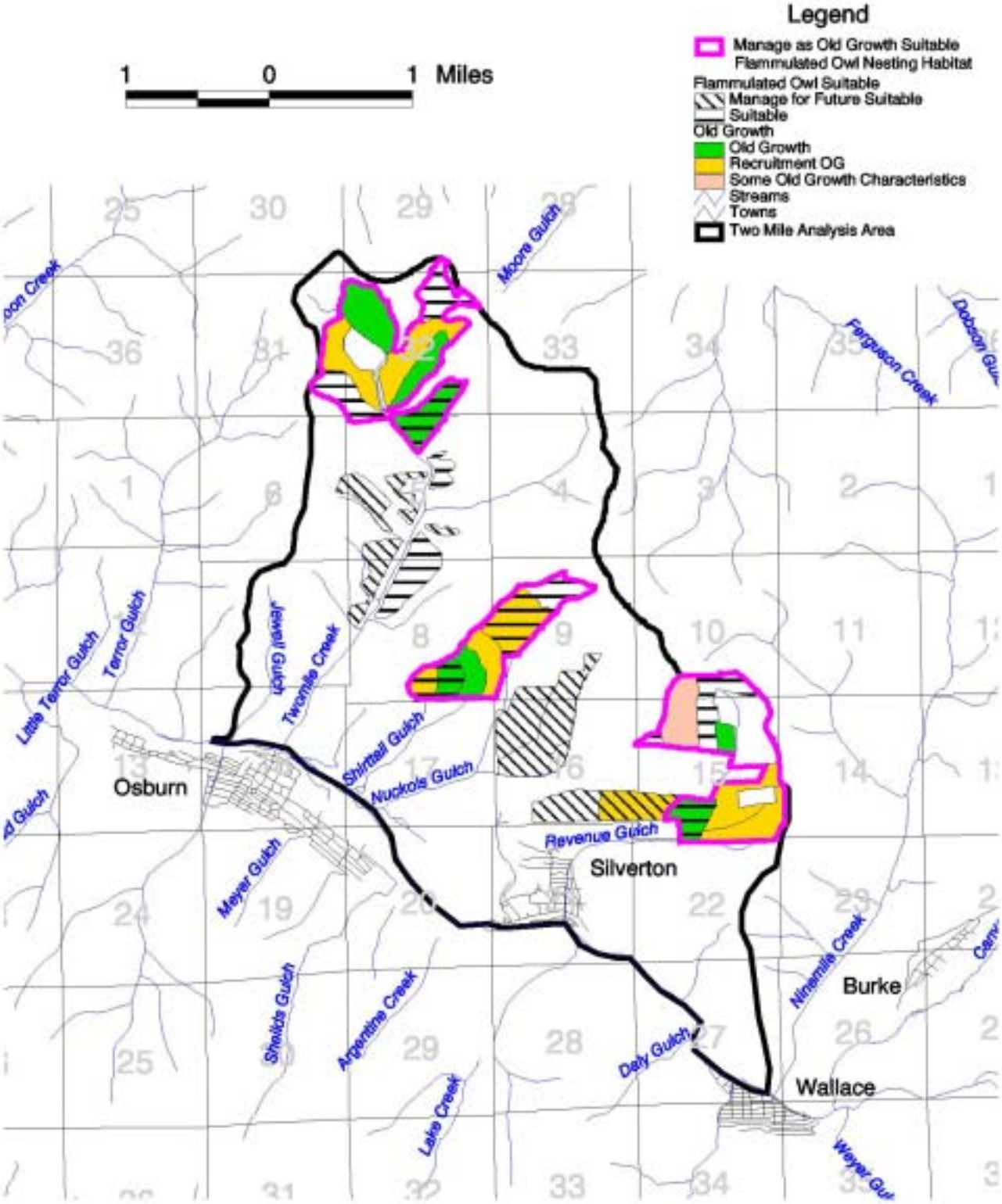
***Figure 3-WL-7. Open canopies in the Twomile Resource Area (such as those preferred by flammulated owls).***

Historically, the Rathdrum Prairie provided flammulated owl and white-headed woodpecker habitat (Refer to Figure 3-WL-4). It is expected that there were greater numbers, larger distribution and more stable populations both locally and on the broad scale at that time. Much of the historic ponderosa pine habitat on the Rathdrum Prairie is now gone due to agriculture and urban expansion. This loss of habitat places greater importance on national forest dry forest habitat like that found in Twomile.

**Affected Environment for Flammulated Owls & White-headed Woodpeckers**

Ponderosa pine and Douglas-fir stands in the watershed appear to provide some of the best flammulated owl habitat found on the Coeur d'Alene River Ranger District. Ponderosa pine is the primary component on dry ridges. In stands lower on the slope, ponderosa pine is widely scattered with encroaching Douglas-fir and grand fir. Field surveys found very large, old ponderosa pine scattered throughout the Twomile Resource Area, many surrounded by stands of Douglas-fir (Figure 3-WL-7). Some of these ponderosa pine trees are 40 to 50 inches in diameter. Habitat modeling shows 905 acres of suitable flammulated owl habitat in the resource area. There are 1,903 acres of potential habitat that could become suitable for these species over the long-term. Potential habitat includes all suitable habitat. Flammulated owls were given a moderate probability of occurrence in the resource area because there are large blocks of suitable habitat, and potential habitat exists. No reports of the species have been reported on the District, but a sighting was recently reported along the lower sections of the Coeur d'Alene River. White-headed woodpeckers were given a low probability of occurrence because although some habitat occurs in the resource area as described for flammulated owls, observations of this species in the Coeur d'Alene Basin and surrounding area are very limited with only one known confirmed sighting.

***Figure 3-WL-8. Existing Flammulated Owl Habitat and Old Growth Stands in the Twomile Resource Area.***



Surveys for flammulated owls in the Twomile Resource Area were conducted in 1994 and in 2002 (PF Doc. WL-38). No flammulated owls were detected during these surveys. Surveys for white-headed woodpeckers were also conducted in 2002 with no observations recorded (PF Doc. WL-38).

**Environmental Consequences to Flammulated Owls & White-headed Woodpeckers**

Habitat for these species was evaluated using a habitat suitability model derived from data in the Forest timber stand database (TSMRS). Specifics of the model can be reviewed in the wildlife project file (PF Doc. WL-26). Impacts were assessed by predicting changes in current habitat and snag availability under each alternative.

***Under all action alternatives, specific mitigation measures would be applied to protect goshawk nesting and foraging habitat (Chapter 2, Features to Protect Wildlife Habitat and Mitigation to Reduce Effects to Wildlife).***

***Figure 3-WL-9. Scattered ponderosa pine with a dense understory and encroaching Douglas-fir.***

***Table 3-WL-5. Suitable Flammulated Owl/White-headed Woodpecker Habitat Reduced to Potential Habitat after implementation of alternatives.***

| | Alternatives 1, 2 and 4 | Alternative 3 | Amount of Change |
|---|---|---|---|
| Suitable Habitat | 642 | 497 | - 145 acres |
| Potential Habitat | 1,716 | 1,861 | + 145 acres |

Direct and Indirect Effects Under Alternative 1: There would be no short-term change to suitable or potential flammulated owl habitat under the No-Action Alternative. Over time, database modeling shows that stands would decrease in canopy closure. Stands that now have 60 percent canopy closure are predicted to decrease to half that over the next fifty to one hundred years as a result of mortality related to current high insect and disease occurrence in the resource area (refer to the Vegetation section of this chapter for more detail). As these canopies decrease the stand would continue to provide habitat for the flammulated owl until stand characteristics decline. Over the short term, this alternative would result in retention of all suitable habitats.

With reductions in the seed source and competition with Douglas-fir and other species such as grand fir, the potential for dry-site stands in the resource area to become suitable over the long term in the absence of management (under the no action alternative) is low. Due to the density of Douglas-fir and grand fir and the loss of fire tolerant species to harvest, seed sources have been lost. The potential for stand replacing fire would be highest under Alternative 1 (please refer to the Fire/Fuels section of this document for further discussion).

***The following action alternatives propose restoring fire as an ecological process in the watershed. Flammulated owls and white-headed woodpeckers are closely tied to dry-site ecosystems that evolved with fire. Any suitable or potential habitat for these species would benefit from the reintroduction of fire, which would maintain habitat. The long-term goal of this project is to restore fire adapted ecosystems. These are the habitats preferred by flammulated owls and white-headed woodpeckers. No snags are planned for harvest – in fact, fire is likely to create additional snags. Restoration of ponderosa pine would eventually benefit flammulated owls and white-headed woodpeckers.***

Direct and Indirect Effects to Flammulated Owls/White-headed Woodpeckers Under Alternative 2: This alternative would establish large blocks of dry habitat old growth and suitable flammulated owl habitat. The size of these blocks is based on the Montana Partners in Flight Bird Conservation Plan for the flammulated owl (2000, PF Doc. WL-R39), which recommends managing flammulated owl habitat in blocks large enough to accommodate multiple home ranges with suitable habitat. Flammulated owls appear to occupy habitat in clusters across the landscape (Montana Partners in Flight 2000; PF Doc. WL-R39). Alternative 2 was designed to protect from harvest activities all **suitable** flammulated owl habitat within the Twomile Resource Area..

The four blocks of suitable flammulated owl habitat and old growth provide a total of 487 acres of suitable flammulated owl habitat and 748 acres of old growth, and range in size from 161 to 446 acres (Old Growth/Flammulated Owl Habitat Patches, PF Doc. WL-20 and WL-21). These blocks would not be treated with any commercial harvest under Alternative 2 and are intended to provide flammulated owl and white-headed woodpecker habitat for about the next 50 years, until the stands begin to fall apart and no longer meet the needs of these two species.

Approximately 57 acres of suitable habitat would be treated for fuels reduction with slashing and/or underburning. Ponderosa pine would be retained on the site and sapling Douglas-fir and grand fir are slashed. These stands would then be underburned. The ponderosa pine would increase in size over time and these stands would provide habitat for the flammulated owl and white-headed woodpecker for the long term (50-150 years).

Various treatments would also occur in future (capable) habitat. These areas do not currently provide habitat for the flammulated owl. Treatments would promote large ponderosa pine and some large Douglas-fir. Over the long term (50 to 100 years), these areas should provide suitable habitat for the flammulated owl.

Direct and Indirect Effects to Flammulated Owls/White-headed Woodpeckers Under Alternative 3: Alternative 3 was designed to focus on reducing fuels in the wildland urban interface, not to provide old growth and flammulated owl blocks for flammulated owl nesting. Alternative 3 shows an increase in potential habitat because harvest would occur in some of the suitable habitat, which would reduce it to potential habitat. This alternative would treat 145 acres of suitable flammulated owl habitat with shelterwood or group shelterwood harvest methods (Table 3-WL-5). The shelterwood harvest method alters flammulated owl habitat by reducing canopies, understories and the Douglas-fir component. These stands would not provide suitable habitat for the flammulated owl for a period of 50 to 100 years. In addition to the shelterwood treatments, 112 acres of suitable habitat would be slashed and underburned. It is not anticipated that this activity would impact flammulated owl habitat. Historically flammulated owl habitat burned at periodic intervals. Various treatments would also occur in future (capable) habitat. These areas do not currently provide habitat for the flammulated owl. Treatment would promote large ponderosa pine and some large Douglas-fir. Over the long term (50 to 100 years), these areas should provide suitable habitat for the flammulated owl.

Direct and Indirect Effects to Flammulated Owls/White-headed Woodpeckers Under Alternative 4: This alternative would treat stands with a combination of slashing and/or underburning. No commercial harvest would occur. Alternative 4 would have slash/underburn treatments in four suitable flammulated owl stands totaling 95 acres. All large diameter trees would be retained. Underburning could result in some mortality of trees within the stand. These would still provide snags and structure within the stand. However, loss of canopy that could occur due to mortality could alter the stand characteristics and trend the area towards larger ponderosa pine. These dry-site stands, historically, were maintained by frequent low intensity ground fires that retained the seral species (usually ponderosa pine) and reduced understories. These stands would provide suitable flammulated owl habitat in both the short and long term. Burning would also stimulate growth of brush species. Currently much of the brush in the Twomile Resource Area is tall and in a decadent condition. Burning should kill some of the older brush and produce new growth. These shrubs are host species for moths, which make up much of the flammulated owls' prey base.

Cumulative Effects to Flammulated Owls and White-headed Woodpeckers: Reduction in flammulated owl habitat has occurred throughout the Coeur d'Alene River Basin, particularly on the Rathdrum Prairie and on lower elevation private lands in the Twomile Resource Area as a result of urban development and private timber harvest. Timber harvest, salvage logging, fuelwood gathering, road construction and fire suppression have all played a role in the declining size and distribution of stands that provided suitable habitat for the species on public lands.

Lower elevation private lands likely had the best habitat for flammulated owls and white-headed woodpeckers in the Twomile Resource Area historically. Activities on private lands and reductions in ponderosa pine habitats on these private lands have probably contributed to decreased abundance of flammulated owls and white-headed woodpeckers and placed more importance on the dry forest habitat on National Forest System lands in the drainage. Extensive broadcast vocalization surveys across the District over the past 5 years have never resulted in a confirmed observation of this species.

Today the value of open ponderosa pine stands, which evolved with fire, is becoming more widely recognized. Currently, most proposed projects in ponderosa pine habitats have the objective of restoring this conifer species and the ecological processes that maintain it. This should result in a trend towards improved habitat for wildlife species dependent on this habitat on both the small scale and the large scale.

Reasonably foreseeable precommercial thinning projects within the Twomile Resource Area will trend the area towards larger ponderosa pine, improving habitat for the flammulated owl. Timber harvest on private lands will likely reduce mature dry forest habitat for the flammulated owl within the Twomile Resource Area.

There would be no reduction in suitable habitat for the flammulated owl with the implementation of Alternatives 1, 2 or 4 (Table 3-WL-5). **Implementation of Alternative 2 or 4 may impact individual flammulated owls but would not trend the species towards listing.** (Alternative 4 may impact individual owls due to the proposed burning activities.) Viability concerns would be addressed under either alternative, because there would be no reduction of the already below historic levels of suitable flammulated owl habitat across the landscape. In addition, habitat would be provided to accommodate multiple nesting territories, R1 snag protocol would be followed (exceeding IPNF Forest Plan standards), dry site old growth would be maintained on the landscape, and 10% old growth would be maintained across the IPNF (USDA 2000; PF Doc. WL-R54)) (IPNF 1987; PF Doc. WL-R53, WL-41).

The same snag guidelines would be applied under all alternatives. However, Alternative 3 would reduce suitable habitat for the flammulated owl by 145 acres. These treatment areas would not provide habitat for the flammulated owl for approximately 50 to 100 years. This would be a substantial loss of habitat, since only 10% of historic habitat remains across the Coeur d'Alene River basin. The additional loss of suitable flammulated owl habitat under **Alternative 3 would impact the flammulated owl and trend the flammulated owl towards listing.** Viability would not be assured under Alternative 3.

## *E. Black-backed Woodpecker (Sensitive Species)*

### Life History of Black-backed Woodpeckers

Black-backed woodpeckers forage for insects in the bark of live trees such as lodgepole pine and larch. Some studies indicate that they also prefer to forage on burned snags (Dixon et. al. 2000; PF Doc. WL-R16), and may be concentrated in areas that have recently burned. Post-fire habitat is thought to have the greatest value as source habitat for black-backed woodpeckers (O'Connor et al. 2001; PF Doc. WL-R41). They forage in various levels of the canopy, from ground level to 60 feet high or more (Jewett, et al. 1953; PF Doc. WL-R28). The species could inhabit the Resource Area. Larch and lodgepole pine, which is preferred breeding habitat, are found in low amounts in the Resource Area. Root disease has resulted in insect infestations that provide foraging opportunities for the black-backed woodpecker in the resource area (Draft Assessment – BBWP; R1-11-5-2003; PF Doc. WL-R58).

*National Image Library (//images.fws.gov).*

**Management Recommendations for Black-backed Woodpeckers**

Specific management recommendations for this species support re-introduction of fire into the ecosystem, particularly in larch. Adhering to the Region 1 snag management protocol (USDA 2000; PF Doc. WL-R54), and to the snag guidelines developed in association with the Upper Columbia River Basin (UCRB EIS as described in Bull et. al. 1997, UCRB EIS, Appendix K; PF Doc. WL-41) would maintain snag availability for black-backed woodpeckers under all alternatives.

**Reference Condition for Black-backed Woodpeckers**

Black-backed woodpeckers are found within coniferous forests of North America including the Cascade Range, northern portions of the Sierra Nevada and the Rocky Mountains (Washington Department of Wildlife 1991; PF Doc. WL-R62). Black-backed woodpeckers have been found in scattered locations throughout Washington state, with the heaviest concentrations east of the Cascade crest. Their distribution in Idaho is largely unknown. The species has been sighted during their breeding season on the Coeur d'Alene River Ranger District.

There is little information about historic sightings or populations of black-backed woodpeckers. It is likely that their habitat has declined over the past century because of their preference for post-fire habitats and ongoing fire suppression for that time period. Fire exclusion has potentially reduced the amount of young stands that originated from wildfire. Lodgepole pine may have had greater distribution and occurred in larger patches across the forest prior to fire suppression as this conifer species relies on fire to open cones and allow seeds to regenerate. Although the role of white pine in providing black-backed woodpecker habitat is largely unknown, this species may have used white-pine snags when it existed in large blocks across the basin. Studies in Region 1 suggest that from 1940 to 1987, black-backed woodpecker habitat was below the historical range of variation in the region. From 1989 to the present black-backed woodpecker habitat is thought to be well above the historic range on a regional scale as a result of the frequent high intensity fires that have occurred since that time (USDA 2003; PF Doc. WL-R58).

**Affected Environment for Black-backed Woodpeckers**

Although some habitat exists for this species, the Twomile Resource Area is inherently low in habitat for black-backed woodpeckers due to the lack of lodgepole pine and larch. Larch is scattered across the Resource Area and lodgepole is found primarily along Brown's Ridge and at Twomile Saddle. Little information is available on the benefits of white pine to wildlife, but such stands may have historically provided habitat for black-backed woodpeckers in the Resource Area. Besides the lack of lodgepole and larch, another concern is the low numbers of large-diameter snags within the Twomile Resource Area, primarily on private lands, as a result of past harvest practices (based on field review by district wildlife biologist and discussions with district silviculturist; PF Doc. WL-54). Database queries indicate limited habitat for the black-backed woodpecker. There are 14 acres of black-backed forage habitat and 543 acres of nesting habitat within the resource area. There are an additional 247 acres of burns (black-backed woodpecker habitat table; PF Doc. WL-1). However, these stands were burned in 1999 and may no longer provide optimal burn forage habitat. Post fire habitat is a short-lived resource for foraging black-backed woodpeckers. Abundance of woodborers in burned trees begins to decline after 3 years, with substantial declines after 5 to 6 years (O'Connor et. al. 2001; PF Doc. WL-R41). The queries underestimate black-backed woodpecker habitat, because the current model does not include pine beetle outbreaks that contribute to foraging opportunities. Most of the mountain pine beetle activity is in the Browns Ridge and Twomile Saddle areas (Insect & Disease map 2002; PF Doc. WL-2).

### Environmental Consequences for Black-backed Woodpeckers

The potential effects on black-backed woodpeckers and other snag dependent species were determined by estimating the change in distribution, quantity and quality of snag habitat as a result of the alternative management actions. Nesting and foraging habitat were modeled using stand data and fire occurrence. Under all alternatives, treatment in forage habitat would still maintain the forage habitat. Under Alternatives 2 and 3, shelterwood and group seedtree harvest prescriptions would reduce value of the burns and nesting habitat for black-backed woodpecker.

***Table 3-WL-6. Acres of Black-backed Woodpecker Habitat Remaining After Treatment.***

| Type of habitat | Existing (acres) | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|
| Forage | 14 | 14 | 14 | 14 |
| Burns | 247 | 139 | 81 | 266 |
| Nesting | 543 | 462 | 462 | 543 |

Direct and Indirect Effects to Black-backed Woodpeckers Under the Alternatives: Since this area provides less than optimal black-backed woodpecker habitat, there would be limited effects upon black-backed woodpecker habitat under any alternative, including the No-Action Alternative. No short-term effects or changes would result from the implementation of Alternative 1. Over the long term, natural mortality due to insects would result in snag recruitment. Some mature stands would move towards old growth, while others may deteriorate before they meet old growth criteria. Under the action alternatives, treatment in forage areas would serve to maintain the forage habitat. Despite proposed burning activities, Alternatives 2 and 3 would result in a slight reduction in black-backed woodpecker nesting habitat due to the shelterwood and group seedtree harvests near Twomile Saddle. Alternative 4 would increase habitat for the black-backed woodpecker as a result of proposed burning activities (Table 3-WL-6).

Cumulative Effects to Black-backed Woodpeckers Under the Alternatives: Past harvest and historic fires have reduced the number of large snags across the Coeur d'Alene River Basin. The Twomile Resource Area reflects this loss of snags in the landscape. Over the long term, implementation of the District's new Travel Plan will protect some snags from harvest by firewood gatherers. Private lands within the Twomile Resource Area may provide some habitat for the black-backed woodpecker, however these lands were not considered in the analysis since the Forest Service has no authority over future management of these lands. Reasonably foreseeable timber harvest on private and BLM lands will cause some reductions in black-backed woodpecker habitat.

Over time, precommercial thinning within the Twomile Resource Area would provide a larger diameter tree for black-backed woodpecker foraging. In untreated areas, forest pests and diseases would continue to provide foraging opportunities for the black-backed woodpecker. Fire scorched trees provide an important source habitat for black-backed woodpeckers. Site treatment (burning) prior to planting could have some beneficial impacts for the black-backed woodpecker by creating forage habitat. Salvaging fire scorched trees could have a detrimental impact on the black-backed woodpecker (O'Connor et al. 2001, p. 14, PF Doc. WL-R41). Under any action alternative, in the event incidental trees are fire scorched during site preparation activities, these fire-scorched trees would be retained for black-backed woodpecker habitat (Chapter 2, Mitigation).

Mountain pine beetle infestations would continue to provide foraging habitat for the black-backed woodpecker. Under alternatives where shelterwood harvests are implemented (Alternatives 2 and 3), mature trees would be retained that would provide some black-backed woodpecker habitat in the future. These retained trees would also provide a future snag component and provide another age class as the stand regenerates. Adhering to snag guidelines developed in association with the Upper Columbia River Basin (UCRB EIS as described in Bull et. al. 1997; PF Doc. WL-41), which would leave 4 to 6 snags per acre in harvest units, would help to ensure viability of black-backed woodpeckers (UCRB EIS, Appendix K; PF Doc. WL-R52) under all alternatives.

Although Northern Idaho is below the historic range for burned habitat on the landscape, large fires in Montana in 2002 and 2003 have created a source habitat for black-backed woodpeckers in the Northern Rockies Region and burned habitat is now above historic levels in Montana. Therefore, the implementation of any of the 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.**

## *F. Fisher (Sensitive Species)*

**Life History**

*Source: www.fs.fed.us/r1/cohesive_strategy.*

Fishers are associated primarily with northern coniferous forests (Powell 1982 in Arthur 1989; PF Doc. WL-R42). These species inhabit late successional coniferous forests preferring old growth or spruce-fir stands (Spencer 1981, PF Doc. WL-R50). Fishers den in hollow logs, under rocks, and in holes in trees. They are mostly arboreal and hunt in the trees. However, they also forage on the ground.

Today, the range of the fisher in the United States includes portions of the Appalachian Mountains from New England south to West Virginia, northern Wisconsin, Minnesota, Michigan, northern Idaho, western Montana, and as far south as northern California along the West Coast (Allen 1983 in: Washington Department of Wildlife 1990; PF Doc. WL-R1).

**Management Recommendations for Fisher**

Witmer et al (1998; PF Doc. WL-R64) describes the four major issues of concern to fisher conservation and management in the Columbia River basin in "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates":

- ***Conservation of late successional forest at low to mid elevations*** - Past decades of land management activities in the Coeur d'Alene basin have fragmented forest habitat, thereby reducing the contiguous area and creating barriers to movement. Fishers can probably tolerate small patch cuts or other small-scale disturbances, provided these occur in a larger matrix of relatively dense, closed canopy, late successional forest (Powell and Zielinski 1994, p. 64; PF Doc. WL-R43). The Habitat Conservation Assessment and Conservation Strategy for Forest Carnivores in Idaho" (Gibilisco et.al. Idaho Fish and Game. 1995. PF Doc. WL-R70) state that drainages with moderate quality fisher habitat should be managed for 40% late successional habitat in preferred or suitable habitat types for fisher.
- ***Maintenance of links between populations*** - Barriers to movement may include large non-forested openings and highways.
- ***Maintenance of riparian corridors*** – Waterways and riparian habitat provide travel corridors and often are found at the lower elevations fishers prefer within a given area.
- ***Trapping pressure and human disturbance*** - Fisher trapping in Idaho is closed. Road densities of less than 1 mile per square mile are a deterrent to incidental trapping of fisher.

**Reference Conditions for Fisher**

The status of the fisher in the Western United States is poorly known but generally perceived as precarious and declining (Powell and Zielinski 1994 in USDA 1998, WL-R43) therefore, current populations may be extremely vulnerable to local and regional extirpation because of their lack of connectivity and their small numbers (USDA Forest Carnivore Conservation and Management in the Interior Columbia Basin 1998, page 14, WL-R64).

Large fires between 1910 and 1934 were probably responsible for declines in fisher in Idaho (Jones 1991 in Idaho Fish and Game 1995; PF Doc. WL-R29). Fishers are also susceptible to over trapping and habitat loss. During the late 1800's and 1920's, fisher pelts were worth up to $300 and demand was high. Over trapping, habitat losses from settlement and logging, and the widespread use of poisons as a predator control agent caused population reductions in many areas (Heinemeyer 1995 in Idaho Fish and Game; PF Doc. WL-R70).

**Affected Environment for Fisher**

***Late Successional Forest:*** If 40 percent of a drainage is in late successional stage, the drainage provides moderate quality habitat for fishers (Idaho Fish and Game et. al. 1995, PF Doc. WL-R70; and USDA Forest Service, Douglas-fir Beetle Project Final EIS [Fisher Methodology]; PF Doc. WL-R57).

Historically in the Coeur d'Alene River Basin late successional stage forests (mature and old growth) were found across 23% to 55% of the landscape (mean value of 46%) (Geographic Assessment, Appendix A: Report #2; PF Doc. WL-R71). The loss of late successional habitat in the Coeur d'Alene Mountains is probably the most important issue for the fisher in this area. Currently, across the Coeur d'Alene Basin about 31% of the forest is in late successional stage (mature and old growth) forest (Geographic Assessment, p. 39; PF Doc. WL-R71).

Despite a high amount of late successional forest in the Twomile Resource Area, no suitable habitat for the fisher exists within the Twomile analysis area. Late successional forest habitat in the Twomile Resource Area exceeds the historic range, probably due to surrounding private lands and topography, which limited commercial harvest in the area. However, within the Twomile analysis area the larger trees and late successional forest are found primarily in the dry habitat types that do not provide optimal habitat for the fisher and not considered suitable habitat (PF Doc. WL-17). There are 718 acres of future fisher habitat within the Twomile Resource Area . This future habitat does not currently meet the needs of the fisher due to young age, open canopies or lack of large snags.

***Linkages:*** In "Forest Carnivores in Idaho Habitat Conservation Assessments and Conservation Strategies" (1995, Figure 1, page 32; PF Doc. WL-R70), Idaho Fish and Game mapped the Coeur d'Alene Mountains as fisher habitat. The only linkage corridor mapped on Coeur d'Alene River Ranger District is the St. Joe Divide. The Twomile watershed is outside any major linkage for forest carnivores. Interstate 90, just south of the Resource Area, is an obstacle to wildlife movement, and may result in isolated populations.

***Riparian Habitat:*** The quality of riparian habitat in the Twomile Resource Area has been reduced by road construction. Road construction in riparian areas has had large impacts on streams throughout the Coeur d'Alene River Basin.

***Trapping Risks:*** Trapping fisher is illegal in Idaho. However, the proximity of the Twomile Resource Area to urban developments may increase the potential for incidental trapping risks. The area receives some recreational use, which increases the potential for disturbance. The largest population of fisher in Idaho appears to occupy the area north of the Salmon River to the Silver Valley (J. Jones, USFS Eastside Assessment Team, May and Garton 1994, all in Idaho Fish and Game 1995; PF Doc. WL-R47, 70). Reports of fisher are few north of the Silver Valley (P. Harrington, IPNF; May and Garton 1994 all in Idaho Fish and Game 1995; PF Doc. WL-R70). Fishers have been trapped in the past on the Coeur d'Alene River Ranger District, confirming their presence. No fishers have been reported in the Twomile Resource Area, but there are periodic reported observations to the north and east.

Since the Twomile Resource Area is of insufficient size to provide for a home range of a fisher, analysis for the fisher includes habitat outside the analysis area. A query for fisher habitat (late successional forest at low to mid elevations) in and around the Twomile Resource Area found 7,398 acres of future (capable) habitat (See map PF Doc. WL-49). Of this capable habitat, approximately two-thirds would be suitable for fishers in 50 years or less. Within the analysis area there are 3,852 acres of future fisher habitat. Most of these stands are too open to qualify as suitable fisher habitat. The habitat is well dispersed across Twomile Resource Area. Very little of the habitat is found along the riparian corridors. The lack of riparian fisher habitat and the mix of urban interface reduce the value of the Resource Area to fisher.

**Environmental Consequences for Fisher**

The major issues of concern for fisher as described in the Columbia River basin "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates" (Witmer et al 1998; PF Doc. WL-R64) are analyzed using TSMRS data, delineated corridors and security areas (GA) and roads information. TSMRS data was also used to describe late successional habitats used by fishers in the Twomile Resource Area.

As shown in the table below, the percentage of late successional forest would not change over the short term under Alternatives 1 and 4; however, the vegetation analysis shows canopy closure in the area declining rather than increasing over the long term, which could decrease the value of existing late successional forests. Under Alternative 4, underburning would occur in 157 acres of future fisher habitat, which may create additional snags and downed logs for fisher habitat, but should not result in any negative impacts to future fisher habitat.

***Table 3-WL-7. Acres of Late Successional Stage Forest in the Twomile Resource Area resulting from implementation of alternatives.***

| Structural Stage | Historical Range across the Coeur d'Alene Basin | Alt. 1 and 4 | Alt. 2 | Alt. 3 |
|---|---|---|---|---|
| Late Successional Acres | NA | 4,188 | 3,530 | 3,482 |
| Percent of Total Area | 23%-55% | 89% | 75% | 74% |

Under Alternative 2, 448 acres of future fisher habitat would have shelterwood, group shelterwood or thinning treatments, all of which would increase the time necessary for these stands to provide suitable fisher habitat. In addition there would be a reduction of 658 acres of late successional stage habitat. Similar treatments would occur on 385 acres of future fisher habitat under Alternative 3, with similar impacts. In addition there would be a reduction of 706 acres of late successional stage habitat. Under both Alternatives 2 and 3, forested habitat should provide larger diameter trees in the future (50-100 years) due to reduced competition.

Under all alternatives, large patches of unroaded habitat in the Upper Coeur d'Alene River would provide security for the fisher and other large ranging carnivores (Geographic Assessment, page 42; PF Doc. WL-R71). The large patches would also help facilitate movement of fisher between the Coeur d'Alene River Basin and Montana. Providing security and movement corridors that link to "refugia" areas in western Montana are consistent with management recommendations by Idaho Fish and Game in the Habitat Conservation Assessment and Conservation Strategy for Forest Carnivores in Idaho (1995, pp. 45-47; PF Doc. WL-R70).

Under all alternatives, no **suitable** fisher habitat would be altered. Under Alternatives 1 and 4, future fisher habitats would provide for fishers approximately 50 years, primarily along Twomile Creek, East Fork Twomile, and Nuckols Gulch. The potential fisher habitat altered with the implementation of alternatives 2 and 3 would require a longer time period (approximately 50-100 years) before these stands meet the needs of the fisher.

Alternatives 2, 3 and 4 would result in 1.5 miles of riparian habitat available to the fisher as a result of riparian restoration activities. There would be no riparian restoration under Alternative 1, so less riparian

habitat would be available to the fisher with implementation of either of this alternative. Short-term displacement of prey for fisher would occur under all action alternatives.

***Table 3-WL-8. Acres of Suitable and Future Fisher Habitat Altered****. (There are currently approximately 3,842 acres of potential habitat in the Twomile Resource Area. Although Alternatives 2 and 3 would alter potential habitat, the habitat would still provide potential habitat.)*

| Habitat | Alt. 1 | Alt.2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Suitable | 0 | 0 | 0 | 0 |
| Potential | 0 | 448 | 385 | 0 |

**Cumulative Effects to Fisher**

Implementation of the District Travel Plan should increase security for the fisher across the Coeur d'Alene River Ranger District. Riparian corridors through private land within the resource area may provide movement corridors for fisher, but most of these areas likely do not provide high quality habitat due to the proximity to urban development and high degree of recreational use. Precommercial thinning would result in a short-term decrease in prey populations until canopies are once again closed (10 to 20 years). Private lands in the Twomile Resource Area are not considered important areas for the fisher because of their proximity to development and activities on these lands would have little effect upon the fisher.

The alternative management options presented in this document address the four issues of concern to fisher conservation and management as outlined in "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Coordinates" (Witmer et al. 1998; PF Doc. WL-R64). The Forest Plan provides guidelines to ensure viability of old growth-dependent species. Forest Plan monitoring reports (1998, pp. 31-33 and 38-40; PF Doc. WL-R51) indicate that these conditions are being met.

Under all alternatives, the drier forest types within the Twomile Resource Area would continue to inherently provide less than optimal fisher habitat. **There would be no impact to the fisher under Alternative 1. Alternatives 2, 3, and 4 would impact individuals but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**. Viability for the fisher would be maintained under the action alternatives because of the availability of movement corridors outside the analysis area, riparian habitats would be restored in the East Fork of Twomile Creek watershed, mature/old age classes have been maintained above historic range, the fisher is not a legally trapped species in Idaho, R1 snag protocol (exceeding IPNF Forest Plan standards) would be implemented, and old growth would be maintained at 10% across the IPNF (Witmer et al 1998, PF Doc. WL-R64, WL-41; USDA 2000, PF Doc. WL-R54; and IPNF 1987, PF Doc. WL-41).

## *G. Wolverine (Sensitive Species)*

**Life History**

*Source: www.fs.fed.us/r1/cohesive_strategy.*

Wolverines are rare inhabitants of montane forests. They are primarily nocturnal, but will also hunt during the day. Their primary food source is big game carrion, but they also eat small mammals such as marmots, gophers, and mice. Males seem to be territorial (Chapman et al. 1982; PF Doc. WL-R12). Wolverines are solitary animals that have large territories. A male's home range may be up to 790 square miles. Their habitat includes mature or younger forests with natural openings, riparian habitats, and high-elevation subalpine fir areas (USDA-Forest Service R1, 1989; PF Doc. WL-R56). Wolverines are particularly fond of marshy areas, and are most at

home in regions with snow on the ground during winter. They are most successful in capturing big game in the winter where the snow is deep (Chapman et al 1982; PF Doc. WL-R12) and are often associated with wilderness (Krott 1960 PF Doc. WL-R34; Van Zyll de Jong 1975 PF Doc. WL-R60; Hornocker and Hash 1981 PF Doc. WL-R27; Whitman et. al. 1986; Banci 1994 PF Doc. WL-R3). Female wolverines in Idaho appear to use subalpine cirque basins for natal denning and kit rearing; home ranges in Idaho vary from 80 to over 700 square kilometers (Copeland 1995 in Idaho Fish and Game 1995, PF Doc. WL-R13).

**Management Recommendations for Wolverines**

In the "Habitat Conservation Assessment and Conservation Strategies for Forest Carnivores in Idaho," Idaho Fish and Game states that habitat connectivity with Montana, Canada and northern Washington most likely provide subpopulations of wolverines interspersion throughout the northern region of Idaho (1995; PF Doc. WL-R13). The Habitat Conservation Assessment (HCA) also emphasizes the importance of dispersal corridors for linking subpopulations and the presence of relatively undisturbed "refugia" areas to protect wolverines from human activities (Copeland 1995; PF Doc. WL-R13).

Witmer et al (1998; PF Doc. WL-R64) in the USDA's "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates" describe three issues of concern to wolverine conservation and management in the Columbia Basin:

*Issue 1: Maintenance of large, remote areas of habitat (including denning habitat).*

*Issue 2: Prey populations*

*Issue 3: Incidental trapping and predator control mortality*

**Reference Condition for Wolverines**

When Europeans first arrived in the United States, the wolverine's range extended from Maine to Washington, but by the early 1800's its range was greatly reduced. Although wolverines were widespread in presettlement times, they likely occurred at low densities (Banci 1994; PF Doc. WL-R3). Reports from the mid 1930s and 1940s suggest that the wolverines mostly occurred in the inaccessible mountains in the center of the state (Davis 1939; PF Doc. WL-R72). Records in the late 1940s came from the northern panhandle (Pengelley 1951; PF Doc. WL-R73). Nowak (1973; PF Doc. WL-R40) reported several animals taken from the central mountains, apparently reflecting a comeback.

**Affected Environment for Wolverines**

Present distribution of the wolverine in the western United States includes Alaska, northern Washington, Wyoming, Oregon, northern California, northern Idaho, central Idaho, western Montana, and along the Idaho-Montana border to approximately Fremont county, Idaho (Nowak 1973, PF Doc. WL-R40; Groves 1987, PF Doc. WL-R19). In the western United States and interior Columbia basin, wolverines occur widely at very low densities, but only in northwestern Montana are wolverine populations considered to be healthy and thriving (Butts 1992 in Witmir et. al. 1998; PF Doc. WL-R9).

The wolverine, with its large home range, would most likely use the area periodically during its long distance movements. Because of the presence of big-game winter range within the resource area it is possible that wolverine would use the area for a carrion source during the winter months. Wolverine may also take advantage of snowshoe hares found in the area (PF Doc. WL-16 [Field notes]). The close proximity to humans reduces the value of this carrion source for the wolverine. The Twomile Resource Area also lacks high elevation cirque basins that could be used by denning female wolverines.

Potential habitat for denning and travel for the wolverine lies east along the Idaho/Montana border and along the St. Joe Divide. Interstate 90 is a barrier to wolverines traveling north from the St. Joe divide. Maintaining forage habitat is probably the most important factor affecting wolverine in the Twomile Resource Area. None of the Twomile Resource Area was delineated as potential "refugia" (large, remote areas of habitat) in the Habitat Conservation Assessment because the area lacks any wilderness or Roadless Areas (Copeland 1995 p. 114; PF Doc. WL-13). The Twomile Resource Area is used by recreationists (primarily ATVs) and is adjacent to human settlement. In addition, the area is roaded and does not provide large, remote areas of

habitat. There is trapping activity currently occurring in the area. A slight potential of incidental trapping of wolverine exists because occasional trapping still occurs.

The Twomile Resource Area provides some prey and travel habitat for the wolverine but due to the lack of denning habitat and wilderness, recreational use by humans and human settlement the area is not considered optimal habitat. Wolverines are likely a sporadic traveler through the area and may occasionally wander into the winter range in the drainage to utilize available carrion. A wolverine fatality occurred just south of the Twomile Resource Area and south of I-90 in the Big Creek area in 1988 (PF Doc. WL-34). The Big Burn area of the Lolo National Forest and the Cabinet Mountains on the Kootenai National Forest provide refugia for wolverine that may occasionally use the Coeur d'Alene Mountains.

**Direct and Indirect Effects to Wolverines**

Elevation and other habitat elements were delineated using GIS. Issues of concern for wolverine according to Witmer et al (1998; PF Doc. WL-R64) in the USDA's "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates" are evaluated.

The most likely use of the Twomile area would be by non-denning wolverines in search of carrion. Since elk populations will be maintained under all alternatives, none of the alternatives would alter a potential carrion source for wolverine.

Large patches of unroaded habitat lie east of the project area in the Big Burn area of the Lolo National Forest and the Cabinet Mountains on the Kootenai National Forest and would continue to provide habitat for the wolverine under all alternatives. These patches are greater than 2,500 acres in size and all lie more than ¼ mile from a road. There is known denning habitat in the Big Burn area. In the Coeur d'Alene Geographical Assessment, patches of habitat could function as travel habitat or security for the wolverine were delineated in the Coeur d'Alene Mountains (Geographic Assessment, pages 42, 46 PF Doc. WL-R71). However, because these patches lack wilderness quality and are small in area they do not function as "refugia" for the wolverine. The location of these large patches also facilitates dispersal of the wolverine between the Coeur d'Alene Mountains and western Montana populations (Interagency Unified Lynx Linkage Map PF Doc. WL-42).

**Cumulative Effects to Wolverines**

Private lands within the resource area are not considered to provide habitat for the wolverine. These private lands receive a high amount of human use and are probably avoided by the species. Patches of unroaded habitat in the upper Coeur d'Alene River drainage and along the St. Joe and Montana Divides would provide security and travel habitat for the species. Other security areas, refugia and travel habitat for the wolverine and other large ranging carnivores designated in the Geographic Assessment would maintain some security, refugia and connectivity for the species. These large patches would also help facilitate movement of wolverine between the Coeur d'Alene River Basin and Montana, where additional refugia is provided. Providing for refugia and movement corridors are consistent with management recommendations by Idaho Fish and Game in the Habitat Conservation Assessment and Conservation Strategy for Forest Carnivores in Idaho (Copeland 1995; PF Doc. WL-R13).

Based on the unlikely occurrence of wolverine, the absence of denning habitat, the current high recreational use of the area, and the presence of a security approximately 7 miles from the project area, all of the action alternatives **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**. Viability would be maintained because security patches in the Coeur d'Alene Mountains are provided and large patches of refugia are available on the nearby Kootenai and Lolo National Forests. Prey base would also be maintained. In addition, there is no trapping season in Idaho for the wolverine (Copeland 1995; PF Doc. WL-13).

## *H. Coeur d'Alene Salamander (Sensitive Species)*

### Life History

*Source: Montana Natural Heritage Program (http://nhp.nris.state.mt.us).*

Coeur d'Alene salamanders are restricted to cool, damp aquatic habitats that have stable temperatures and moisture levels. The species has been found in three main types of habitat in northern Idaho; springs seeps, the spray zones of waterfalls and along stream edges between 1,800 and 3,500 feet in elevation. Known populations have been located at sites where the presence of fractured bedrock, combined with high substrate moisture, high humidity and moderate air temperatures create favorable habitat conditions (Groves 1989; PF Doc. WL-R74). They are often associated with low elevation areas having dense canopies (USDA-Forest Service R1, 1989; PF Doc. WL-R56).

### Reference Conditions for Coeur d'Alene Salamanders

The Coeur d'Alene salamander is a remnant of a once diverse salamander fauna in the northern Rocky Mountains that was likely reduced by climatic changes over the past 10 million years. Surveys have found some known populations extinct due to roads, landslides, heavy metals and extensive logging. Historically, populations were probably higher in the Coeur d'Alene basin and have been reduced by past human activities including logging, mining and road building.

### Management Recommendations for Coeur d'Alene Salamanders

Any changes in peak flows could have detrimental effects upon the Coeur d'Alene salamander by either flooding or drying habitat (Cassirer et al 1994; PF Doc. WL-R11). Forest Plan riparian management objectives decrease the potential for effects from management activities in riparian or wet areas.

### Affected Environment for Coeur d'Alene Salamanders

Coeur d'Alene salamanders have a patchy distribution below 5,000 feet in northern Idaho. There are no known populations of the species in the Twomile Resource Area or adjacent watersheds although potential habitat exists along streams, seeps and in wet areas. A salamander was found in a mine in the West Fork of Moon Gulch, west of the Twomile Resource Area.

### Environmental Consequences for Coeur d'Alene Salamanders

<u>Direct and Indirect Effects Under Alternative 1</u>: No change to Coeur d'Alene salamander habitat would occur under the no action alternative.

<u>Direct and Indirect Effects Under Alternatives 2 and 3</u>: Any changes in peak flows could have detrimental effects upon the Coeur d'Alene salamander by either flooding or drying the habitat for the salamander (Cassirer et al 1994; PF Doc. WL-R11). Alternatives 2 and 3 may result in a slight increase in peak flows. However, these increases would be slight and would not alter habitat for the Coeur d'Alene Salamander. A helicopter landing area off the Twomile Road is unlikely to have effects upon the Coeur d'Alene salamander since the area does not currently provide good habitat for the species (the site was once used for mining waste and explosives development). Riparian restoration on 1.5 miles of road in the Twomile drainage could negatively affect habitat over the short term, but would improve habitat over the long term by returning streamside habitat to more natural conditions where riparian roads and culverts currently exist.

Direct and Indirect Effects to Coeur d'Alene Salamanders Under Alternative 4: There is some potential for prescribed fire associated with this alternative being allowed to creep into a riparian buffer to benefit vegetation, but the possibility of this occurring in an area wet enough to support Coeur d'Alene salamander habitat is low. Riparian restoration on 1.5 miles of road in the Twomile drainage could negatively affect habitat over the short term, but will improve habitat over the long term by returning stream-side habitat to more natural conditions where riparian roads and culverts currently exist.

Cumulative Effects to Coeur d'Alene Salamanders: Past activities on Forest Service, private lands and BLM lands within the Resource Area have altered habitat for the Coeur d'Alene salamander. Reasonably foreseeable activities on private and BLM lands will alter Coeur d'Alene salamander habitat because of potential increases in peak flows. Reasonably foreseeable precommercial thinning activities would have no impact on the habitat of the Coeur d'Alene salamander.

Stream restoration projects could also alter currently unidentified habitat for the Coeur d'Alene salamander, however stream restoration would improve habitat for the salamander over the long term. Because of slight changes in peak flows in Twomile Creek, risk of currently unidentified populations destroyed during stream restoration projects and potential of unidentified habitat in other streams the implementation of any of the alternatives **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**. Since no known populations would be affected by any of the alternatives and restoration trends habitat towards an improved condition the alternatives should maintain or enhance viability over the long term for the Coeur d'Alene salamander. Implementing guidelines and buffers under the Inland Native Fish Strategy would ensure viability of the Coeur d'Alene salamander (Cassirer et al 1994; PF Doc. WL-R11).

## *I. Townsend's Big-eared Bat (Sensitive Species)*

### Affected Environment

Townsend's big-eared bats use caves and cave-like structures for hibernacula in winter and for summer roosts by nursery colonies. They occasionally use bridges and old buildings for roosting and in some places have been known to use building attics as nursery sites. In northern Idaho, these bats primarily roost in abandoned mines. Loss and disturbance of hibernacula and roosting habitat are the limiting factors for the species. There are many abandoned mines in the Twomile Watershed that may serve as potential habitat.

*Photo courtesy of Bat Conservation International (www.batcon.org).*

Several surveys have been done on abandoned adits within the watershed (wildlife survey information, project files 2002, 2003); the species has never been documented to occur in the watershed. Although there has been no documented use of mines in the Coeur d'Alene Mountains by Townsend's big-eared bats, there is potential habitat and many adits have not yet been surveyed.

Several other bat species have been identified within the analysis area. Most abandoned mine sites on the Idaho Panhandle National Forests are cool and wet making them suitable for hibernacula, mating sites, bachelor roosts and night roosts (Sherwin 2003; PF Doc. WL-48). Derusseau (2003; PF Doc. WL-15) also found that other bat species were using mines on the Coeur d'Alene River Ranger District as foraging sites or night roosts.

**Environmental Consequences (Direct, Indirect & Cumulative Effects) for Townsend's Big-eared Bat**

Mining activities within the Twomile Resource Area have created bat habitat. This habitat is important on a broader scale since nation-wide natural (caves) bat habitat has been altered and, in some cases, lost. Some bat friendly closures have been installed within the Resource Area. Open adits on BLM and private lands within the Resource Area provide additional habitat. Some of the adits within the Resource Area will likely close naturally over time, as tunnels become unstable and eventually collapse.

Mitigation measures would ensure protection of the Townsend's big-eared bat should it occur within the Twomile Resource Area. Therefore, the implementation of any of the alternatives **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.** Retaining snags at levels recommended in the R1 Snag Protocol and mitigations implemented to protect bats during burning operations will ensure viability of the Townsend's big-eared bat.

## *J. Pileated Woodpecker (Old-Growth Management Indicator Species)*

**Life History**

Pileated woodpeckers nest within their home ranges (usually about 1,000 acres), in mature to old-growth stands of about 50 to 100 acres with greater than 65% closed canopies and greater than 20-inch diameter trees (Bull 1980, PF Doc. WL-R76; McClelland 1977 and 1979; PF Doc. WL-R37 and R38). They prefer stands with snag densities greater than 12 per acre for feeding (Warren 1989; PF Doc. WL-R75). Nest trees are snags averaging 30 inches in diameter and 90 feet in height (Aney and McClelland 1985; PF Doc. WL-R2). However, pileated woodpeckers can excavate a nest in a live ponderosa pine if heart rot is present (Bull 1975 PF Doc. WL-R5). Both larch and ponderosa pine are preferred nest trees (Bull 1975; PF Doc. WL-R5). They feed mostly on carpenter ants (McClelland 1977, PF Doc. WL-R37; Bull 1980, PF Doc. WL-R76), but also eat other insects and fruits and berries. They usually avoid openings for foraging, and prefer dense canopies with many snags and down logs. Large, continuous habitat blocks are more desirable than more fragmented patches.

*Source: www.fs.fed.us/r1/cohesive strategy.*

**Reference Conditions for Pileated Woodpeckers**

No historic population information is available for pileated woodpeckers. There is some information on historic forest structure in the area from the Geographic Assessment for the Coeur d'Alene River Basin, the Assessment of Ecosystem Components in the Interior Columbia River Basin and in modeling done based on historic records by the Idaho Panhandle National Forest (WL-R71, WL-26). These records and models indicate that more habitat existed for pileated woodpeckers historically than exists today. The amount old forests are believed to be less than under historical conditions due to the amount of timber harvesting done in older stands and the decreased amount of older stands remaining following stand replacing wildfires on the District in the early 1900s.

**Management Recommendations for Pileated Woodpeckers**

Adhering to the Region 1 snag management protocol (USDA 2000; PF Doc. WL-R54), and to the snag guidelines developed in association with the Upper Columbia River Basin (UCRB EIS as described in Bull et. al. 1997, UCRB EIS, Appendix K; PF Doc. WL-41) help to assure snag availability for this species. Aney and McClelland (1985; PF Doc. WL-R2) recommend that pileated woodpecker habitat be managed to support at least one pair per 2,500 acres. Shelterwood cuts and small group selection cuts are suitable, but not preferred, in feeding areas (McClelland 1979; PF Doc. WL-R38). Often, old growth habitats will be found along stream courses in linear patterns. To provide suitable pileated woodpecker habitat, strips should be at

least 300 feet in width (McClelland 1979; PF Doc. WL-R38). Habitat components include continuous blocks of 50-100 acres, 65% canopy closure and 20-inch diameter or larger trees, high snag density, large down wood, larch and pine preferred, 1,000-acre home ranges.

**Affected Environment for Pileated Woodpeckers**

Pileated woodpeckers are found in the Pacific Northwest and throughout the Northern Rocky Mountains, including Idaho and Montana. This species occurs throughout the IPNF and there is evidence of pileated use in the Twomile Resource Area. Pileated woodpeckers often use ponderosa pine and mixed conifer habitats for nesting and foraging, and this type of habitat is common throughout the resource area. Forage sign was abundant in the cedar bottoms along Twomile Creek. There are many large live ponderosa pines in the resource area; however, large-diameter snags are in short supply and canopy closure in many stands is less than optimal for pileated woodpeckers because of the structure found in dry habitat types.

*Idaho Panhandle National Forests Scale:* Old growth management units (OGMUs) are the land area designated by the Forest Plan to manage old growth across the Forest. Forest Plan guidelines state that 10% old growth across the Forest ensures viability of old growth dependent species (pg V-3). This will be accomplished by maintaining at least 10 percent of the Forest as old growth and retaining up to 5% old growth in each old growth unit to assure adequate distribution. To obtain the desired distribution, the IPNF will be managed to maintain approximately 5 percent of each Old Growth Management Unit (OGMU) as old growth where it exists (IPNF Forest Plan II-5, PF Doc. WL-41; Forest Plan Monitoring report; PF Doc. WL-R51). The guidelines require that old growth be well distributed across the Forest. If an OGMU has less than 5% existing old growth, more can be allocated in another OGMU to meet the guidelines forest wide or District wide.

*Coeur d'Alene River Basin Scale:* The table below displays current and historical forest age classes in the Coeur d'Alene Basin. The table indicates the primary change that has occurred in pileated woodpecker habitat, or mature/old stands. Although the amount of mature age classes are similar to historical conditions, the old component of that age class has been significantly reduced. The old component provides the most large diameter, long-lived snags and down wood that are vital to pileated woodpeckers and many other wildlife species. Fragmentation of old and mature habitats has also occurred over time through urban development, road construction and timber harvest.

***Table 3-WL-9. Current and Historic Mature and Old Forests in the Coeur d'Alene River Basin.***

| | Shrub/Seed/Sapling | Pole | Immature | Mature | Old |
|---|---|---|---|---|---|
| Percent Historic | 21 | 13 | 20 | 25 | 21 |
| Percent Existing | 17 | 9 | 43 | 25 | 6 |
| Existing as % of Historic | 83 | 70 | 208 | 102 | 30 |

*Twomile Watershed Scale:* The Twomile Resource Area is within OGMU 121, which currently contains 7.1% (1,067 acres) allocated old growth. Stand data was re-evaluated and additional information gathered over the past two years to confirm that the best possible stands were allocated towards old growth. Existing allocated old growth and potential stands to be added to the allocated old growth in OGMUs 21 were evaluated using stand exams in 2002. Due to the dynamic, changing conditions inherent in forested stands of timber, some stands that had previously been allocated no longer met the criteria for old growth and other stands that were not previously allocated now meet standards. The old growth allocation in the OGMU was changed to reflect current conditions of the stands in the resource area and across the basin (PF Doc. VEG-17). Please refer also to Table 3-VEG-5, page 3-25.

An explanation of the methodology used for the allocated old growth analysis is found in PF Doc. VEG-16. Definitions for allocation of old growth are from the Forest Plan (page II-29), the Regional Task Force Report "Old Growth Forest Types of the Northern Region" (Green et al, 1992; PF Doc. VEG-R18, R20) and Forest Supervisor letters of direction for implementing Forest Plan old growth standards (PF Doc. VEG-15).

### Environmental Consequences for Pileated Woodpeckers

Pileated woodpecker habitat was assessed using methods similar to black-backed woodpecker, but focusing on older stands and the condition and distribution of mature stands. Information used includes forest type, age classes, current and projected canopy closure, current known snags across the resource area (PF Doc. WL-47) and presence of recruitment snags where diseases, bark beetles or structural damage to trees is known to occur. It was also based on old growth allocation on the Coeur d'Alene River Ranger District and in the Twomile Resource Area.

***Table 3-WL-10. Acres of Affected Pileated Woodpecker Snag Habitat.***

| Treatment/Effect on Pileated Woodpecker Snag Habitat | Alt. 1 | Alt's 2 & 3 | Alt. 4 |
|---|---|---|---|
| Thinning *(stands continue to provide habitat)* | 0 | 45 | 0 |
| Group seed tree *(stands would no longer provide habitat)* | 0 | 20 | 0 |
| Prescribed burning *(snag density could be increased; stands would still provide habitat)* | 0 | 16 | 16 |
| **Total acres habitat provided** | **532** | **512** | **532** |
| **Acres of change** | **~~** | **-20** | **0** |

***Table 3-WL-11. Acres of Affected Pileated Woodpecker Habitat in Allocated Old Growth.***

| Treatment/Effect on Allocated Old Growth | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Thinning *(stands still meet old growth criteria)* | 0 | 0 | 25 | 0 |
| Group seed tree/shelterwood *(stands no longer meet old growth criteria)* | 0 | 0 | 155 | 0 |
| Prescribed burning *(stands still meet old growth criteria)* | 0 | 168 | 168 | 232 |
| **Total acres allocated old growth** | **1,067** | **1,067** | **912** | **1,067** |
| **Acres of change** | **~~** | **0** | **- 155** | **0** |

Direct and Indirect Effects to Pileated Woodpecker Habitat Under Alternative 1: No short-term effects or changes would result from the implementation of Alternative 1. Although Alternative 1 would not result in a *decrease* in late successional forests in the Twomile Resource Area over the short term, over the long-term dry site ponderosa pine would sustain encroachment of Douglas-fir and tall brush. The white pine and larch components in the resource area would continue to be low. Beetle activity and insects and diseases would continue to provide snag recruitment although size of snags is not optimal. Risks to late successional habitat are greatest under this alternative as a result of dense stand conditions due to the long-term absence of fire from the ecosystem. This could result in stand-replacing fire. The action alternatives attempt to reduce this risk to current stands. There is no road construction or reconstruction proposed, which can decrease habitat quality.

Direct and Indirect Effects to Pileated Woodpecker Habitat Under Alternative 2: Alternative 2 would retain all but 20 acres of pileated woodpecker snag habitat in the Twomile Resource Area (PF Doc. WL-47). There would likely be additional snags created under this alternative due to prescribed fire even with measures to protect leave trees. Most larger diameter ponderosa pine would survive the fire. However, larger diameter grand fir that are often used by this species may experience some mortality as a result of prescribed fire. Snags and scorched trees resulting from prescribed burns will provide additional nesting and foraging habitat. This alternative would also maintain the current level of old growth, and there would be no road construction bisecting old growth. Prescribed burning often occurs in spring so that burning conditions are most favorable to achieve the desired results. This could directly impact this species if a snag with nesting birds is burned. Field surveys will continue to occur and field personnel will avoid burning near snags with large cavities as described in Chapter 2.

Direct and Indirect Effects to Pileated Woodpecker Habitat Under Alternative 3: Alternative 3 would affect the same amount of pileated woodpecker snag habitat as described under Alternative 2. However, there would be 155 fewer acres of habitat provided in allocated old growth, due to group seedtree and shelterwood harvest activities. These treated stands would not provide old growth pileated woodpecker habitat again for

approximately 150 years. Like Alternative 2, there would be no road construction that bisects old growth. Old-growth stands where prescribed burning occurs would continue to meet old growth criteria, but nesting birds could be impacted if their nest is in a snag burned during treatment. Field surveys for pileated woodpeckers would continue to occur, and field personnel would avoid burning near snags with large cavities, as described in Chapter 2 (Features Designed to Protect Wildlife Habitat).

Direct and Indirect Effects to Pileated Woodpecker Habitat Under Alternative 4: Under this alternative, units treated with thinning and prescribed burning would continue to provide habitat for pileated woodpeckers. Old-growth stands where prescribed burning occurs would continue to meet old growth criteria, but nesting birds could be impacted if their nest is in a snag burned during treatment. Field surveys for pileated woodpeckers would continue to occur, and field personnel would avoid burning near snags with large cavities, as described in Chapter 2 (Features Designed to Protect Wildlife Habitat).

**Cumulative Effects/Determination of Effects for Pileated Woodpeckers**

Over time, any of the action alternatives would result in a trend toward more suitable habitat for pileated woodpeckers, since the proposed activities in the Twomile Resource Area would increase the distribution of older ponderosa pine forests that are used by this species. Under these alternatives, there would be only short-term losses in pileated woodpecker snag habitat. Providing for the management necessary over the next 150 years to achieve these conditions is outside the scope of this analysis, so future management is uncertain.

Past timber harvest selecting for the removal of seral species and salvage harvests which impact snag availability have decreased the quality of habitat for pileated woodpeckers in the Twomile Resource Area and across the IPNF. Fire suppression and road construction have contributed to these effects. Private lands adjacent to, and within, the resource area provide some habitat for this species, but stand conditions on private lands are similar to those on forest lands having experienced selective harvest of seral species, salvage and fuelwood harvests, and fire suppression.

Although Alternative 3 would decrease canopy closure over the short term, it is designed to retain all current large trees and snags on the landscape and trend overall stand conditions to more closely represent preferred habitat. This management goal will eventually improve habitat in the resource area for this species.

All alternatives would implement riparian buffers, which would protect cedar bottoms where pileated woodpeckers are foraging. The action alternatives are consistent with Forest Plan direction to manage the habitat of sensitive species to prevent further declines in populations which could lead to listing under the Endangered Species Act (USDA 1987, p.II-28 PF Doc. WL-R53). In addition, old growth would be maintained at 10% across the Idaho Panhandle National Forests (Monitoring Reports; PF Doc. WL-R51) and Forest Plan standards for snag retention are exceeded with the adherence to the R1 Snag Protocol (USFS 2000; PF Doc. WL-54). These actions would also be consistent with National Forest Management Act requirements for population viability (36 CFR 219.19). **This project may impact individual pileated woodpeckers or their habitat, but would not likely contribute towards federal listing or cause a loss of viability to the population or species.**

## *K. Rocky Mountain Elk (Big-Game Management Indicator Species)*

### Reference Conditions for Rocky Mountain Elk

*Source: National Image Library (http://images.fsw.gov).*

Early records indicate that Rocky Mountain elk occurred throughout most of Idaho; however, large herds were apparently absent from the Idaho Panhandle. Settlement led to exploitation of the species, causing elk to be reduced to a few isolated herds in the state. An elk-restocking program was initiated in Idaho in 1915, and continued for the next 30 years. Today, elk exceed their population level of a century ago. However, high road densities in elk habitat in northern Idaho have increased hunter success and have led to changes in hunting regulations. Elk herds are younger, with fewer experienced old cows and bulls. Winter range for the species has been greatly impacted by urban development and agriculture, and noxious weeds can have high impact on forage in some areas.

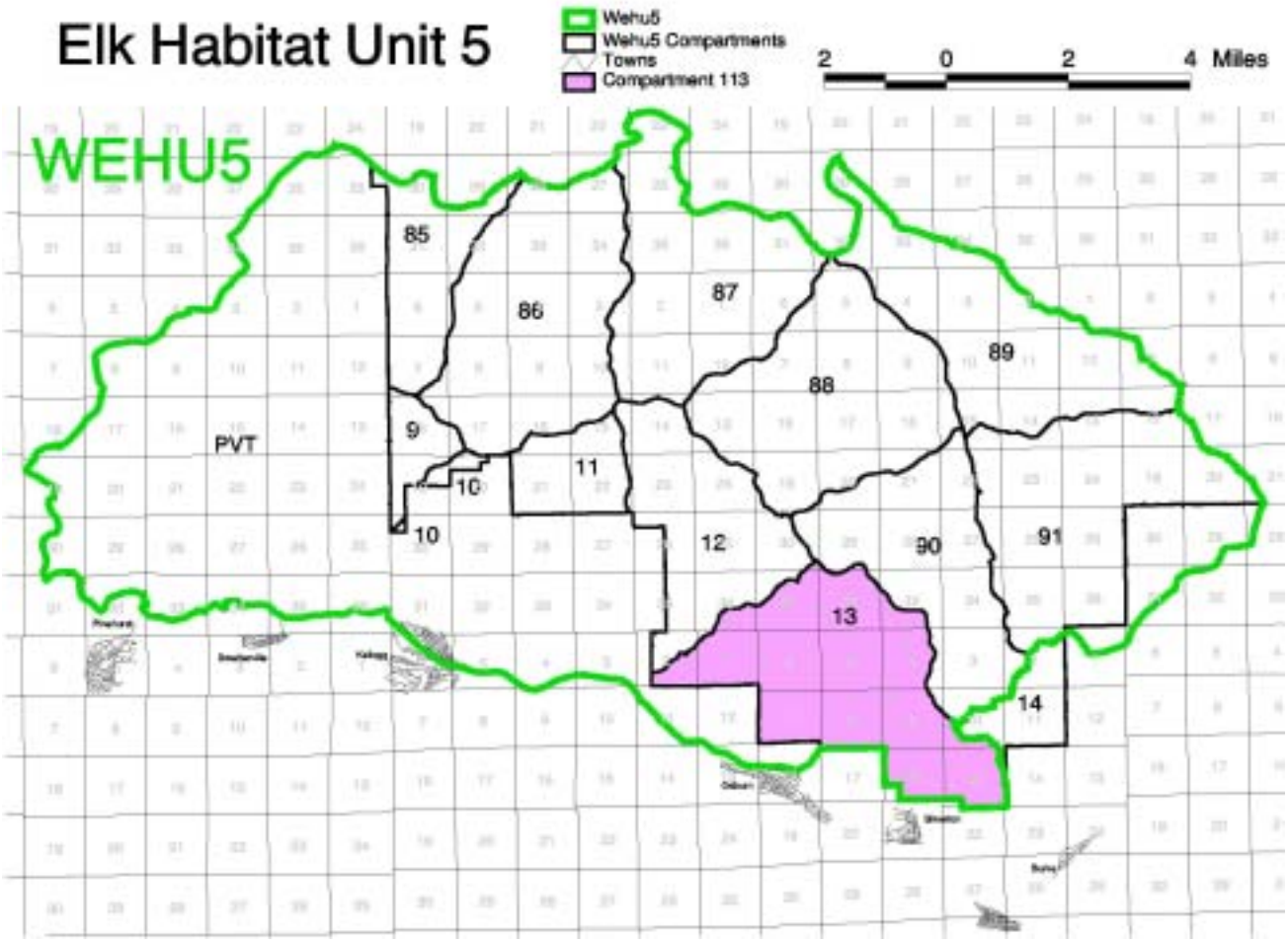
### Management Recommendations for Rocky Mountain Elk

The Forest Plan directs that forest management for elk should be coordinated with the Idaho Department of Fish and Game. The plan recommends using "Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho" (IDFG 1984; PF Doc. WL-R78) to evaluate elk habitat potential. Elk Habitat Units (EHUs) are the land area recommended for tracking elk habitat potential in the Forest Plan. EHUs consist of several compartments used for database management of timber stand information. Compartments are groups of stands topographically delineated and used for tracking current condition and land management activities. Road miles, road status, forage, cover, security areas and other factors that could affect elk habitat are considered in the model. A detailed report on the status of each road within the resource area is available in the wildlife project files and in the Roads Analysis for this project (PF Doc. WL-10, WL-11, WL-12). Information includes miles of each road, whether it is open year long, open seasonally or closed, the type and effectiveness of the closure device and the condition of the road such as drivable or brushed in.

### Affected Environment for Rocky Mountain Elk

White-tailed deer, moose and elk inhabit the Twomile Resource Area, which comprises about 10% of Wallace Elk Habitat Unit (Wallace-EHU) 5. EHU 5 is comprised of 14 compartments. Major land features in the EHU are Twomile Creek, Beaver Creek and Browns Ridge. Within the EHU there is a mix of ownership that includes National Forest System lands, Bureau of Land Management, and private lands. Each EHU has a habitat goal developed in the forest planning process. Elk habitat values are also calculated for each compartment. However, the Forest Plan does not identify elk habitat potential goals at the compartment level. It is believed that the model is most accurate at the compartment level of analysis (communication with Idaho Fish and Game; PF Doc. WL-55). The current elk habitat potential for EHU 5 is 47%, which is below the Forest plan goal of 55% (Forest Plan Appendix B, Summer Range Elk Management Plan; PF Doc. WL-R53). Compartments 112, 189, 187 and 190 all have elk habitat potentials below 40%, reducing the overall potential in EHU5. The low elk habitat potential is due to reduction of effectiveness of security areas due to use of trails by motorized vehicles (ATVs). The elk population target for EHU5 is 357. Even though EHU5 does not currently meet the Forest Plan goal for elk habitat potential, the existing average elk habitat potential for the eastern half of the Coeur d'Alene River Ranger District (formerly the Wallace Ranger District) is currently 54% (USDA Forest Service, 1999, Douglas-fir Beetle EIS; PF Doc. WL-R57). This is above the Forest Plan goal (52%) for this area on the eastern half of the District.

***Figure 3-WL-10. Map Displaying Boundaries of the Twomile Resource Area (shaded) and Elk Habitat Unit 5.***




Much of the EHU 5 and almost all of the Twomile Resource Area are managed as winter range. There is high quality elk summer range within the EHU but outside the analysis area. This high quality elk summer range is found in the Pony Peak area and at the top of Potosi Gulch on the east side of compartments 189 and 191. Mid-elevation habitat provides transitional spring range for elk. Field reviews by wildlife biologists found much of the winter range had brush in a decadent condition and of a height that is now out of reach by big game (displayed in the figures below). Most of the brush species in a decadent condition were desirable forage species for elk and included willows, serviceberry, mountain maples and cherry. There is considerable opportunity within the Resource Area to rejuvenate this brush to improve winter habitat.

***Figures 3-WL-11 and 3-WL-12. Tall, decadent brush in the Twomile Resource Area.***

Gentle terrain, forage and water provide an area that could be used by calving elk at the headwaters of Twomile Creek. The Twomile Resource Area provides 97% hiding cover and 3% of the land in openings. Roughly half of the hiding cover stands also provide thermal cover. Thermal cover modifies extremes in climate and helps animals to regulate body temperature during both the hot summer and cold, windy winter. Snow depths are also reduced beneath thermal cover canopies because conifer branches intercept snow. Most of the stands providing cover also provide some forage opportunities.

Security: Large secure areas are important for big game. These secure areas are used for calving and fawning and rearing of young. In addition, they provide places for elk to escape from hunting pressure. The recommended minimum security is 20% in an area the size of EHU 5. EHU5 is below the recommended security with only 10% of the EHU providing security. However, the Twomile Resource Area has 28% of the area in three security blocks. These areas have limited access due to road closures or brushed-in roads. However, ATV use occurs within all three areas, reducing the effectiveness of the security (the reduced effectiveness was accounted for in the elk model by using a lower value for security). Roading and motorized use is the biggest impact to elk security within the Twomile Resource Area. Currently there are 2.1 miles of roads per square mile of land that are drivable with standard-sized vehicles.

Cover: Cover is not a limiting factor within the area. Most harvest units from the 1960s are now of sufficient age to provide cover. Cover values are incorporated into the elk habitat effectiveness model.

**Environmental Consequences for Rocky Mountain Elk**

As discussed, the methodology presented in *Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho* (Leege 1984; PF Doc. WL-R748 was used to evaluate current elk habitat potential. Changes in this potential under each alternative are used to evaluate potential effects to elk habitat. The elk habitat potential model determines a numerical value for habitat suitability using factors such as the length of road, type of road, whether the road is open or closed and the distribution of forage and cover. When all habitat factors are optimum in abundance and distribution, elk potential is 100%. The Idaho Fish and Game recommends a minimum value of 50% or greater for general elk summer range (IDFG 1984; PF Doc. WL-R78).

***Table 3-WL-12. Percent Elk Habitat Potential During and After Project Activities.***

| Analysis Area | Goal | Alt. 1 Existing | Alt. 2 During Project | Alt. 2 Post Project | Alt. 3 During Project | Alt. 3 Post Project | Alt. 4 During Project | Alt. 4 Post Project |
|---|---|---|---|---|---|---|---|---|
| Elk Habitat Unit 5 | 55 | 47 | 46 | 47 | 47 | 47 | 47 | 47 |
| Compartment 113 | NA | 43 | 35 | 42 | 38 | 43 | 43 | 43 |

***Table 3-WL-13. Acres of Elk Security.***

| Analysis Area | Alt. 1 Existing | Alt. 2 During Project | Alt. 2 Post Project | Alt. 3 During Project | Alt. 3 Post Project | Alt. 4 During Project | Alt. 4 Post Project |
|---|---|---|---|---|---|---|---|
| Compartment 113 | 1,686 | 635 | 1686 | 1071 | 1686 | 1686 | 1686 |

Direct and Indirect Effects to Elk Under Alternative 1: The Coeur d'Alene River Ranger District Travel Plan will be implemented, resulting in special changes in security. No short-term vegetative effects or changes would result from the implementation of Alternative 1. There would be a loss of forage habitat over time, as existing sapling stands move towards mature forest structure and vigor of brush continues to decline. As mature stands decline, there would be a reduction in thermal cover. Watershed restoration and road obliteration would not occur therefore, habitat for big game and other species dependent upon security and riparian corridors would not trend towards an improved condition.

Direct and Indirect Effects to Elk Common to Alternatives 2, 3 and 4: After activities are completed under Alternatives 2, 3 and 4, security would return to the existing level within the Twomile Resource Area. Big-game forage would increase under any of the three action alternatives.

Direct and Indirect Effects to Elk Under Alternatives 2 and 3: Elk habitat potential for the Twomile Resource Area would be reduced during activities because of reductions in security during implementation. This security reduction results from both new road construction and reconstruction of currently closed roads. Post sale, after all newly constructed roads and reconstructed roads are closed, Alternative 2 would have an elk habitat potential (EHP) 1% below the existing EHP. The 1% reduction is due to the newly constructed road and gate closure post-sale. The elk habitat model gives a lower value to gated roads than the same road with an earth barrier or partial obliteration. A gated road is considered less secure. Under Alternative 3, the EHP would return to the existing value after activities are completed (Refer to Table 3-WL-12).

Cumulative Effects to Rocky Mountain Elk: The District Travel Plan restricts motorized use (ATVs and motorcycles) to designated trails across the District (Chapter 2, "Ongoing and Reasonably Foreseeable Activities"). This will improve the effectiveness and size of the elk security areas within the Twomile Resource Area by reducing ATV access into portions of the analysis area where there currently are no restrictions. To provide recreationists with opportunities for motorized recreation, areas within the Twomile Resource Area would be added to the motorized trail system.

Private lands are not considered habitat for wildlife in the project modeling and analyses, because the Forest Service has no jurisdiction over management of private lands. However, the area may in fact provide some values for wildlife.

Implementation of any alternative, including the no action alternative, would result in the same road densities because the District Travel Plan would be implemented under all alternatives. Since the model is primarily sensitive to changes in roads densities, the implementation of the Travel Plan would result in similar post-sale Elk Habitat Potential values for all alternatives. Slight differences between alternatives in Elk Habitat Potential Values, post sale, can primarily be attributed to the methods of road closures used in each alternative. Some alternatives result in more miles of road obliteration. For example, the elk model gives a higher security value to an obliterated road and a lower security value to a gated road.

The elk habitat model used is a cumulative effects model that includes past, current and proposed activities. Elk habitat potential was calculated for both Elk Habitat Unit 5 and the Twomile Resource Area (Compartment 113). The tables display the percent elk habitat potential prior to, during, and after post-sale activities (including road closures) are completed, and the acres of elk security prior to, during and after sale activities. With the exception of Alternative 1, all alternatives would result in an increase in big-game forage. Forage is generally not considered a limiting factor for elk in the Coeur d'Alene Mountains at this time, however, forage takes on greater importance in the Twomile area since it is big game winter range. There will be ATV trails added that would bisect some existing security areas, which would reduce security in those areas. Idaho Fish and Game, who manage elk as a hunted species and monitor their populations, insure elk viability.

## *L. Non-Game Habitat*

### Affected Environment for Non-Game Habitat

Vegetation in the Twomile Resource Area (and the non-game habitat it provides) has changed considerably over the last 100 years as a result of settlement and associated activities in the area. Due to past selective harvest of seral species like ponderosa pine, western larch and white-pine, the species composition of the resource area has changed to include more grand fir, hemlock and Douglas-fir. Past timber harvests and road construction has decreased the size and distribution of seral conifers across the resource area.

*Ground Squirrel (Source: National Images Library - http://images.fws.gov).*

The location of private lands and topography of the resource area have limited access into some areas of the Twomile drainage. The result is some patches of old growth have been protected from harvest and fuelwood gathering. Very large, old ponderosa pine, some over 200 years old, can be found within the Twomile Resource Area. Currently only 11% of the resource area is in seedlings and small to medium sized timber. Mature and old stands make up about 89% of the resource area. Some of the stands that are mature have had some of the larger trees harvested at one time or another. While mature age classes are similar to historic levels, the old component is substantially reduced. Historically, dry-sites with ponderosa pine had an open canopy of very old trees. Historic harvests, road construction and fire suppression have combined in effect to leave only small isolated patches of old growth. Fragmentation and lack of interior habitat has decreased the quality of the old growth that does exist in the resource area. Mature stands are generally denser with fewer very large trees.

One of the largest effects of the decrease in old trees is the lack of snag and down wood habitat they provide. Almost all non-game species use large snags and down wood for some part of their habitat requirements whether it be nesting, cover, foraging substrate or just resting. Dry forest types, in general, have less downed wood (USFS 2000, R1 snag protocol; PF Doc. WL-54). The loss of down wood has greatly reduced habitat for non-game. Some snag habitat is being provided as a result of root disease and other insects and diseases at high levels throughout the resource area. Following harvest, stumps left on the ground can promote the occurrence of root rot in Douglas-fir. The mortality from this disease and other agents is currently providing some snags and down wood of smaller sizes.

Another element of change for non-game habitat is the absence of fire on these dry-sites, which depend on frequent fires to maintain the structure preferred by the species that inhabit these sites. Currently dense understories of Douglas-fir, grand fir and western hemlock have changed the composition of stands, decreased forage availability and increased the risk of loss to high-intensity fire. Noxious weeds are at high levels in parts of the resource area, which can affect forage for non-game.

Riparian areas are another important habitat for non-game species, generally providing large trees in the overstory, and a hardwood component. They are areas of abundant herbaceous vegetation on the forest floor, and complex habitat structures including the bed and banks of the stream. Often they are associated with floodplains, ponds or wallows and wetlands. Many of the riparian areas have been disrupted by roads and mining and no longer provide extensive wet areas. Past road construction in riparian areas and through flood plains has filled and isolated these low areas, reducing their abundance. Roads, along with their associated disruption of riparian habitat and the trapping access they provide, have probably led to a reduction in forest non-game species.

**Environmental Consequences for Nongame Habitat**

Direct and Indirect Effects Under Alternative 1: Taking no action at this time would allow changes in vegetation to continue. These changes may not be within the normal successional pattern due to management activities that have caused loss of seed sources and excluded fire from the system. Ponderosa pine, white pine and western larch forests, and the wildlife species associated with them, would remain below historic levels for the long term. Lack of existing seral species and associated seed sources may preclude these species from returning to historic levels. Root diseases would continue to kill the susceptible firs and hemlock, continually adding to snags and downed log recruitment of smaller sizes.

Dry-site ponderosa pine stands would slowly decrease in canopy closure and overall tree diameter, as root diseases and beetles continue to work in the stands. Some stands would move toward mature and old, but most stands on the drier sites would experience a high degree of mortality in all age classes. This is likely to be more pronounced in the older trees that are more susceptible to the insects and diseases currently present in the resource area. Some mature stands, particularly on the moister northerly slopes, would move towards climax species of hemlock, cedar and grand fir. As some of these moister site stands mature they may start to take on old growth characteristics, and some could eventually be added to the old growth allocation for the Old Growth Management Unit associated with the resource area. The fire risk to wildlife habitat within the resource area would remain high due to lack of fuels reduction after decades of fire suppression.

Direct and Indirect Effects to Nongame Habitat Under Alternatives 2 and 3: Underburning proposed under these alternatives would decrease the complexity of vegetation on the forest flood and decrease cover and shelter for nongame species. The openings created with the harvest proposed under this alternative would reduce non-game habitat for those species dependent upon mature forests, and on large diameter snags and down wood. Reserve trees within the shelterwood units would provide some stand structure and diversity in the future and provide for future legacies (old, large trees) as long as these trees are not harvested at a future date. Loss of down wood as a result of harvest and down wood would decrease habitat quality for most non-game species.

These alternatives would potentially result in the restoration of ponderosa pine stands to have characteristics more similar to historical conditions over the long term (100 to 150 years or more). These alternatives would have short-term impacts on non-game species through further loss of mature forests, and loss of snags. Over the long-term, the regeneration of healthy long-lived seral species like ponderosa pine, white pine and larch could benefit non-game species. There is some potential for the spread of existing noxious weeds with the reintroduction of fire. This could affect foraging habitat for some non-game species.

The additional amount of road construction proposed under these alternatives may have a negative effect on non-game species contributing to fragmentation, and increasing disturbance and the potential for incidental trapping or random shooting. Even though the roads would be closed with a gate during project implementation and closed with barriers or decommissioning following the project, there would still likely be effects from unauthorized motorized use and increased access to those on foot.

Old growth would not be harvested under Alternative 2. Under Alternative 3, shelterwood and group shelterwood harvests would occur in 126 acres of old growth; although large trees would be retained in the stands, they would no longer meet old growth criteria and would not provide the structure needed for old-growth dependent nongame species. Mature suitable flammulated owl habitat would be managed adjacent to

old growth stands to provide large patches of habitat, and would provide nongame travel routes along the Dago Peak Ridge and at the head of Twomile Creek. Under Alternative 3, these routes would be fragmented by harvest openings.

Direct and Indirect Effects to Nongame Habitat Under Alternative 4: The underburning proposed under this alternative would decrease the complexity of vegetation on the forest floor as well as cover and shelter for nongame species. North slopes would continue to provide the complexity of habitat preferred by many non-game species. Reintroduction of fire as an ecological component would increase habitat for species that depend on dry-sites that evolved with fire. Some non-game species (including certain species of birds) evolved with fire. These species would likely benefit from the regeneration of ponderosa pine. If stands were managed into the future to promote frequent low intensity fire and to increase the old, early seral conifers as proposed, non-game species would benefit over the long term. Having open ponderosa pine sites on south slopes with more densely vegetated north slopes would increase biodiversity across the resource area. There is some potential for the spread of existing noxious weeds with the reintroduction of fire. This could affect foraging habitat for some non-game species.

Old growth would not be altered. Mature suitable flammulated owl habitat would be managed adjacent to old growth stands to provide large patches of habitat, and would provide nongame travel routes along Dago Peak Ridge and at the head of Twomile Creek.

Cumulative Effects to Non-Game Habitat: Past salvage and timber harvest has reduced the occurrence of large snags, down wood and old forests. Fire suppression has caused stands to become more dense leading to higher incidence of insects and disease. Burning and replanting in stands salvaged in previously salvaged stands over the next few years will continue to create some disturbance for non-game and will decrease the down wood component in the resource area. Restoration of fire as an ecological process in the Twomile Resource Area would result in a trend it toward historical conditions and provide additional biodiversity with open, large-diameter stands on south slopes and moist, denser stands of various conifers on north slopes. Species that have evolved with fire and that depend on large-diameter open ponderosa pine stands would benefit over the long term, but could experience a short-term loss of habitat in areas treated with shelterwood prescriptions.

Lands under other ownership in the vicinity of the Twomile Resource Area provide habitat for non-game species. These lands provide low elevation riparian habitats, meadows and the lowest elevation conifer habitats in the resource area. There are some activities planned within these private lands as discussed in Chapter 2. These projects, depending on their scope, could have effects on non-game species in the resource area. The extent of those effects are difficult to predict as the plans of private landowners do not appear to propose major activities, but that could change over a short period of time. Although some current habitat may be lost over the short-term as a result of proposed activities, taking no action could have similar effects. Efforts to trend stands in the resource area towards historic species composition and age structure and to maintain the ecological processes which created these conditions will eventually benefit non-game species.

## 3.6.4 Consistency With Forest Policy and Legal Mandates Related to Wildlife

All alternatives would be consistent with Forest Plan management direction, goals, objectives, standards and guidelines for the management and protection of wildlife and species, as described below.

### A. Elk

***1. (a) Coordinate with the Idaho Fish and Game Department to allocate the distribution of habitat potential.***

Idaho Fish and Game participated in the allocation of Elk Habitat Units and goals during the Forest Planning process, which is consistent with this standard.

***1. (b) Identify and delineate existing and potential winter range for each elk habitat unit and establish goals for forage production suitable to support desired population levels, including such tools as designation of permanent forage areas, scheduling of timber harvest, and habitat movement.***

The Forest Plan delineated winter range as a Management Area. Forage goals were identified during the development of the elk habitat suitability model. Permanent forage areas, scheduling of timber harvest and habitat shifts are analyzed with each proposed project.

***1. (c) Utilize the "Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho" (Wildlife Bulletin No. 11, 1984, Idaho Department of Fish and Game) for evaluation of effects of proposed activities on elk habitat (Appendix Y, Idaho Panhandle National Forests Plan).***

These guidelines have been incorporated into the elk suitability model.

***1. (d) Include lands of all cooperators for habitat analysis where mixed ownership is within Elk Habitat Units.***

There are no specific cooperators for habitat analysis. Private lands have been qualitatively analyzed, and plans for future management of these lands was requested for this assessment, refer to Chapter 2.

### B. Threatened and Endangered species

***2. (a) Management of habitat and security needs for threatened and endangered (T&E) species will be given priority in identified habitat. Results of research regarding habitat of T & E species will be incorporated into management direction as it becomes available.***

Habitat conservation strategies for Threatened and Endangered species address the habitat and security needs for these species. These are identified and analyzed in the Biological Assessment. Current and ongoing research information is used in the Biological Assessment.

***2. (b) Biological evaluations will be done on any project likely to have an adverse effect on identified habitats or threatened or endangered animals.***

A Biological Assessment and Biological Evaluations have been completed for all Threatened, Endangered and Sensitive species.

***2. (c) Current direction for management of T & E species will be amended or revised to ensure conformance with Species Recovery Plans.***

All current management direction for Threatened and Endangered species, including recovery plans and strategies, have been incorporated into the Biological Assessment, which will be attached to the Twomile Resource Area Decision Notice.

## C. Bald Eagle

***5. (a) Nesting, feeding and roost areas will be protected in accordance with the Pacific States Bald Eagle Recovery Plan (Appendix W, Idaho Panhandle National Forests Plan).***

There are no known nest, roost areas, or feeding areas within the resource area. If any such area were identified in the future, it would be and protected from disturbance in compliance with the Pacific States Bald Eagle Recovery Plan.

***5. (b) Develop site specific bald eagle nest management plan for each located eagle nest on National Forest land as outlined in the Montana Bald Eagle Management Plan (Appendix II, Idaho Panhandle National Forests Plan).***

There are no known nest sites on National Forest Land of the Coeur d'Alene River District. However, measures are implemented to provide protection when forest management activities could impact an active nest on adjacent lands under other ownership. There are no known nest sites near or adjacent to the resource area.

***5. (c) Cooperate in research and surveys involving bald eagles on the Forest.***

District biologists participate in annual winter surveys for bald eagles.

## D. Gray Wolf

***6. (a) In areas of reported occurrence, consider maintenance of a high number of prey species (deer, elk) and maintenance of security through road management.***

The analysis of the gray wolf was based on maintenance of prey and security. Please refer to the Biological Assessment for further information.

***6. (b) Forward information on reported sightings to the Wolf Recovery Team.***

All information regarding possible wolf sightings are forwarded immediately to the Wolf Recovery Team.

***6. (c) Cooperate in research and data collection involving wolf and wolf habitat.***

District biologists cooperate with all wolf relocation efforts and report all possible sightings.

## E. Other Wildlife

***7. (a) Maintain at least minimum viable populations of management indicator species distributed throughout the Forest.***

Viability analysis has been done for these species. Viability thresholds have yet to be developed at the Regional Level. For additional discussion, please refer to the analysis of sensitive and management indicator species in this chapter.

***7. (b) Maintain habitat for cavity nesting species and foraging substrates by implementation of the IPNF Snag and Woody Down Timber Guidelines (Appendix X, Idaho Panhandle National Forests Plan).***

Snag requirements for this assessment are described in Chapter 2, Features Common to All Action Alternatives, and Features Designed to Protect Wildlife Habitat. Based on these features, snag management would meet or exceed the requirements identified in the Forest Plan and in the Regional Snag Retention Protocol (USDA 2000; PF Doc. WL-R53, WL-R54). No snags are proposed for removal as a result of this project unless they pose a hazard to forest workers.

### F. Sensitive species

***9. (a) Manage the habitat of species listed in the Region 1 Sensitive species List to prevent further declines in populations, which could lead to Federal listing under the Endangered species Act.***

All alternatives would comply with the Endangered species Act of 1973 as amended (ESA). Forest Plan standards (Forest Plan, Chapter II, pages II-26 through II-29; PF Doc. WL-R53), in compliance with NFMA (219.20 Ecological sustainability), were incorporated into all alternatives. These standards addressed elk and elk goals, threatened and endangered species, sensitive species and old growth management indicator species. All alternatives are consistent with Forest Plan standards regarding allocated old growth. No harvest is proposed in allocated old growth or recruitment old growth is proposed under alternatives 1, 2 and 4. Harvest is proposed in old-growth in Alternative 3.

## 3.6.5 References Cited in the Wildlife Analysis

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# 3.7 RECREATION ACCESS

## 3.7.1 Regulatory Framework and Methodology for Recreation Access

Recreation goals and objectives identified in the Forest Plan (Forest Plan, Chapter II) are to 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 (both motorized and non-motorized), to pursue opportunities to increase and improve the recreation trail system, and to continue to increase cooperative trail programs with organizations, clubs and other public agencies.

Determination of the existing conditions for recreation activities, facilities and opportunities is derived from facility inventories, facility maintenance work, observation by recreation specialists and technical personnel, and contact with recreation user groups and individuals. Guidance for management of recreation resources is provided in various National Forest manuals and handbooks, as well as professional publications and documents.

Forest Service Recreation Planners also make use of the Recreation Opportunity Spectrum (ROS) as a framework for understanding recreation facilities, opportunities and settings to meet the visitors needs for a desired set of outdoor recreation experiences.

## 3.7.2 Existing Recreation Access Conditions

The Twomile Resource area represents a small portion of the Coeur d'Alene River District. There are no developed campgrounds, picnic areas or other structural recreation developments in the area or in the immediate vicinity. Recreation management in the Twomile area focuses on trail and road systems as facilities for recreation opportunities.

Facilities maintained for recreation use are represented by trails. Beef Camp Trail 102 (2.2 miles in length) occupies the Twomile Creek drainage and ends at Capital Hill. There is also an extension to the trail that crosses the south face of Capital Hill and adds another ½ mile to the total. This area is classified as being in a *roaded natural appearing* condition using the ROS classification system. The close proximity of urbanized and rural lands influences the classification. The presence of numerous old roads and trails influence the classification of the area as well. There are no plans to develop recreation facilities in the area, other than trails and attendant parking sites.

There are 6.9 miles of single-track trail within the Twomile Resource Area. The 4.4-mile Jewel Gulch Trail 103 ascends the main ridge dividing Jewel Gulch and Terror Gulch, connecting with Trail 102 near Capital Hill. With a small portion of Evolution Gulch Trail 101, these trails currently represent the full extent of developed recreation within the drainage. The trails were constructed in the 1920's as fire access trails and for fire lookout maintenance, then incorporated into the District recreation trail system in the 1960's. Local use of motorcycles on the trails began at about the same time. Motorcycle use on the trails creates some difficulty for maintenance, as the trails are somewhat steep and not built for motorized conveyances.

In comparison to these uses, all-terrain-vehicles (ATVs) are a relatively new form of trail user. The existing trail system is inadequate for these machines. ATV's are being used on old logging and mining roads in the area, in some cases causing erosion, stream bank collapse and effects on wildlife habitation. ATV's damage narrow single-track trails and present great hazards to riders when the machines are forced onto the fall line of the ridges.

The number of people that visit the Twomile Resource Area for recreation is relatively small. Most visitors are local residents of the Silver Valley, represented by the communities of Osburn, Silverton, Kellogg, and Wallace. The population of these communities is approximately 13,770, based on 2000 census data. Of the visitors that come to the Twomile Resource Area for trail use, approximately 30% use ATVs, 15% motorcycles, 45% hike and 10% use bicycles (2003 Idaho Statewide Outdoor Recreation and Tourism Plan).

Roads in the area are also used for recreation. Driving for pleasure and sight seeing is an important recreation activity. Roads are also used to facilitate access for hunting and gathering forest products, in particular

berries, mushrooms and Christmas trees. Forest Roads 271 and 424 are the most important access roads for these purposes. Non-system roads (roads not designated for maintenance) are also being used, in some cases illegally. Field review has shown that a substantial amount of the off-highway vehicle use is occurring in an unregulated manner. For example, ATVs are being driven on trails that are not managed to accommodate them; cross-country travel and travel within the confines of creeks and streams. Activity such as this is common where facilities have not been sufficient to meet the recreation demand. Enforcement of regulations by the Forest Service is practically non-existent due to lack of budget and personnel to perform enforcement tasks.

There is a strong interest for continued access to the Twomile Resource Area for motorized vehicles, both on trails and on roads (there are also those that want to preserve a degree of quiet and solitude for walking). In the foreseeable future, it is not anticipated that there would be a large demand for trail development by recreation visitors outside of the local communities. Nor is it anticipated that the local area will grow in population beyond modest gains over the next two decades. Therefore the goal for recreation will be to maintain the existing trail system as single track, while developing some additional trails to accommodate ATV travel and to link trails that would create opportunities to access other trails outside the Twomile Resource Area. Trail expansion would be accompanied by some trail obliteration and closure to protect other resource values as well as to protect trail developments from impacts. For example, forming barricades to prevent ATVs from accessing single- track trails.

Development of a small parking area at the confluence of Twomile and the East Fork of Twomile Creeks would be desirable. Signs to direct trail users and some signing to influence care for the land would be a part of the plan to expand trail facilities in the area.

The road system presently managed in the Twomile drainage will be adequate to handle peoples' need to access the area for recreation activities. Development of facilities for camping, picnicking or interpretation sites is not anticipated for the foreseeable future.

## 3.7.3 Environmental Consequences to Recreation Access

***Direct and Indirect Effects to Recreation Access Under Alternative 1***

No immediate changes to recreation access in the Twomile Resource Area would occur with the selection of Alternative 1. The public would continue to use roads and trails in the area for recreation. Unregulated (illegal access) would also likely continue.

***Direct and Indirect Effects to Recreation Access Under Alternatives 2, 3 and 4***

All action alternatives propose the same combination of trail improvement, expansion and closures. Trails 102 and 103 (and the small portion of 101 that is within the Resource Area) would be maintained as "single track," for motorcycles, horseback riding, mountain bike riding and hiking. The level of difficulty for the users would fall into "more difficult" (due to trail grade and width) for all uses except hiking. Hiking would be managed to provide a readily accessible opportunity for a scenic hike. Hiking is expected to become increasingly important as a means for people to gain a better level of physical fitness. Readily available hiking areas near population centers are important to meeting this need.

Approximately 0.4 miles would be added to the single- track trail system. The additions would focus on reroutes to avoid road intersections and to route around poor trail segments. Sections of damaged trail would be repaired and waterbars constructed in portions of trail that exceed 20% grade. There are at least five points where ATV's have encroached upon the trail; these would be repaired and blocks established to prevent further encroachment and resource damage.

The public demand for access to trails and routes for ATV's would also be addressed under all action alternatives. ATV trails would be created to provide access into and through the Twomile Resource Area. Old logging roads would facilitate the creation of the trails. These roads have the proper width to safely allow ATVs to pass each other and accommodate the width of the machines. Local recreation users were consulted during the development of trails proposed for the Twomile Area.

Approximately 9.5 miles of trail would be created for ATV use. These trails would utilize old roads that originate in the bottom of Twomile Creek canyon and go east and west to the summits of Capital Hill and Dago Peak. To further accommodate ATV travel some Forest Service System roads would be designated for co-use as road and trail routes. Co-use is legal under Federal and State law. Special signing would be installed to provide for safe travel for trail type vehicles and conventional vehicles. An estimated 6.4 miles of road would be designated for co-use within the Twomile Resource Area, including Forest Roads 271, 424, 953 and 2322. Additional miles of Forest Road 424 *outside* the Resource Area would be designated for co-use to allow trail vehicles to travel the length of the scenic Browns Ridge between Dobson Pass and Moon Saddle. This route would be extended to include Road 620 from Moon Saddle to Forest Highway 9, creating the opportunity for ATV travel without the need to spend scarce trail maintenance funds.

Designated parking would be needed to fulfill the need for access. An existing site near the confluence of Twomile Creek and the East Fork of Twomile Creek would serve the purpose. The site is well located to provide access to Trail 102 and to facilitate unloading of ATVs accessing new trails proposed for this project. Improvements to the parking site would be to spread a gravel surface over the area to minimize soil impact and install various signs related to trail use.

***Cumulative Effects to Recreation Access Under Alternative 1***

There would be no appreciable effect on the recreation developments and opportunities in Twomile Creek if Alternative 1 were selected and proposed vegetative treatments did not occur. A large fire in the area might have short-term effects on trail access and maintenance due to falling timber, with possible erosion of bared soil. The primary long-term effect would be on the scenic qualities of trails.

***Cumulative Effects to Recreation Access Under Alternatives 2, 3, and 4***

The anticipated effects on the recreation resource in the Twomile Resource Area from vegetative management (including timber harvest, log haul and controlled burns) would be of short duration. Some trails could be temporarily closed for public safety. Log haul would increase traffic on roads, warranting additional care for travelers during the operational period.

Forest Roads 271 and 424 are designated snowmobile trails between December 15 and April 1st of each year. Log haul would not be allowed during this period.

## 3.7.4 Consistency With Forest Plan and Other Legal Mandates

The Forest Plan identifies specific goals and objectives related to providing a variety of recreation opportunities and settings (Forest Plan, pages II-1 and II-3). The following standards apply to recreation management:

***1. The Forest will continue to provide a share of recreation opportunities and diversity in relation to other public and private entities; recreation planning and operations will be coordinated with other federal, state, local and private recreational managers.***

All alternatives would continue to provide a diversity of recreation opportunities. Coordination with other recreation managers is done on an ongoing basis throughout the Coeur d'Alene River Ranger District. Based on this information, all alternatives would meet this standard.

***2. Forest Service recreational programs will be complementary with other public and private programs where possible.***

Recreational programs on the Coeur d'Alene River Ranger District are complementary with other recreational programs provided by county, state, and private facilities. The activities proposed under the action alternatives would not change this situation; therefore all alternatives would meet this standard.

***3. Consult with recreational users and other recreational suppliers to coordinate public needs.***

Consultation occurs with recreational organizations on an ongoing basis, and with the recreating public at large through project scoping. Recreation needs in the Twomile area have been considered and will be provided under all alternatives. Based on this information, all alternatives would meet this standard.

***4. Evaluate and authorize service by the private sector on National Forest lands that complement National Forest objectives.***

There are currently no recreation service permits authorized in the area. There are no applications on file for such services at the time of this writing. This standard does not apply to the project.

***5. Continue existing private recreation uses of National Forest lands only on lands that are not suitable or not needed for public use, providing that long-term public interest is protected.***

There is no existing private recreation uses (such as a leased cabin or resort) provided in the Twomile Area, therefore this standard would not apply.

***6. Additional recreational sites will not be permitted.***

There would be no additional recreation sites permitted under any alternative; therefore all alternatives would meet this standard.

***7. Provide a broad spectrum of dispersed and developed recreation opportunities in accord with identified needs and demands. Enhance user experience by on and off-site interpretation.***

A broad spectrum of dispersed and developed recreation opportunities are provided in the Twomile Resource Area in response to public needs and demands. The Recreation Opportunity Spectrum (ROS) classification system has identified the area as having a "roaded natural setting." Geography of the Twomile drainage limits development to trail developments and limited dispersed recreation. Trail user education can be provided as necessary. Based on information all alternatives would meet this standard.

***8. On proposed developed sties treat and maintain timber stands in a manner compatible with recreation objectives prior to development.***

Current recreation objectives would be maintained under all alternatives, and potential for future recreation developments would be unaffected. Based on this information, all alternatives would meet this standard.

***9. Trailhead facilities in dispersed areas will be minor and limited to resource protection. Off-site interpretation is encouraged.***

At this time, none of the existing trailheads in the area warrant expansion. It is expected that this will change over time due to the trend of increasing ATV use. At that time, trailheads would be improved to protect natural resources. Improvements normally include informational signing. This trend and the resulting improvements would occur under any alternative; all alternatives would be consistent with this standard.

***10. Trails will be managed in accordance with management area requirements as identified in a more site-specific analysis of needs.***

The No-Action Alternative would not have any affect on area trails. Under all action alternatives, standards for trails would be met.

***11. Cooperate with the State of Idaho in developing a joint management agreement on the Lower Priest River.***

The Lower Priest River is not located in the Coeur d'Alene River Ranger District; therefore this standard is not applicable to the Twomile Resource Area.

***12. Maintain the free flowing characteristics of rivers identified as eligible for consideration as part of the National Wild and Scenic Rivers System pending suitability. Identified rivers will not be modified to the degree that eligibility or classification would be affected.***

There are no eligible rivers within the resource area, therefore this standard does not apply.

***13. Maintain free flowing and related characteristics of the Lower Priest River and Moyie River until prescribed guidelines in cooperative agreements or ordinances have been approved per River Study recommendations.***

The Lower Priest and Moyie Rivers are not located in the Coeur d'Alene River Ranger District; therefore this standard is not applicable to the Twomile area.

### 3.7.5 References Cited in the Recreation Access Analysis

State of Idaho, Department of Parks and Recreation, Statewide Comprehensive Outdoor Recreation & Tourism Plan,2003-2007

USDA Forest Service ,1996, Status of the Interior Columbia Basin, Summary of Findings

## 3.8 SCENIC RESOURCES

### 3.8.1 Regulatory Framework/Methodology Used in the Scenic Analysis

Scenery management direction is provided by the Forest Plan and is described in terms of Visual Quality Objectives. The objectives are based on the area seen from sensitive travel corridors and on other features that result in a high visual sensitivity level. The visual management system was revised in 1995, and is now known as the Scenery Management System. The revised guidelines are provided in "Landscape Aesthetics: A Handbook for Scenery Management," (USDA Forest Service, 1995).

### 3.8.2 Existing Scenic Conditions

The Twomile area is visible in part from locations identified in the Idaho Panhandle National Forest Plan as having a high sensitivity and concern for the scenic quality of the area. The communities of Osburn and Silverton are of most concern and then the travel corridor of Interstate Highway 90. Only portions of the area can actually be seen from the locations above. There is a separation between the communities and the National Forest Lands that varies from over one mile to ¼ mile. This buffer land is in private hands and not subject to the same standards for the maintenance of the scenic conditions as is the National Forest.

From *Osburn* the project area is viewed across a foreground of residential and industrial structures and a gravel-mining site. In the back foreground the raised line of the Interstate highway dominates the view. Behind the Interstate the land rises steeply and is mostly forest covered. Evidence of past logging is visible on some of this ground. Thinned timber stands and some roads are readily visible. This is on the private land part of the landscape. The mouth of Twomile Creek lies directly opposite Osburn and tends to funnel the view up the narrow canyon. Proposed vegetative treatments for most of the project are confined to the narrow canyon and gulches of the drainage. The position of Osburn and residents in Twomile Creek itself only have a limited view of the project area due to their location deep in the valley bottom and confined by close, steep hillsides.

*Silverton* is tucked up against the project area and separated from National Forest Lands by less than a ¼ mile of private property. The visual orientation of the community is to the south, away from the project area . Twomile Creek and Dago Creek drainages are blocked from view of Silverton residences by intervening terrain. Only logging proposed for the gentle slopes immediately to the north of Silverton would be of concern from residential locations.

The view of the Twomile Resource Area from Interstate Highway 90 is fairly brief for travelers rolling along at interstate speeds. The Interstate Highway; much the same as the communities, is confined by the valley. Close proximity of steeply rising ground mostly interdicts views up, into the project area.

Visitors to the Twomile Creek area will notice that it is land that has been subject to timber harvest and related road development. Signs of past mining are evident. From the north end of the project area, along Browns Ridge, Capital Hill and Two Mile Saddle it is readily apparent that this is a portion of the Coeur d'Alene Mountains where resource management activities have taken place for over 50 years. Tree plantations in past timber harvest locations are at various stages of reforestation, a power transmission line runs east to west, several old mines are in sight and radio transmission facilities are visible on nearby Sunset Peak. Despite these impressions on the viewer, the scenery remains satisfying and open.

The Forest Plan standards for visual quality in the Twomile Resource Area are:

- *Partial retention: ground seen from the key points identified in the description above*
- *Modification: standards are applied to land adjacent to grounds classified as partial retention and as lands observed as background.*
- *Maximum modification: visual standard is applied to all other ground obscured from observation by terrain, from the key points described above.*

## 3.8.3 Environmental Consequences to Scenic Resources

**Alternative 1**

With no harvest activities proposed, there would be no short-term effects to the scenic condition of the area. Old harvest units would continue to recover tree growth slowly muting unnatural appearing visual effects. Long term, the increasing vulnerability to wildfire of the area may bring change to the scenic conditions.

**Alternatives 2 and 3**

The following table discloses the visual effects of each harvest unit under Alternatives 2 and 3.

***Table 3-SCE-1. Visual Effect of Proposed Harvest Units, Road Construction and Road Reconstruction in the Twomile Resource Area Under Alternatives 2 and 3.***

| Unit | Alternative 2 | Alternative 3 |
|---|---|---|
| 1 | Mix of shelterwood harvests, slashing and burning. Would not be seen from key visual locations due to blocking terrain. The visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 2 | Can be seen through a very limited corridor at the mouth of Twomile Creek. The visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 3 | Mix of shelterwood harvests, slashing and burning. Would not be seen from key visual locations due to blocking terrain. The visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 5 | Mix of shelterwood harvests, slashing and burning. Would not be seen from key visual locations due to blocking terrain. The visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 6 | Mix of shelterwood harvests, slashing and burning. Would not be seen from key visual locations due to blocking terrain. The visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 7 | Can be seen through a very limited corridor at the mouth of Twomile Creek. The visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 9 | Mix of shelterwood harvests, slashing and burning. Would not be seen from key visual locations due to blocking terrain. The visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 10 | Mix of shelterwood harvests, slashing and burning. Would not be seen from key visual locations due to blocking terrain. The visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 11 | An underburn that is either located far away enough from viewpoints to be imperceptible, or is blocked by intervening terrain. *Modification* standard would be met. | Burning and shelterwood harvest. Terrain would screen unit from key viewpoints. |
| 12 | Tucked into narrow tributary stream canyon. Group shelterwood harvest would open the tree cover considerably; a portion can be observed only from near the mouth of the stream. Visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 13 | Tucked into narrow tributary stream canyon. Slash and burn only. Visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 15 | No unit proposed under Alt. 2. | Burning and shelterwood harvest. Terrain would screen unit from key viewpoints. |
| 16 | No unit proposed under Alt. 2. | Burning and shelterwood harvest. Terrain would screen unit from key viewpoints. |
| 17 | No unit proposed under Alt. 2. | Shelterwood unit; mostly screened by terrain in the narrow Dago Peak Gulch. If visible at all, would be visible from that part of Osburn just opposite Dry Gulch. Visual quality standard of *partial retention* would be met. |
| 18 | No unit proposed under Alt. 2. | Shelterwood unit; mostly screened by terrain in the narrow Dago Peak Gulch. If visible at all, would be visible from that part of Osburn just opposite Dry Gulch. Visual quality standard of *partial retention* would be met. |
| 19 | No unit proposed under Alt. 2. | Commercial thin; would have virtually no visual impact due to distance from valley viewpoints. |
| 20 | Pre-commercial thinning of young stands would have little discernable effect on visual quality. Visual quality standard of *partial retention* would be met. | Same as Alt. 2 |
| 21 | Portions could be observed from Osburn. The slopes on either side of the creek limit the view of the unit to less than 40% of the affected land area. The viewer's perspective would be one that looks through the side of the unit, thus limiting exposed ground and using the trees left in the stand to best effect. Visual quality standard of *partial retention* would be met. | Same as Alt. 2 |
| 22 | Portions could be observed from Osburn, but the narrow mouth of the canyon and slopes above Twomile Creek would limit the view to less than 40% of the affected land area. The viewer's perspective would be one that looks through the side of the units, thus limiting exposed ground and using the trees left in the stand to best effect. Visual quality standard of *partial retention would* be met. | Same as Alt. 2 |

| Unit | Alternative 2 | Alternative 3 |
|---|---|---|
| 23 | Portions could be observed from Osburn, but the narrow mouth of the canyon and slopes above Twomile Creek would limit the view to less than 40% of the affected land area. The viewer's perspective would be one that looks through the side of the units, thus limiting exposed ground and using the trees left in the stand to best effect. Although the unit would be visible, no unusual unit shapes would be created by the treatment and therefore the visual quality standard of *partial retention* would be met. | Same as Alt. 2 |
| 25 | Pre-commercial thinning of these young stands will have little discernable effect on visual quality and meet *partial retention* standards. | Same as Alt. 2 |
| 27 | Group shelterwood, constitutes middleground and background view for the community of Osburn. The visual impact would be greatly reduced by the existence of older logged timber stands immediately to the front and below. The bottom half of unit 27 would be blocked by an intervening ridge that divides Shirttail and Dago drainages. The partially timbered and open ground in the vicinity would help mute the effects of opening the stands of timber adequately enough to meet the low end of *partial retention.* | Same as Alt. 2 |
| 28 | Commercial thinning with minimal effect on scenic quality. Located at the bottom of Nuckols Gulch and only partially visible from Osburn. Visual quality standard of *partial retention* would be met. | Same as Alt. 2 |
| 29 | Commercial thinning with minimal effect on scenic quality. Located at the bottom of Nuckols Gulch and only partially visible from Osburn. Visual quality standard of *partial retention* would be met. | Same as Alt. 2 |
| 30 | Located immediately to the north of Silverton, within ½ mile of the upper residential lots of the community. Although in close proximity the group shelterwood unit and fuels treatments would have minimal impact on scenic quality. Once the short-term effects of operations have healed, the remaining forest would be open with many large trees remaining. The goal of making the forest more fire resistant also improves its' natural appearance by removing crowded vegetation and creating open effect. The unit would be screened from direct view of the community by a margin of trees. Since the screen of trees is located on private land, it cannot be assumed that the screen would remain, but it would help cover the short-term effects of logging and underburning. A short segment of road construction to access a helicopter landing would not be visible from the key viewpoints. | Same as Alt. 2 |
| 31 | Located immediately to the north of Silverton, within ½ mile of the upper residential lots of the community. Although in close proximity the group shelterwood unit and fuels treatments would have minimal impact on scenic quality. Once the short-term effects of operations have healed, the remaining forest would be open with many large trees remaining. The goal of making the forest more fire resistant also improves its' natural appearance by removing crowded vegetation and creating open effect. The unit would be screened from direct view of the community by a margin of trees. Since the screen of trees is located on private land, it cannot be assumed that the screen would remain, but it would help cover the short-term effects of logging and underburning. | Same as Alt. 2 |
| 32 | Located immediately to the north of Silverton, within ½ mile of the upper residential lots of the community. Although in close proximity the slash and burn unit would have minimal impact on scenic quality. Once the short-term effects of operations have healed, the remaining forest would be open with many large trees remaining. The goal of making the forest more fire resistant also improves its' natural appearance by removing crowded vegetation and creating open effect. The unit would be screened from direct of from the community by a margin of trees. Since the screen of trees is located on private land, it cannot be assumed that the screen would remain, but it would help cover the short-term effects of the slashing and burning. | Same as Alt. 2 |
| 33 | Tucked into narrow tributary stream canyon. Group seed tree harvest would open the tree cover considerably; a portion can be observed only from near the mouth of the stream. Visual quality standard of *modification* would be met. | Same as Alt. 2 |
| 34 | This unit treatment involves slashing of undergrowth vegetation and burning. The short-term visual effect would impact several residents living adjacent to Twomile Creek. The long-term result should be that of a more open cover of large trees, generally thought of as an improvement in scenery. The unit would meet *modification* established by the Forest Plan for this geographic location. | |
| 36 a-b | A new road would be constructed in section 8 to access a helicopter landing and the units. Neither units nor the new road would be visible from key viewpoints; would meet visual quality standard of *modification.* | Same as Alt. 2 |
| 37 a-e | These group shelterwood treatments constitute middleground and background view for the community of Osburn. The visual impact to the viewer would be greatly reduced by the existence of older logged timber stands immediately to the front and below. New road constructed to reach units 37a and 37b would be partially visible from Osburn. Distance from the viewpoints and intervening timber screening along the ridgeline east of Nuckols would be enough to allow the developed road to meet the low end of *partial retention.* Reconstructed road designed to reach Units 37 c-e would not be visible from the key viewpoints. The partially timbered and open ground in the vicinity help mute the effects of opening the stands of timber adequately enough for this group to meet the low end of *partial retention.* | No unit proposed under Alt. 3. |

**Alternative 4**

All of the units proposed for this Alternative would have less potential visual impact than the corresponding units under Alternatives 2 and 3. No roads would be constructed or reconstructed under this alternative. Therefore, all units proposed under Alternative 4 would meet Forest Plan visual quality standards.

## 3.8.4 Consistency With the Forest Plan and Other Legal Mandates Related to Scenic Resources

The Forest Plan identifies specific goals and objectives related to protection of visual (scenic) quality (Forest Plan, pages II-1 and II-4). The following standards (Forest Plan, pages II-25 and II-26) apply to visual management:

***1. Meet adopted visual quality objectives (VQO's). Exceptions may occur in unusual situations; these will be identified through the project planning process involving an interdisciplinary team…Mitigation measures should be developed for areas when VQO's are not met.***

All alternatives would be consistent with this standard. Alternative 1 would have no short-term visual effects because no openings would be created by timber harvest. Alternative 4 will have so little effect on scenery resources that it would be unnoticed from key view points.

Alternatives 2 and 3 will have vegetative manipulations that can be seen from viewpoints identified in the Forest Plan as having a degree of sensitivity for observers of the scenery in the project area.

Standards will be met by helicopter logging which eliminated the need for the introduction of highly visible roads excavation. Where roads are constructed they will either be unseen from the most sensitive viewpoints or will blend in with the visual character of the Twomile Area. Vegetative treatments are of the type that have muted effects on the landscape by leaving larger trees scattered in groups.

***2. The visual resource has been evaluated based on visual sensitivity levels assigned to travel routes, use areas, and water bodies in and adjacent to the IPNF. Adjustments in VQO boundaries based on project level analysis will conform to principles in FSM 2380.***

There would be no adjustments to VQO boundaries under any alternative; therefore all alternatives would be consistent with this standard.

## 3.8.5 References Cited in the Scenic Resources Analysis

USDA Forest Service, 1995. Landscape Aesthetics: A Handbook for Scenery Management.

USDA Forest Service, 1973. National Forest Landscape Management, Volume 1.

USDA Forest Service, 1974. National Forest Landscape Management, Volume 2.

USDA Forest Service 1990, ROS Field Guide.

# 3.9 FINANCES

## 3.9.1 Regulatory Framework for Finances

Forest Service policy sets a minimum level of financial analysis for timber sale planning (Forest Service Handbook 2409.18, section 32; PF Doc. FIN-R2). The level of timber harvest is important not only in providing jobs in the timber industry, but also through indirect and induced impacts on other business sectors as well (Forest Plan, page IV-47). One of the seven major issues for the Forest Plan was community stability (Forest Plan, pages 1-8).

## 3.9.2 Methodology Used in the Financial Analysis

This analysis deals only with project-level financial attributes (predicted costs and revenues) of each alternative; and approached the analysis as though each alternative was a timber sale (PF Doc. FIN-11, pp. 32-36). An appraisal was then performed as though each alternative was actually being offered for sale at this time. The analysis was used to ascertain the probability of a timber sale (and therefore the alternative) being financially viable; it also serves as a tool that compares the alternatives against each other. A summary of that work is contained in the tables under "Financial Consequences."

Revenues and costs vary by action alternatives due to the level of management activities proposed. A computer program was used to calculate an expected stumpage (i.e. gross bid value) of timber harvested, on a sale-by-sale basis. The program runs the same regression equation that is contained in the Transactions Evidence (TE) appraisal model that is used for appraising actual timber sales (PF Doc. FIN-9). Since the model is based on several independent variables collected from actual bidding on recent similar sales within Region 1 of the Forest Service (northern Idaho and western Montana) production costs for logging and milling are reflected in the predicted rates. The 2003 second-quarter TE version was used to analyze action alternatives that propose timber harvest. The TE appraisal model works in combination with factors unique to the proposed harvest units (please refer to the table below). Volume-by-species is another factor used in the TE model; this data is contained in the Project Files (PF Doc. FIN-11, pp. 2-22). Typically higher bids are received if there are larger diameter trees, larger sale volumes, no helicopter yarding, shorter distance between mills and harvest units, and higher amounts of high-value tree species (such as white pine and cedar).

***Table 3-FIN-1. Site-specific Factors Affecting Expected Stumpage Values.***

| Feature | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|
| Net Volume (million board feet) | 4.6 | 5.7 | 0 |
| Yarding Systems (percent of volume) | | | |
| Tractor | <1 | <1 | 0 |
| Skyline | 24 | 11 | 0 |
| Helicopter | 75 | 88 | 0 |
| Average Diameter of Harvested Trees Inches) | 12 | 12 | NA |

Although uncertainty of the national economy looks to be over (discussed under section 3.8.3 Existing Conditions, below), a conservative approach was taken in financial modeling: figures generated by the 2003 TE model were used for the predicted stumpage values, but were applied against recent costs, overhead rates, and inflation factors.

Costs (such as road maintenance, fuels reduction and site preparation burning, and planting) were developed based on actual District costs. Road construction and reconstruction costs were also developed based on current costs. Cost estimates are summarized in the tables below; the Project Files (PF Doc. FIN-7) contain detailed documentation of cost estimates (which were adjusted for inflation) and overhead costs (PF Doc. FIN-3 and FIN-11, pp. 27-30). Net predicted stumpages were calculated by subtracting costs for road construction and reconstruction, reforestation, mitigation and other direct costs from the expected gross stumpage value. The costs of upgrading existing arterial roads (main travel/haul routes), to further reduce long-term risks to the watersheds, are included in the reconstruction costs.

*Quick-Silver* (Version 5) software was used to calculate Present Net Values for Table 3-FIN-5. A 4% discount rate was used, consistent with Forest Service Handbook 2409.18, section 32.25. *Quick-Silver* was developed by J. Michael Vasievich, North Central Research Station, USDA Forest Service (PF Doc. FIN-10). Printouts that resulted from the use of this program are included in the Project Files (PF Doc. FIN-11, pp. 37-40).

Please refer to Table 3-FIN-2 and the Project Files (PF Doc. FIN-11, pp. 31-36) to view printouts displaying purchaser costs. A summary of the analysis results are displayed in Table 3-FIN-3, which also reflects the sensitivity of the alternatives to a timber market turndown. The financial efficiency analysis does not include non-commodity costs, which is consistent with Forest Service Handbook 2409.18, section 32.5 (PF Doc. FIN-R2). Non-commodity values were not included in this analysis (i.e., an Economic Efficiency Analysis was not conducted) because effects to the resources that give rise to the non-commodity values are evaluated under the specific resource section. In complying with NEPA, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are qualitative considerations (40 CFR 1502.23; PF Doc. FIN-R3). Analysis of monetary and social impacts on the human population, which in-turn has effects on the greater environment well outside of the analysis area, are appropriate at the Forest Plan level of analysis. What is important in maximizing net public benefits, which cannot be calculated nor assigned monetary values, is " the agency's public involvement and collaborative processes, not its analytical procedures…," (Bartuska 2000; PF Doc. FIN-R1). For additional discussion, please refer to 3.8.5 Consistency With Forest Policy and Legal Mandates.

***Table 3-FIN-2. Cost Estimates for Proposed Activities.***

| Project Activity | Cost* | Per Unit |
|---|---|---|
| **Roads: Timber Sale** | | |
| Maintenance (during sale) | $0.54 | /mile/mbf |
| Maintenance (presale) (blading roads, brushing cut-slope) | $1,050 | /mile |
| Reconstruction | $1,400 | /mile |
| Recondition | $18,500 | /mile |
| New permanent road construction | $ 30,000 | /mile |
| New temporary road construction | NA | /mile |
| **Fuel Treatment: Purchaser** | | |
| Slash unmerchantable and brush/prep. for under burning | $100.00 | /acre |
| Grapple pile slash with a machine (excavator) | $250.00 | /acre |
| Pile slash at landings: | $667.00 | /acre |
| Fire line constructed by hand | $181.00 | /chain |
| Fire line constructed by machine | $55.00 | /chain |
| **Fuel Treatment: Forest Service** | | |
| Burn slash at landings: | $100.00 | /acre |
| Under burn in units for slash reduction and site preparation | $548.00 | /acre |
| **Erosion Control** | | |
| Seed skid trails and landings (purchaser) | $59.00 | /acre |
| Seed and water bar roads | $200.00 | /mile |
| **Noxious Weeds Control (Purchaser)** | $264.00 | /acre |
| **Essential Regeneration** | | |
| Post Harvest Exam | $14.00 | /acre |
| Plant (10x10 ft spacing) | $490.00 | /acre |
| Stocking surveys (3 each per acre planted) | $39.00 | /acre |
| **Watershed Recovery Projects (Road Obliteration and Storage)*** | | |
| Full recontouring | $5,000 | /mile |
| Partial re-contouring | $4,000 | /mile |
| Riparian road re-contouring | $27,280 | /mile |
| Removing crossings (cost depends on depth of fill) | $750 - $3,100 | each |
| Seeding | $300 | /crossing |
| Waterbar | $3 | chain |

** Please refer to the Project Files (Finances) for a discussion of values used for these factors (without overhead or inflation) and how they were applied.*

## 3.9.3 Existing Financial Conditions

Within northern Idaho, the Forest Service has been offering for sale 11 to 12 percent of the timber that was on the market the last few years. This figure is down from approximately 33 percent of the timber harvested during the late 1980s to early 1990s; which matched a trend throughout the western U.S. (Keegan III, et al, p. 9; PF Doc. FIN-R4, p. 25). Keegan co-authored Idaho's Forest Products Industry: A descriptive Analysis 1979-1996 that provides a detailed look at the causes of the timber market fluctuations, and the effects on both the local and national economy, over the past 20 years. The report also notes that the "net growth of timber on national forests exceeds harvest by several fold…"

For the past several years (prior to 2003), sales of timber from National Forest System lands in the Idaho Panhandle have been flat, matching the lumber/stumpage prices, and the number of jobs in the lumber and wood products industry has fallen locally. During 2003, stumpage prices began to rise, as attested by the bid-up amounts in timber sales. Besides the ongoing rate of growth for the local and regional area, several factors affect the timber market throughout a year and from year to year. These factors include interest rate adjustments, trade negotiations with Canada, tax cuts (or increases), and the mix of species and yarding systems in a sale contract. Because of the region's sustained growth, the drops in interest rates, and an ongoing dialogue with Canada over imports of Canadian timber, a drop in the timber market is not expected within the next year. Instead, market prices seem to be on an upward trend, and this optimism is reflected in the nationally traded lumber futures. The recovery of the U. S. economy as a whole, together with sustainability of expanding the number of jobs and housing starts in the region, corresponds well with the existing local stumpage market trend. Thus there is no indication that the gradual upward trend in stumpage prices should abate in the next one to two years; and the modeled predicted high bids for harvest alternatives are expected to be well within "the ball park" if an alternative containing a timber sale is prepared within the schedule modeled.

## 3.9.4 Financial Consequences

Timber Management Financial Viability: Implementing stand-management treatments would depend on having financially viable timber sales that the local forest products industry is willing to purchase or the availability of Congressionally-appropriated funding. Generating funds to help finance watershed and wildlife projects while having sales that are not below cost is also desirable. For such an analysis, all identifiable costs associated with timber sales (including administration, mitigation, sale preparation, and sale execution) were included. Printouts in the project files show a complete list of the benefit and cost items considered, overhead and inflation factors used, and the timelines applied to the alternatives (PF Doc. FIN-11, pp. 27-30).

The following tables provide a summary of the financial appraisal and financial efficiency analysis of each alternative. In Table 3-FIN-3, the "Difference Between Predicted and Minimum Bid per CCF" values indicate how far the timber market could fall before the funding of the other projects (such as contracted road obliteration, watershed restoration, and road closures for wildlife security) are in jeopardy of not being funded by sale-generated monies and would require appropriated funding. Modeling indicates that stumpage for both Alternatives 2 and 3 should not be expected to fund most of the fuel treatment costs. In the same vein, the market would have to rise, from where it is presently, $63/ccf for Alternative 2, and $44/ccf for Alternative 3, to fully fund all of the required contractual sale work plus fund the other featured projects (especially the eco-underburn of non-harvested stands that are part of Alternatives 2 and 3). Thus the alternatives are considered to be below cost if looked at from strictly a timber sale viewpoint. However, this financial picture was expected because a) the purpose and need of the EA is to reduce the ladder fuels in the area, b) the volume of trees per acre is low, and c) there is a high amount of helicopter yarding proposed for both of these Alternatives.

Alternatives 2 and 3 are essentially the same, with the expected high bid of Alternative 2 showing the financial effects of using more conventional yarding (less helicopter) systems. While the total gross of value of Alternative 3 is higher because it would harvest approximately 1.2 million board feet more than Alternative 2. Some of the saving in yarding costs in Alternative 2 went toward the associated higher road costs.

Alternatives 1 and 4 are not included in the Table 3-FIN-3 because harvesting is not a feature of these alternatives and thus do not have a predicted bid value associated with them.

Table 3-FIN-4 displays the short-term costs and sales revenue of all of the modeled alternatives, to include Alternatives 1 and 4. As expected, Alternative 4 is also a below cost alternative since it does not offer timber for sale. This table also shows the effects of the associated planning and administration costs. The benefits of planting in Alternatives 2 and 3, plus a sale 100 years from now was not modeled because of the long time horizon, although modeling of expected tree growth in that time is projected to be about twice as much for Alternatives 2 and 3 than for Alternative 4. This effect is evaluated under Forest Vegetation in this chapter.

In order to compare the action alternatives on the basis of their fuel treatment costs per acre, Present Net Cost Values of the associated fuel treatment items were calculated. The modeling was simplified in Alternatives 2 and 3, because they are so similar, and brought onto more of a common playing field with Alternative 4, by calculating how many acres of fuel treatment could be funded by applying the difference between expected (predicted) net bids and a minimum bid of $1/CCF to fuel treatment work (PF Doc. FIN-11, pp. 34). Specifically, in this scenario the purchaser accomplishes all harvest unit slashing, fire line construction, piling of landings, and pays into the BD fund for burning of all landings, underburning 300 harvest acres under Alternative 2 and underburning 440 harvest acres under Alternative 3, plus cover all planting costs. Then appropriated monies were used for the remaining fuels work (420 and 330 harvested acres respectively, plus 235 non-harvested acres for both alternatives). A total of 1,100 acres would be treated (non-harvested, harvested treated by purchaser, and harvested treated by appropriated monies) under Alternative 2, and a total of 1,180 acres under Alternative 3, and 375 acres under Alternative 4. The watershed restoration work was not specifically modeled and displayed because the cost of the work is quite small (Table 3-FIN-7) when compared to the cost of the fuel reduction work, and because it would be the same under all action alternatives involving harvesting.

The results of the above assumptions and modeling are displayed in Table 3-FIN-6, indicating that, on a Net Present Value-cost per acre basis, the sale of harvested trees can reduce the amount of appropriated monies needed to achieve the desired fuel treatment if the stumpage market allows the purchaser to accomplish the slashing, landing piling fire line construction, and pay into the BD fund for the underburning of about 300 acres for Alternative 2 and 440 acres for Alternative 3 of harvested stands. However, there is a break-even point in this work for Alternatives 2 and 3: if the timber market should fall about $20 per CCF for Alternative 2 and about $22 per CCF for Alternative 3 (PF Doc. FIN-11). On the other hand, if the market/bids should go up there would be a greater savings of appropriated (taxpayer) monies.

When appropriated monies is used to accomplish <u>all</u> of the fuel treatment work then the cost per acre to the taxpayer is the greatest. This is demonstrated by comparing the present net values of costs in Table 3-FIN-6 (bottom line) compared to the bottom line of Table-FIN-5. It is obvious that Alternative 4, which accomplishes fuel reduction work without a timber sale, would carry the highest fuels treatment cost per acre

***Definitions***

The **stumpage value** reflects the size of timber harvested (average diameter), volume per acre, species composition, planned yarding method (helicopter, skyline, cable or tractor) and hauling distance (on paved and unpaved roads).

**Timber sale contractual costs** are those costs that are considered in the timber purchaser's bid, which includes contractual requirements. The timber purchaser is billed for Forest Service slash treatment to be completed after the sale. Normally, a timber sale would not have as much road obliteration or reconstruction that is planned for watershed restoration in many of these alternatives. The other contractual items are generally indicative of the type and amount of contractual work required in a timber sale.

The **predicted bid** is the stumpage price, minus the total of the other contractual costs. The estimated bid per hundred cubic feet is calculated by dividing the predicted bid by the estimated volume.

The **Difference Between Predicted and Minimum Bid** was determined by adding the costs of all the contractual items *plus* the cost of stand regeneration and other featured KV projects then subtracting that sum from the predicted net stumpage. The resulting number indicates how much "cushion" is available in the predicted net bid-up before some of the projects would not be funded. In other words, it shows how much the price of a bid could fall, due to market forces, and still cover featured KV work. On a sale-by-sale basis, this number was also used to determine below cost sales; which is when the costs of timber sale contractual items, plus featured projects, are higher than the predicted bid.

($1,462). The lower figures in Table 3-FIN-6 ($568 and $468, respectively) are indicative of the value of the trees being returned, in part, directly back to accomplishing fuels reduction work on the ground via a timber sale purchaser.

***Table 3-FIN-3. Summary of purchaser contractual costs and sensitivity of featured KV (planting) and KV-Other project funding to market fluctuations were all the work is accomplished via a commercial timber sale contract. (There would be no sale of timber under Alternatives 1 or 4.) Purchaser contractual costs include fuel reduction work on harvested areas, while the KV-Other costs include non-mitigation watershed work, pre-commercial thinning, and fuels reduction work on non-harvested areas.***

| | Alt. 2 | Alt. 3 |
|---|---|---|
| Total of stumpage (gross predicted high bid) | $1,295,000 | $1,487,000 |
| Total sale contractual costs | $1,102,000 | $1,139,000 |
| Total of stumpage minus contractual costs | $193,000 | $349,000 |
| Predicted (net) bid/ccf | $18 | $26 |
| Total other featured costs (KV [planting], and KV-Other [pre-commercial thinning, fuels reduction on non-harvested areas, and non-mitigation watershed/road restoration]) | $865,000 | $943,000 |
| Stumpage minus contractual and other featured costs | ($671,000) | ($549,000) |
| Minimum bid to cover all featured key projects (/ccf) | $81 | $70 |
| Difference between predicted and minimum bid (/ccf) needed to fund all BD and KV work, plus other work that could be accomplished under KV-Other deposits. | ($63) | ($44) |

***Table 3-FIN-4. Benefit and Cost Items and Amounts used in the Financial Analysis.***

| With Overhead and Inflation | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| ***Revenue*** | | | | |
| Stumpage value (predicted net bid) [1, 2] | NA | ($14,000) | ($188,000) | NA |
| ***Financial Costs*** | | | | |
| Planning | $200,000 | $200,000 | $200,000 | $200,000 |
| Sale Preparation | $0 | $126,000 | $156,000 | $0 |
| Harvest Administration | $0 | $16,000 | $20,000 | $0 |
| Engineering Administration | $0 | $6,000 | $3,000 | $0 |
| Slash disposal/site prep non-harvested stands (FS) | $0 | $268,000 | $262,000 | $497,000 |
| Reforestation (FS) | $0 | $543.000 | $623,000 | $0 |
| Road storage and decommissioning for watershed restoration (FS)[3] | $0 | $38,000 | $38,000 | $0 |
| Pre-commercial Thin | $0 | $15,000 | $15,000 | $11,000 |
| $0.50/MBF to US Treasury | $0 | $2,000 | $3,000 | $0 |
| ***Total of short-term modeled cash flows*** | ($200,000) | ($1,022,000) | ($977,000) | ($709,000) |

[1] *A lower inflation value was used for Alternative 4 because the work could be accomplished earlier, as it does not rely on the completion of a timber sale.*

[2] *Estimated stumpage value after purchaser contractual work is removed from the high bid, along with BD and KV deposits.*

[3] *Non-mitigation work.*

***Table 3-FIN-5. Financial efficiency if the Forest Service accomplishes all fuel-related work, which the agency normally undertakes in regards to a timber sale, through appropriated fuels funding instead of collecting BD deposits.***

| Activities | Alternative2 | | Alternative 3 | | Alternative 4 | |
|---|---|---|---|---|---|---|
| | Units | Total $ | Units | Total $ | Units | Total $ |
| Slashing in non-harvest units | 235 acres | $22,000 | 235 acres | $22,000 | 310 acres | $35,000 |
| Lop & scatter | 0 acres | $0 | 0 acres | $0 | 15 acres | $1,000 |
| Chipping | 9 acres | $0 | 9 acres | $0 | 10 acres | $26,000 |
| Hand pile | 45 acres | $116,000 | 45 acres | $116,000 | 45 acres | $111,000 |
| Burn hand piles | 45 acres | $11,000 | 45 acres | $11,000 | 45 acres | $10,000 |
| Burn grapple piles | 65 acres | $16,000 | 65 acres | $16,000 | 0 acres | $0 |
| Handline construction | 410 chains | $88,000 | 375 chains | $81,000 | 415 chains | $86,000 |
| Machine construction | 10 chains | $1,000 | 10 chains | $1,000 | 10 chains | $1,000 |
| Burn Landings | 85 acres | $11,000 | 95 acres | $12,000 | 0 acres | $0 |
| Underburn in harvest units | 720 acres | $537,000 | 770 acres | $574,000 | 0 acres | $0 |
| Underburn in non-harvest units | 235 acres | $175,000 | 235 acres | $175,000 | 340 acres | $227,000 |
| ***Subtotal*** | | $982,000 | | $1,012,000 | | $497,000 |
| Present Net Value Costs (Discounted) | | ($911,000) | | ($938,000) | | ($497,000) |
| ***PNV cost per acre treated**** | | ***($920)*** | | ***($902)*** | | ***($1,462)*** |

* *A total of 1,100 acres would be treated (non-harvested, harvested treated by purchaser and harvested treated by appropriated monies) under Alternative 2, with a total of 1180 acres under Alternative 3, and 375 acres under Alternative 4.*

***Table 3-FIN-6. Financial efficiency if the purchaser accomplishes a portion of the fuel work (all harvest unit slashing, fire line construction, piling at landings) and pays into the brush disposal fund for burning of all landings and for burning 300 acres of a harvest unit under Alternative 2 and 330 acres in Alternative 3 to the point that net predicted bids essentially equals costs, and the remainder of work is accomplished by appropriated fuels funding:***

| Activity | Alternative 2 | | Alternative 3 | |
|---|---|---|---|---|
| | Units | Total $ | Units | Total $ |
| Slashing harvest units | 0 acres | $0 | 0 chains | $0 |
| Slashing non-harvest units | 235 acres | $28,000 | 235 acres | $28,000 |
| Pile landings | 0 acres | $0 | 0 acres | $0 |
| Hand line construction | 410 chains | $88,000 | 375 chains | $81,000 |
| Machine construction | 10 chains | $1,000 | 10 chains | $1,000 |
| Underburn harvest units | 300 acres | $313,000 | 440 acres | $246,000 |
| Underburn non-harvest units | 235 acres | $175,000 | 235 acres | $175,000 |
| **Total** | | $605,000 | | $530,000 |
| Present Net Value Costs (Discounted) | | ($562,000) | | ($530,000) |
| ***PNV costs per acre treated**** | | ***($568)*** | | ***($486)*** |

* *A total of 1,100 acres would be treated (non-harvested, harvested treated by purchaser and harvested treated by appropriated monies) under Alternatives 2, with a total of 1180 acres under Alternative 3.*

## Direct, Indirect and Cumulative Financial Effects at the Coeur d'Alene River Ranger District Project Area Scale

Alternatives 1 and 4 do not propose timber sale activities and thus no trees would be harvested under this alternative. Nor would any fuel treatment occur under Alternative 1; while all fuel treatments and aquatic restoration features would need to be carried by appropriated funds and/or grants under Alternative 4.

Alternatives 2 and 3 would produce forest products in the short term, and half again to over double the potential cubic foot growth per acre in the long term over what would occur under Alternatives 1 and 4 (please refer to Table 3-VEG-26 in the Forest Vegetation section of this chapter). Traditional employment opportunities in the woods product industry would be similarly affected, and contribute to continuing operation of local mills, thus, directly and indirectly enhancing the local and state economy through employment and tax revenues. Planting via Alternatives 2 and 3 would have a similar effect on the local

economy. Also, there is a good chance that Alternatives 2 and 3 can produce monies that would reduce the amount of needed appropriated funding for fuel treatments (Table 3-FIN-6), plus the treated sites would be replanted back to a more suitable mix of tree species.

Through the design of Alternatives 2 and 3, a portion of the total watershed recovery work identified in the analysis area can be achieved (Table 3-FIN-7) by contracts let by the Coeur d'Alene River Ranger District that are funded by expected stumpage revenues, and/or by appropriated funding. These are not mitigation features.

Employment opportunities would also occur from watershed restoration activities under Alternative 4; but with Alternative 4 there would be a lesser degree of employment opportunities because of a much lesser amount of fuels treatment, and no road maintenance activities are associated with this alternative. It is anticipated that the sale of timber from National Forest Lands under Alternatives 2 and 3 would have very little effect on the price that private land owners receive for their timber, because the timber under this proposal would be part of the IPNF's normal timber program.

***Table 3-FIN-7. Accomplishment of Watershed Restoration Work through KV (Other) Contracts Funded by Sale Stumpage or Appropriated Funding***

| Activity | No-Action & Alt. 4 | Alternatives 2 & 3 |
|---|---|---|
| Cost of road restoration/obliteration | $0 | $5,500 |
| Miles of road restoration/decommissioning | none | 1.1 |
| Cost of stream crossings removed | $0 | $10,800 |
| Number of stream crossings removed | none | 14 |
| Cost of Upgraded Stream Crossings | $0 | $9,000 |
| Number of Upgraded Stream Crossings | none | 3 |
| Cost of Water-bars and Seeding | $0 | $1,100 |
| **Total costs** | **$0** | **$26,392** |

** The costs listed in the table do not include inflation or overhead. The effects of inflation and overhead factors are contained in Table 3-FIN-3 through Table 3-FIN-6.*

As displayed in Tables 3-FIN-3 through 3-FIN-6, special funding and/or grant monies would need to be sought for work not accomplished by a timber sale purchaser and/or timber stumpage.

**Cumulative Financial Effects**

Alternatives 2 and 3 would produce forest products in the short term, and half again to over double the potential cubic foot growth per acre over the long term over Alternatives 1 and 4 (please refer to Table 3-VEG-26 in the Forest Vegetation section of this chapter). Traditional employment opportunities in the woods product industry would be similarly affected, and contribute to continuing operation of local mills, thus, directly and indirectly enhancing the local and state economy through employment and tax revenues.

A timber sale offered under Alternatives 2 and 3 would be part of the volume normally offered for sale by the IPNF (described under 3.8.3 Existing Conditions); and would therefore not generate additional timber volume that could adversely affect the regional timber market or private landowners with timber to sell.

The amount of watershed improvement work accomplished would be the same for all action alternatives, which would lower risks to the watersheds through a combination of culvert upgrading or removal, and storage or obliteration of roads.

**Funding of the Identified Opportunities**

All of the action alternatives would be dependent upon appropriated and/or grant monies to some extent. Historically, very little of these funds have been available for watershed restoration work; especially in the amount necessary to complete the full spectrum of inventoried work on the ranger district. A change in that funding trend is not expected in the foreseeable future. The foregoing discussions involving the probabilities of the predicted

stumpage bid-ups being realized can be also applied to timber sale funding of the watershed opportunity work that is identified by alternative. Two other possible sources of funding include:

1. *Appropriated hazardous fuels treatment money is appropriated to the district each year, and is to be spent in a manner consistent with the National Fire Plan, 10-Year Comprehensive Strategy and 10-Year Comprehensive Strategy Implementation Plan (the activities proposed in the Twomile Resource Area are consistent with the Strategy). The priority for expenditure of this money is the wildland/urban interface. The Twomile Resource Area is within and adjacent to the urban interface and is designed to help protect the community from the effects of a large fire.*
2. *The "Secure Rural Schools and Community Self-Determination Act of 2000" provides increased funding to counties, a portion of which is designated for projects on National Forest System lands. The Idaho Panhandle Resource Advisory Committee is charged with dispersing this money for various resource management projects. It is possible that the activities identified for implementation in the Twomile Resource Area could receive funding from the Idaho Panhandle RAC.*

## 3.9.5 Consistency With Forest Policy and Legal Mandates

Forest-wide goals, objectives, and standards for finances are not specifically addressed in the Forest Plan. This issue is addressed indirectly in the discussion of community stability. Chapter II of the Forest Plan states, "Management activities will continue to contribute to local employment, income, and life-styles. The Forest will be managed to contribute to the increasing demand for recreation and resource protection while at the same time continuing to provide traditional employment opportunities in the woods product industry," (Forest Plan, page II-11). All the action alternatives would meet this Forest Plan direction to varying extents.

## 3.9.6 References Cited in the Financial Analysis

Carlson, John, 1999. Personal communication with John Carlson, USDA Forest Service, Idaho Panhandle National Forests.

Steward, Fred, 1999. Personal communication with Fred Steward, Northern Region Economist, USDA Forest Service.

USDA Forest Service, 1997. Timber Sale Planning and Analysis System (TSPAS). USDA Forest Service, General Technical Report INT-GTR-348.

USDA Forest Service Handbook 2409.18, section 32.

# 3.10 THREATENED, ENDANGERED AND SENSITIVE (TES) PLANTS

## 3.10. 1 Regulatory Framework for TES Plants

Federal legislation, regulations, policy and direction that require protection of species and population viability, evaluation and planning process consideration of threatened, endangered and other rare (Forest Service "sensitive") plants species include the Endangered Species Act (1973) as amended; the National Forest Management Act (1976); the National Environmental Policy Act (1969); Forest Service manual 2670.1-2673.4 (PF Doc. TES-1); Forest Plan, 1987 (PF Doc. TES-2, pp. II-1, 5, 6, and 27); and direction from the Regional Watershed, Wildlife, Fisheries and Rare Plants program and Washington Office.

## 3.10. 2 Methodology Used in the Analysis for TES Plants

**Methodology Used in Assessment of Existing Plant Conditions**

The geographic scope of the analysis for sensitive plants is the Twomile Resource Area boundary. A pre-field review was conducted of aerial photos, topographical maps, Idaho Department of Fish and Game Conservation Data Center (ICDC, 2002; PF Doc. TES-3) element occurrence records, Timber Stand Management Records System (TSMRS), U.S. Fish and Wildlife Service National Wetlands Inventory Maps (USDI, 1987; PF Doc. TES-4) and recent literature.

This assessment describes the extent of all rare plant guilds in the Resource Area. The potential for Threatened, Sensitive, and Forest Species of Concern (FSOC) plant occurrence in the Resource Area was based on an assessment of potential habitat for the thirty species that may occur on the Coeur d'Alene River Ranger District. The Coeur d'Alene Threatened and Sensitive plant species list may be broken into eight general habitat guilds; moist forest, wet forest, dry forest, grassland, alpine/subalpine, alluvial/deciduous shrub, aquatic, and peatland (Mousseaux, 1998; PF Doc. TES-5). TSMRS queries were used to identify high potential Sensitive plant habitat by guild in the Resource Area (PF Doc. TES-6). Photo interpretation, USFWS Wetland Maps, and personal knowledge of similar habitats were used to refine data derived from TSMRS. Areas considered to be high potential habitat for Sensitive plants were identified on a topographic map (PF Doc. TES-17). High potential habitats where project work is proposed would be field surveyed prior to project implementation.

**Methodology Used in Assessment of Environmental Consequences to TES Plants**

Analysis was conducted using results of past sensitive plant surveys, current distribution and condition of sensitive plant species in habitats similar to those found in the proposed treatment sites, types of proposed treatments and the likely effects to existing populations and habitat from the proposed activity based on current knowledge and professional judgment. It included a broad-scale assessment of the distribution and suitability of sensitive plant habitat in relation to proposed activities and a detailed analysis of each proposed activity and the need for mitigation, including field surveys. Discussion of effects will focus on the grassland, and wet, moist, and dry forest guilds, as these are the habitats most likely to be affected by proposed activities. The Project Files include lists of stands where activities are proposed under each alternative, including potentially affected plant guilds and acreage (PF Doc. TES-35). The cumulative effects analysis area for TES plants is the Twomile Resource Area.

Effects to sensitive plant species or suitable habitat from proposed activities are generally described as very low, low, moderate or high, with the following definitions:

> ***very low*** *= no measurable effect on individuals, populations or habitat*
>
> ***low*** *= individuals, populations and/or habitat not likely affected*
>
> ***moderate*** *= individuals and/or habitat may be affected, but populations would not be affected, and habitat capability would not over the long term be reduced below a level which could support sensitive plant species*
>
> ***high*** *= populations may be affected and/or habitat capability may over the long term be reduced below a level which could support sensitive plant species*

Indicators used to measure effects on Sensitive plants and suitable habitat include: the effects of harvest treatments, the amount of each proposed activity, the extent of ground disturbance resulting from activities, and the proximity of known sensitive plant occurrences and suitable habitat to proposed activities. The following table displays the risk of effects to rare plants from various types of disturbance and activities. The level of risk to Sensitive plants from various types of disturbance was used in the evaluation of environmental consequences.

***Table 3-TES-1. Summary of risk to sensitive plants and Forest Species of Concern from proposed activities in highly suitable habitat, by plant guild.***

| Proposed Activity or Event | Rare Plant Guild potentially affected | Risk of Adverse Impacts to Sensitive Plant Occurrences (without mitigation) |
|---|---|---|
| Loss of < 50% canopy due to insects or disease | Wet Forest/ Moist Forest / Dry Forest Forest Guild | Low to Moderate |
| Loss of > 50% canopy due to insects or disease | Wet Forest/ Moist Forest / Dry Forest Guild | Moderate to High |
| Regeneration harvest, including site prep. | Moist Forest / Dry Forest Guild | High |
| Commercial thinning and selective harvest using ground based equipment | Moist Forest / Dry Forest Guild | High |
| Helicopter and Roadside Selection harvest | Moist Forest/ Dry Forest | Low |
| Full Road Obliteration | Wet Forest/ Moist Forest / Dry Forest Guild | High |
| New road construction | Wet Forest / Moist Forest / Dry Forest/Peatland | High |
| Road reconstruction/reconditioning | Wet Forest / Moist Forest / Dry Forest | Low |
| Channel crossing removal (culverts) | Wet Forest / Moist Forest | Low to Moderate |
| Road closure, ripping, seeding | All | Low |
| In-stream fisheries/watershed restoration (structure placement w/equipment) | Deciduous Riparian/Wet Forest/Peatland | High |
| Fuel reduction by underburning | Wet Forest/ Moist Forest / Dry Forest | Moderate to High |
| Fuels reduction - mechanical | Moist Forest / Dry Forest | Moderate to High |
| Fuel break construction | Wet Forest / Moist Forest / Dry Forest | Moderate to High |
| Noxious weed prevention and treatment | Dry Forest / Moist Forest | Low to Moderate |
| Stand replacing wildfire | Wet Forest / Moist Forest / Dry Forest | Moderate to High |

** Some Dry Forest sensitive plant species may be dependent on periodic low levels of disturbance from fire, such as that which occurred historically in some dry forest habitats. The timing of an underburn relative to soil moisture in suitable habitat and the flowering and fruiting of the plant species of concern also influences potential effects.*

For unsurveyed habitat that is highly suitable to support Sensitive plants, presence is assumed. Protection of large occurrences and contiguous, unoccupied highly suitable habitat is assumed to be an effective conservation strategy (Burgman, et al 2001, PF Doc. TES 37). Examples of conservation strategies for Region 1 include Lichthardt, 1995 (PF Doc. TES-38), Lichthardt 2003 (PF Doc. TES-8), and Lorain, 1991 (PF Doc. TES-39). As described in “Features Designed to Protect Rare Plants” (Chapter 2), populations would be protected, while some isolated individuals may be impacted by activities. For occurrences that are likely to be discovered during field surveys prior to project implementation, mitigation measures would be designed by the project botanist to ensure populations are protected.

Effects to population viability from disturbance events (natural or man-caused) are difficult to quantify with certainty for all Sensitive plant species and FSOC. Specific knowledge of population ecology is lacking for several species addressed in this analysis, particularly the sensitive moonworts and certain orchid species: round-leaved rein orchid and phantom orchid. Much of the current knowledge regarding sensitive plant species is based on observational (non-empirical) and even anecdotal information. Recent literature and monitoring reports on several species, including deerfern (IPNF, PF Doc. TES-7), clustered lady’s-slipper (Lichthardt 2003; PF Doc. TES-8), Henderson's sedge, Constance's bittercress (Lichthardt 1998; PF Doc. TES-9) and Idaho strawberry (Crawford 1980, PF Doc. TES-10), provide a greater understanding of the relationship of habitat disturbance to the integrity of populations of these species.

## 3.10.3 Existing Plant Conditions

**Existing Threatened and Endangered Plant Species**

There are no federally listed Endangered plants for the Idaho Panhandle National Forests.

A Threatened species, as determined by the US Fish and Wildlife Service, is any species that is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range. Currently, the US Fish and Wildlife Service (USDI 2002, PF Doc. TES-11) list three species as Threatened for the Idaho Panhandle National Forests, water howellia (*Howellia aquatilis)*, Ute ladies'-tresses (*Spiranthes diluvialis*), and Spalding's catchfly (*Silene spaldingii*). There are no documented occurrences of these species on Idaho Panhandle National Forest lands, although suitable habitat is suspected to occur.

**Existing Candidate Plant Species**

Candidate species are those species which the US Fish and Wildlife Service believes sufficient information is available on biological vulnerability and threats to support proposals to list them as Endangered or Threatened. Slender moonwort (*Botrychium lineare*) was listed as a Candidate species by the U.S. Fish and Wildlife Service on June 6, 2001(USDI 2001; PF Doc. TES-12). Candidate species are not addressed in Biological Assessments. This species is not currently listed on the Regional Forester's Sensitive Plant List (March 1999, PF Doc. TES-13), so it is not addressed as a Sensitive species in Biological Evaluations. According to Forest Service Manual direction, the Forest Plan and NFMA, potential effects of Forest Service projects on Candidate species will be considered in environmental planning. Slender moonwort is addressed as a Forest Species of Concern in this document because of concerns for its viability throughout its range.

**Existing Sensitive Plant Species and Forest Species of Concern**

The subbasins of northern Idaho contain a wide array and diversity of habitats and plant communities, many of which contain plant species that are known or thought to be rare. Of the estimated 1,200 to 1,500 plant species known or thought to occur here, about 10% are considered rare or uncommon. Sensitive species are determined by the Regional Forester as those species for which population viability is a concern, as indicated by a current or predicted downward trend in population numbers or in habitat capability which would reduce the species' existing distribution. Twenty-nine species of Sensitive plants are known or suspected to occur within the Coeur d'Alene subbasin (refer to Table 3-TES-2). Plant species identified as "Forest Species of Concern" (FSOC) are species that may not be at risk on a range-wide, regional or state scale, but may be imperiled within a planning area, such as a National Forest (USDA 1997, PF Doc. TES-14, p. 5). FSOC are addressed in effects analyses to provide for maintenance of population viability as directed in NFMA. Biological Evaluations are not required to address FSOC. A discussion of habitats for FSOC is included within the discussion of rare plant guilds.

Threatened and Sensitive plants and Forest species of concern can be assigned to one or more rare plant guilds (Mousseaux). These guilds are artificial assemblages based on similar habitat requirements used for the purpose of analysis. For the Coeur d'Alene River Ranger District, the rare plant guilds are aquatic, deciduous riparian, peatland, wet forest, moist forest, dry forest, grassland, and subalpine. Rock seeps and springs are microsites that can support certain sensitive plants; however, these can occur across all guilds and are not identifiable at a coarse scale. Refer to the Project Files (PF Doc. TES-5) for specific plant guild descriptions. Rock seep habitats will be detected through field surveys. The following table lists Region 1 Sensitive and Threatened plant species by habitat guild that are known or suspected to occur in the Coeur d'Alene sub-basin.

***Table 3-TES-2. Coeur d'Alene Threatened, Endangered and Sensitive Plants by Rare Plant Habitat Guild (March 1999)****

| Status and Species | Common Name | Habitat Guild |
|---|---|---|
| **Threatened** | | |
| *Howellia aquatilis* | water howellia | Aquatic |
| *Spiranthes diluvialis* | Ute Ladies'-tresses | Deciduous Riparian |
| *Silene spaldingii* | Spalding's catchfly | Dry grassland/grassy openings in Dry Forest |
| **Sensitive** | | |
| *Asplenium trichomanes* | maidenhair spleenwort | rock seeps in Moist/Wet Forest |
| *Blechnum spicant* * | deerfern | Moist/Wet Forest |
| *Botrychium ascendens* * | upswept moonwort | Wet Forest |
| *Botrychium crenulatum* * | dainty moonwort | Wet Forest |
| *Botrychium lanceolatum* * | triangle moonwort | Wet Forest/Moist Forest |
| *Botrychium minganense* * | Mingan moonwort | Wet Forest/Moist Forest |
| *Botrychium montanum* | western goblin | Wet Forest |
| *Botrychium paradoxum* | paradox moonwort | Wet Forest/Moist Forest |
| *Botrychium pendunculosum** | stalked moonwort | Wet Forest |
| *Botrychium pinnatum* * | northwestern moonwort | Wet Forest/Moist Forest |
| *Botrychium simplex* | least moonwort | Wet Forest/Moist Forest |
| *Buxbaumia aphylla* | leafless bug-on-a-stick moss | Subalpine |
| *Buxbaumia viridis* * | green bug-on-a-stick moss | Wet Forest |
| *Cardamine constancei* * | Constance's bittercress | Deciduous Riparian/Moist/Wet Forest |
| *Carex chordorrhiza* | string-root sedge | Peatland |
| *Carex hendersonii* * | Henderson's sedge | Moist/Wet Forest |
| *Carex livida* | livid sedge | Peatland |
| *Carex xerantica* | dryland sedge | Subalpine |
| *Cetraria subalpina* | iceland-moss lichen | Subalpine |
| *Collema curtisporum* * | short-spored jelly lichen | Deciduous Riparian |
| *Cypripedium fasciculatum* * | clustered lady's slipper | Moist/Wet/Dry Forest |
| *Hookeria lucens* | clear moss | Wet Forest |
| *Hypericum majus* * | large Canadian St. John's wort | Peatland |
| *Mimulus alsinoides* | chickweed monkeyflower | rock cliffs/seeps in Wet/Moist/Dry Forest |
| *Rhynchospora alba* | white beakrush | Peatlands |
| *Scheuchzeria palustris* * | pod grass | Peatlands |
| *Scirpus subterminalis* | water clubrush | Peatlands |
| *Thelypteris nevadensis* | Sierra woodfern | Wet Forest Seeps |
| *Waldsteinia idahoenesis* * | Idaho barren strawberry | Moist and Wet Forest |

**Species with documented occurrences in the Coeur d'Alene sub-basin, includes Forest Service and other ownership.*

*** Based on the Regional Forester's TES species list, march 1999.*

## Extent and Type of Suitable TES Habitat

Suitable habitat for five of the eight Rare Plant Guilds is present in the Resource Area. The extent of the habitats is displayed in the table below. There is no suitable habitat present for the Deciduous Riparian, Aquatic, and Peatland Guilds. The project files contain descriptions of Rare Plant Guilds and species with potential for effects from proposed activities in the Twomile Resource Area (PF Doc. TES-5).

***Table 3-TES-3. Rare plant guilds in the Twomile Resource Area.***

| Rare Plant Guild | Acres of suitable habitat in resource area | Percent of resource area in suitable habitat |
|---|---|---|
| Moist Forest | 1,061 | 18 |
| Wet Forest | trace | <1 |
| Dry Forest | 1,548 | 26 |
| Grassland | 537 | 9 |
| Subalpine | 20 | <1 |
| Deciduous Riparian | 0 | 0 |
| Peatland | 0 | 0 |
| Aquatic | 0 | 0 |

** Table acreage and % area pertains to National Forest System Lands only.*

**Plant Surveys and Documented Occurrences**

Alternative design features and mitigation measures (Chapter 2) provide for field surveys to be completed in all previously unsurveyed areas of highly suitable habitat where activities would take place. In addition, some previously surveyed areas may be resurveyed, as deemed necessary. The need for field surveys is based on habitat suitability and the risk of effects to Sensitive plants and habitat due to project activities. Table G-TES-1 illustrates the risk to Sensitive plants and Forest Species of Concern from various types of disturbance. Field surveys would be completed prior to project implementation. Regional direction (Leonard 1992; PF Doc. TES-15) states that the need for and extent of field reconnaissance should be commensurate with the risk associated with the project, the species involved, and the level of knowledge already in hand. Approximately 800 acres in the Resource Area have been field surveyed for this project. Copies of the surveys are contained in the project files (PF Doc. TES-16). There are a total of four rare plant occurrences in the Twomile Resource Area. Two new occurrences of bank monkeyflower (*Mimulus clivicola*), a Forest Species of Concern, were located during field surveys in 2003. In addition, there is one previously discovered occurrence of bank monkeyflower, and one occurrence of deerfern (*Blechnum spicant*). There are no occurrences of Threatened and Endangered plants in the Resource Area.

**Rare Plant Species with Potential for Effects from Project-Related Activities**

Analysis indicates that the Dry Forest, Moist Forest, Grassland, and, to a lesser extent, the Wet Forest plant guild and associated species have the greatest potential to occur in the Twomile Resource Area, and may be affected by project-related activities. Potential Alpine/Subalpine habitat was indicated in the coarse-filter data analysis, however, it was found to be unsuitable during field surveys. Alpine/subalpine habitat generally occurs at elevations greater than 5,000 feet in the Coeur d'Alene subbasin. The species associated with this guild are not likely to be present, and therefore, were not analyzed further. Habitat for Aquatic, Deciduous Riparian, and Peatland Guild species does not exist in the Resource Area.

A complete description of Rare Plant Guilds and species of the Coeur d'Alene River Basin and a map of existing Sensitive plant habitat and occurrence are contained in the Project File (PF Doc. TES-5 and TES-17)). Suitable Threatened, Sensitive and Forest Species of Concern plant habitat that may be affected by proposed activities would be surveyed prior to project implementation to determine presence or absence of these species.

***Dry Forest Plant Guild***

Dry Forest Guild habitat is the predominant Rare Plant Guild in the Resource Area, occupying approximately 26 percent of the Forest Service lands (Table 3-TES-3). Clustered lady's-slipper orchid (*Cypripedium fasciculatum*), is the most likely Sensitive plant species of this guild to occur based on habitat suitability. It is is of particular concern because of its rarity, growth habitat and vulnerability to certain types of disturbance. Bank monkeyflower (*Mimulus clivicola*), a Forest Species of Concern (FSOC), and member of the Dry Forest Guild, has been documented in the Resource Area and may be affected by proposed activities.

Clustered lady's slipper orchid (*Cypripedium fasciculatum*), is found in portions of eight western states: California, Oregon, Washington, Idaho, Montana, Wyoming. Colorado, and Utah. Distribution is patchy throughout its range and populations tend to be small. In Idaho there are 116 documented Element Occurrences (EO's) extending from Kootenai County, south to the South Fork of the Clearwater River. In Idaho the habitat preference includes both moist western red cedar/hemlock forest and dry Douglas-fir/grand fir. On the Coeur d'Alene portion of the IPNF, the habitat preference is primarily dry forests.

There are 17 element occurrences of clustered lady's-slipper orchid documented on the IPNF, 7 of which occur on the Coeur d'Alene River Ranger District. Of these, one occurrence is a historical population that has not been relocated since 1934 (ICDC 2002, PF Doc. TES-3). An additional occurrence in the Coeur d'Alene subbasin is found on private land on the eastern shore of Coeur d'Alene Lake. All of the occurrences in the Coeur d'Alene subbasin are found in Dry Forests, with a Douglas-fir/ ninebark habitat type, in association with ponderosa pine. This species is not known to occur in the Resource Area, however there is a high likelihood that it may be present based on habitat suitability. The closest occurrence to the Twomile Resource Area is approximately 20 miles west in the Alder Creek drainage.

Clustered lady's-slipper is a rhizomatous, perennial orchid. As in other members of the orchid family, this species requires a symbiotic relationship with fungi in the soil for reproduction and development. It reproduces mainly by seed, but also may increase to a limited extent by rhizome. Because of its dependency on fungal associates, reproduction is typically low. Clustered lady's-slipper requires shade, either from overstory trees and/or shrubs, and a level of duff or litter. The amount of shade and duff necessary to sustain the species has not been established, and probably varies depending on habitat type, and other site factors. Natural or management-related disturbances that could affect soil fungi and overstory shade have the potential to impact clustered lady's-slipper survival. Disturbances of primary concern include fire, various types of timber harvest, thinning, and ground disturbance associated with these activities (Lichthardt 2003, PF Doc. TES-8, pp. 22-25). Observers generally agree that the rhizome of Clustered lady's-slipper is shallow (1-5 inches below the mineral soil surface) but differ as to how much protection this affords (Lichthardt 2003, PF Doc. TES-8, pp. 22-25).

Bank monkeyflower (*Mimulus clivicola*), a Forest Species of Concern (FSOC), has approximately 50 documented occurrences on the IPNF and 23 in the Coeur d'Alene River subbasin. Prior to 1999, it was listed as a Sensitive species on the IPNF. Additional information on threats and new occurrences lead to the listing change and its retention as a Forest Species of Concern.

Bank monkeyflower is a regional endemic of the Pacific Northwest, which is distributed from northern Idaho and adjacent Washington, southward to the southern end of the Snake River Canyon (Lorain, 1993, PF Doc. TES-18, pp. 6-7). The species is a small, herbaceous annual that occurs within a narrow set of environmental conditions. Plants are found almost exclusively on southerly aspects with slopes of 60 percent or greater and seasonally moist, exposed, mineral soils. Bank monkeyflower most often occurs in openings in ponderosa pine, Douglas-fir or, occasionally, grand fir forest dominated by a grass or shrub understory. The elevation range at which the species is found varies from 2,200 to 4,900 feet. The closest occurrence to the Project Area is on Bureau of Land Management lands, about 15 miles southwest of the Resource Area near Mt. Weissner. There is suitable dry, open Douglas-fir/Ponderosa pine forest present in the Resource Area, mainly on steep, south-facing slopes. Two occurrences have been documented in Revenue Gulch and the East Fork of Twomile Creek. Documentation of the occurrences is included in the Project File under rare plant surveys.

***Moist Forest Plant Guild***

Moist Forest Guild Sensitive plant habitat occupies approximately 18 percent of the Forest Service lands in the Resource Area, mainly on northeast and northwest slopes, and in drainage bottoms. Of the Moist Forest Sensitive plants, deerfern (*Blechnum spicant*), Henderson's sedge (*Carex hendersonii*), and Constance's bittercress (*Cardamine constanei*) are the most likely species to be affected by project activities based on the presence of suitable habitat and proximity of documented occurrences to the project area. Sensitive moonworts (*Botrychium spp.*), may occur in moist to wet habitats in the Resource Area primarily in riparian zones and near seeps or springs if present.

Deerfern (*Blechnum spicant*) is a long-lived, evergreen, perennial fern favoring moist forest and riparian areas in cedar/hemlock forest. The distribution of deerfern is interruptedly circumboreal. It is found chiefly in the Cascade Mountains but has disjunct populations in Idaho and British Columbia. There are 27 occurrences of deerfern documented on the IPNF. Seven are known to occur on the Coeur d'Alene River Ranger District. One occurrence is present in the Resource Area in the East Fork of Twomile Creek, and may be affected by proposed activities. The extent of this species occurrence in the Resource Area is not documented, as thorough surveys of suitable wet and moist habitats have not been conducted.

Constance's bittercress (*Cardamine constanei*) is an Idaho endemic species that is most likely to occur in partly shaded riparian areas and moist cedar/hemlock forest at lower elevations (below 4,000 feet). Although there are no documented occurrences in the Resource Area, there are several populations approximately 2 miles south in the vicinity of McFarren Gulch on private lands. Another large population of Constance's bittercress occurs in the Big Creek drainage on Bureau of Land Management lands. Most high potential habitat for this species would be excluded from proposed activities. Areas where in-stream rehabilitation work is proposed would be surveyed.

Henderson's sedge (*Carex hendersonii*) is a perennial forb of low elevation (less than 3,500 feet), moist forest habitats. The principal range of this species is west of the Cascade Mountains from southwestern British

Columbia to northwestern California. It has a disjunctive distribution in northern Idaho, extending from the Selway River, north to the Coeur d'Alene subbasin. It is most often found on the IPNF in western redcedar/hemlock and grand fir forests, often near streams or seeps, and on moist benches upslope from streams. Lichthardt and Moseley, 1994 (PF Doc. TES-19, pp. 10, 11, and 23) suggest that there may be genetic differences between plants on mesic versus moist sites, making this an important consideration for population protection. Henderson's sedge is sometimes found associated with elk trails; ungulates or rodents may be important vectors for seed dispersal, since seed heads are commonly nipped off just below the flag leaf (Lichthardt and Moseley 1994, PF Doc. TES-19, p. 23).

There are 38 documented occurrences of Henderson's sedge on the IPNF and 32 in the Coeur d'Alene River subbasin (ICDC 2002, PF Doc. TES-3). Henderson's sedge occurs in the Twomile Resource Area in the Stump, Nilsen, and Jim Creek drainages. A "source" population in Stump Creek is important to the viability of the species in the Resource Area. Stable source populations are thought to supply seed to replace ephemeral populations and individuals in surrounding, less optimal habitat (Pulliam 1988, PF Botany, TES-20). This population was discovered within activity units planned for harvest in the Douglas-fir Beetle project (USDA 1999, PF Doc., TES-36). Mitigation measures were implemented to protect the population.

Moonworts (*Botrychium ascendens*, *B. crenulatum*, *B. lanceolatum*, *B. minganense*, *B. montanum*, *B. paradoxum*, *B. pedunculosum*, *B. pinnatum*, *and B. simplex*) are fern-like plants that are found in a variety of habitats ranging from damp meadows and boggy areas to moist coniferous western hemlock and cedar forest (Lorain 1990, PF Doc. TES-21, p. 7). On the IPNF they occur most often on shallow sloped sites in densely shaded moist to wet forest habitats. There are approximately 75 occurrences of moonworts on the IPNF, and 28 on the Coeur d'Alene River Ranger District. No moonwort occurrences are documented from the Twomile Resource Area, but they may occur there based on potential habitat. A documented occurrence is approximately five miles northeast in the Vendetta Creek drainage.

Slender moonwort (*Botrychium lanceolatum*), a Candidate species for Federal listing and a Forest Species of Concern is one of the more distinctive moonworts. The habitat has been described as "deep grass and forbs of meadows, under trees in woods, and on shelves on limestone cliffs, mainly at higher elevations" (Wagner and Wagner 1994, PF Doc. TES-36). However, a specific habitat description for this species is problematic because of its formerly widespread distribution ranging from sea level in Quebec to nearly 3,000 meters, 9.840 feet in Boulder, Colorado (USDI 2000, PF Doc. TES-22, p. 2). Although slender moonwort was previously documented from Oregon, Colorado, Idaho, Montana and California, only two populations in two states (Montana and Colorado) are thought to exist currently. The Idaho population, documented from Upper Priest River on the Idaho Panhandle National Forests was last observed in 1925, and has not been relocated. The likelihood of slender moonwort occurring in the Twomile Resource Area is very low due to the predominance of Dry Forest Guild habitat. Rare plant surveys to date have not located any occurrences of this species.

***Wet Forest Plant Guild***

The Wet Forest Sensitive Plant Guild occupies a trace amount of acreage in the Resource Area, and is restricted to stream bottoms. These areas have been subjected to considerable alteration from road building, logging and mining in the past. Bogs, springs, and seeps are uncommon in the Resource Area due the predominance of Dry Forest Guild habitat. Wet Forest Guild habitats would be protected by riparian buffers from timber harvesting, as described in Chapter 2 (Features Designed to Protect Aquatic Resources), therefore, the likelihood is low that project related activities would affect plants of this guild. Deerfern (*Blechnum spicant*), Henderson's sedge (*Carex hendersonii*), and moonworts (*Botrychium spp.*) may occur in both wet and moist forests, and are discussed under moist forest plant species.

***Alpine/Subalpine Guild***

Sensitive plant species in the Alpine/subalpine Guild include leafless bug-on -a-stick moss (*Buxbaumia aphylla*), dryland sedge (*Carex xerantica*), and Iceland-moss lichen (*Cetraria subalpina*). There are also several FSOC plants that may occur in subalpine habitats. The highest point in the Resource Area is 5,000 feet. Most of the Alpine/Subalpine species occur at elevations greater than 5,000 feet, therefore it is unlikely that any of these species occur there.

***Grassland Plant Guild***

The Threatened plant Spalding's catchfly (*Silene spaldingii*) may occur in the Resource Area if suitable grassland habitat is present. Potential grassland habitat occupies approximately 448 acres, primarily on south to southwest facing slopes in the Jim Creek and Yellowbanks drainages. Potential Spalding's catchfly habitat was identified using satellite imagery (Mousseaux 2000, PF Doc. TES-23) as a coarse filter approach to defining grassland and forb communities. These communities cannot be identified solely by using timber stand database (TSMRS) queries, because the areas have not been thoroughly inventoried and delineated on maps.

Spalding's catchfly is a perennial herb endemic to the Palouse region of southeast Washington and adjacent Oregon and Idaho and is disjunct in northwest Montana (Lesica 1997, PF Doc. TES-24, P. 1). This species is suspected to occur on the IPNF. Field surveys of potential habitat that were completed for recent projects such as the Douglas-fir Beetle FEIS (USDA 1999, PF Doc. TES-25), Small Sales FEIS (USDA 2000, PF Doc. TES-26), and Iron Honey FEIS (USDA 2001, PF Doc. TES-27) did not detect any occurrences of this species.

Suitable habitat for Spalding's catchfly consists of grasslands dominated by native perennial grasses such as Idaho fescue (*Festuca idahoensis*) and rough fescue (*Festuca scabrella*), with associated species such as bluebunch wheatgrass (*Pseudoroegneria spicata*) snowberry (*Symphoricarpos albus*), ninebark (*Physocarpus malvaceus*) and Nootka rose (*Rosa nutkana*). Depending on soil moisture characteristics, some sites have few to no shrubs or trees present, whereas other sites may have scattered individual ponderosa pine or Douglas-fir (USFWS 2000, p. 2; PF Doc. TES-28). Spalding's catchfly sites range from 1,750 to 5,100 feet. Soils are generally "moderately deep" to "deep." The closest documented occurrences to the project area are in Spokane County, Washington. No occurrences of this species were documented during field surveys conducted in 2003. Potential habitat was found to be of low suitability, mainly because of the presence of thin soils and surface rock. Some areas were found to be noxious weed infested, which lowers habitat suitability, though does not preclude the possibility of the species occurrence.

## 3.10. 4 Environmental Consequences to TES Plants

**Effects to TES Plants Common to All Alternatives**

There would be no effect to any Endangered plant species from project implementation.

There would be no effect to the Threatened plants water howellia (*Howellia aquatilis*), and Ute ladies-tresses orchid *(Spiranthes diluvialis)* under any alternative. There is no habitat present, and no possibility for either species to exist in the Resource Area.

There would be no effect to Threatened, Sensitive or Forest Species of Concern plants of the Aquatic, Peatland, Deciduous Riparian, and Alpine/Subalpine Rare Plant Guilds from implementation of any alternative, as these guilds and species do not occur. The following table summarizes the acres of suitable rare plant habitat affected in each alternative.

***Table 3-TES-4. Summary acres of suitable Sensitive and Threatened plant habitat potentially affected by proposed activities by alternative*.***

| Rare Plant Guild | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Moist Guild | 0 | 216 | 156 | 18 |
| Dry Guild | 0 | 477 | 642 | 256 |
| Wet Guild | 0 | Trace | Trace | Trace |
| Grassland | 0 | 215 | 221 | 154 |
| **Total Guild Acres** | **0** | 908 | 1019 | 428 |

**Acreage figures were derived from Timber Stand Management Records System data and Satellite Imagery (SILC).*

## Effects to TES Plants Under Alternative 1 (No Action)

### *Direct and Indirect Effects to TES Plants Under Alternative 1*

Alternative 1 (No Action) would have no direct impact on any Threatened, Sensitive, or Forest Species of Concern (FSOC) plants. While there would be no direct impacts to these species with this alternative, there would also be no improvement made to vegetative and watershed conditions, which could in the long term provide suitable sensitive plant habitat.

Under Alternative 1, no restoration activities would be implemented to restore dry site ecosystems and reduce the risk of high severity, stand-replacing fires. In the future with no action, wildfires in the Resource area will likely be more widespread and of higher intensity. While there would be no direct effects to Threatened, Sensitive and FSOC occurrences and habitat with Alternative 1, there would be a complex variety of indirect effects. In the long term, the dry forest and moist forest habitat guilds would be the most affected. The current vegetative condition is such that stand structure, function and species composition are far outside the natural range of variability for the Coeur d'Alene River Basin (see also the Forest Vegetation discussion in Chapter 3). The long-term suppression of wildfire, a keystone process in the ecosystem, has strongly influenced the vegetative conditions and plant community composition. Fuel levels and dense stand conditions have rendered the forest more at risk of high intensity, stand-replacing fires. Unhealthy forest conditions currently prevail in portions of the Resource Area, with associated high rates of insect and disease related mortality. Current species composition has rendered the forest ecosystem much less resilient in terms of disease than historically. Although efforts to improve the vegetative and hydrologic conditions would be a long-term process, no strides towards more favorable conditions in the Resource Area would be made under Alternative 1.

Alternative 1 would not implement any management activities to trend watershed and vegetative conditions toward the desired condition and more historic levels. Identified risks associated with certain roads, and road channel crossings would not be treated and hydrologic conditions in some drainages would not be improved (see also the Aquatics Resources discussion in Chapter 3). Suitable rare plant habitat in riparian areas would not be restored or improved with this alternative, but would remain vulnerable to random catastrophic events such as flooding and landslides.

Indirect effects to Threatened, Sensitive, and FSOC plant habitat and populations under Alternative 1 are likely for certain guilds and species. In stands with declining canopy cover due to mortality from insects and diseases, the likely effects to certain sensitive plant guilds and species present could range from a beneficial response, due to factors like increased levels of light and available moisture, a neutral response, species persist but there is no evident change in population levels, to an intolerant response because of factors like loss of shade and decrease in relative humidity.

Indirectly, there would be an increased risk to sensitive plants and habitat due to the gradual increase in fuel loads through time, and with continuing fire suppression. The greater the fuel loading, the greater the risk of a high intensity burn and stand replacing fire, with possible loss of rare plants and habitat. The increase in ignition risk and a resulting fire would also have an array of likely effects for sensitive plant species, ranging from beneficial to intolerant, depending on factors like the intensity of the fire, the species ability to survive the event, and compete in early successional habitat. The ability to analyze these effects for all sensitive plant species is limited given our current level of knowledge. The following section provides general information on how herbaceous plants respond to fire.

There is little specific information for the Coeur d'Alene basin on understory plant community composition or rare plant occurrence in pre-settlement times. Available information on shifts in forest stand structure and composition and disturbance patterns suggests that many changes have also taken place in understory shrub and forb communities and grasslands. Photo-comparison and fire history studies suggest that fire exclusion has allowed a greater portion of inland forests on the landscape to develop as dense stands (USDA 2000, PF Doc. TES-29, p. 116). The spatial continuity of these stands may allow insects and disease epidemics and stand replacement fires to become larger than in the past. At the same time, seral grassland species (shrubs, aspen, and seral conifers) are being replaced by thickets of shade-tolerant conifers. Due to excessive fuel loadings and fire suppression in much of the forest, when fires occur, they are likely to burn more intensely.

Fire behavior, fire duration, the pattern of fuel consumption, and the amount of subsurface heating all influence injury and mortality of plants, and their subsequent recovery. Post-fire responses also depend on the characteristics of the plant species on site, their susceptibility to fire and, and the means by which they recover after fire (USDA 2000, PF Doc. TES-29, p. 9).

A low severity fire (moderately burned, moderate duration, moderate ground char) that only consumes some of the surface fuels may kill laterally growing rhizomes or roots near the surface, or stem buds that are not well protected. It has little effect on buried plant parts and can stimulate significant amounts of post-fire sprouting. In contrast, a high severity fire (heavily burned, long duration, deep ground char) removes the duff layer and most of the woody debris, particularly rotten material. It can eliminate species with regenerative structures in the duff layer, or at the duff-mineral soil interface, and may lethally heat some plant parts in the upper soil layers, particularly where concentrations of heavy fuels or thick duff layers are consumed (PF Doc. TES-29, p. 20).

Whether herbaceous plants recover after fire depends largely on whether their regenerative structures are exposed to lethal temperature. Similar to woody plants, their survival depends on depth below the surface, whether they are located in combustible material, and the subsurface moisture regime at the time of the fire (USDA 2000, PF Doc. TES-29, p. 21). In addition, plants regenerate by a variety of means including vegetatively by means of resprouting or spreading with rhizomes, or by seed. Some plants have seed accumulate in the soil for long periods of time in the form of a "seed bank," which only germinates after a disturbance such as fire.

Long-term impacts to **deerfern** could occur in the event of a high severity fire. Deerfern is apparently able to survive light surface fires, and may recolonize by sprouting from rhizomes or by spores from adjacent populations. Its response to severe wildfire has not been documented. Fire intervals in the cool, wet forest habitats the species prefers are estimated to be several hundred years, so that large-scale fires are usually catastrophic. Cumulative impacts on deerfern from a potential future wildfire would be difficult to predict.

**Clustered lady's-slipper** occurs in dry forest habitats in the Coeur d'Alene basin. It has been found in mid to late-seral Douglas-fir forests in which ponderosa pine is an associate. These dry forest types historically experienced frequent low-intensity fires, so this species is adapted at some level to fire regimes naturally occurring in these type forests. While clustered lady's-slipper may be able to survive low-intensity fires, high intensity fires that would remove canopy cover and eliminate or reduce the duff level may lead to mortality and an inability to reproduce (Lichthardt 2003, PF Doc. TES-8; and Kagan 1990, PF Doc. TES-30). This species has a shallow rhizome that is 1-5 inches below the mineral soil and can be killed by the direct effects of an intense fire (Lichthardt 2003, PF Doc. TES-8). Harrod et al, 1995, (PF Doc. TES-31, pp. 313-314) monitored clustered lady's-slipper on plots burned by the Rat Creek fire on the Wenatchee National Forest. There was a decrease in the number of plants where the duff layer was removed by the fire. There was an accompanying decrease in the percent cover of plants and the number of fruits per stem on the burned plot. Harrod et al states that optimum habitat for clustered lady's-slipper is not found in early successional communities, most populations occurring in areas with relatively closed canopies that develop later in succession. Results of the study indicated that this species is fire-intolerant and should not be managed with prescribed fire.

**Constance's bittercress** reacts favorably to openings in the forest canopy as long as the ground is not severely scarified by equipment (Crawford 1980). It does not tend to flower under shaded conditions, but may be able to maintain itself indefinitely by vegetative growth as long as competitive pressures are not too great (Lichthardt and Moseley 1994). Populations along the St. Joe and Selway rivers which were affected by crown fire have been observed to multiply vegetatively in response to increased sunlight, but successful flowering and seed set was low due to hot, dry conditions later in the summer. Indications are that survival of this species after canopy removal may be dependent on the availability of moist microsites. Proposed harvest treatments in the Action Alternatives provide for the retention of live trees, snags and snag replacements in all activity units. These features would aid in maintaining moist microsites, however, to what degree, would vary by type of harvest treatment.

**Bank monkey-flower**, a dry forest guild species, is present in dry, open forest habitats in the project area. It favors steeply sloping (greater than 60%) southeast to southwest aspects with a thin soil layer. These habitats historically have had a higher frequency of non-stand replacing fires than have the moist and wet habitats. This

annual plant's reliance on a soil seed bank for reproduction may contribute to its ability to survive low intensity fire.

**Spalding's catchfly** habitat is not likely to suffer adverse effects under Alternative 1. The dry grasslands and grassy openings in Douglas-fir/ponderosa pine habitat that may have been inhabited by this species historically were maintained by frequent, low-intensity fires. Studies of Spalding's catchfly by Lesica (PF Doc. TES-32) suggest that fire may contribute to maintenance of grassland habitats through removal of excess litter and creation of sites for seedling recruitment. Increased recruitment and plant vigor were observed following spring and fall burns on experimental plots in Montana. The risk of weed invasion is a potential threat to grassland habitats when weeds such as spotted knapweed, St. Johns wort or cheatgrass are present; these species can increase after a fire.

**Henderson's sedge** occurs in moist to wet forest guild habitats that burned with stand replacing and mixed-severity fires on a longer return interval than in dry forest habitat. In the Resource Area it occurs in the lower elevations along streams and in seepy areas. It extends into upland forest where moist habitats exist. This species ability to survive a high severity fire would depend on the amount and distribution of "refugia" where individuals could survive and recolonize suitable habitat.

Lichthardt and Moseley, 1994, (PF Doc. TES-19, p. 23) considered stable valley-bottom, or "source" populations, to be important as a seed source to replace ephemeral populations and individuals in less optimal surrounding habitats. Little information is available on the response of Henderson's sedge to burning. Some research has been done on this species response to fire under managed conditions. Five years of monitoring Henderson's sedge on the Clearwater National Forest (Lichthardt 1998, PF Doc. TES-9, pp. 10-11) indicate that on logged and burned plots, Henderson's sedge may be negatively affected by management activities during the first year, but can recover in numbers of plants and reproductive ability over a period of time.

All the other moist forest, dry forest, and wet forest guild species have populations in mid and late successional habitats, preferring more closed canopy conditions. Some of these species such as moonworts (*Botrychium* species), round-leaved rein orchid, and phantom orchid, have factors like obligate soil mycorrhizae relationships that are likely to be affected by canopy reduction of greater than 50%, and moderate to intense (duff-removing) fires. Stand-replacing fires were an important part of ecosystem processes in northern Idaho and the Coeur d'Alene Basin prior to the beginning of suppression efforts in the 1930's. 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 increase in fragmentation due to human activities, the ability of most rare plants to recolonize following disturbance has been reduced.

***Cumulative Effects to TES Plants Under Alternative 1***

Cumulative effects under Alternative 1 include those resulting from no action, as well as foreseeable actions discussed above under Effects Common to All Action Alternatives.

*Wet Forest Guild*

Cumulative impacts to wet forest habitat would be low. The amount of wet forest guild habitat is very low in the Resource Area. Proposed activities in wet forest habitat are limited to watershed restoration activities in road channel crossings. These activities would have a short term direct effect on Wet Forest habitat during project implementation. The long-term effects would be beneficial to Wet Forest Guild plant communities by trending riparian habitats toward more stable and lower risk conditions.

*Moist Forest Guild*

Cumulative impacts to highly suitable moist forest habitat related to loss of canopy cover are predicted to be low where stands have been sufficiently opened to promote establishment of early seral understory vegetation. The likeliest cumulative impacts would be to those species with a broader habitat range (moonworts, round-leaved rein orchid, phantom orchid and clustered lady's slipper) which seem to require dense shade and/or soil mycorrhizae and which may not compete successfully with early seral forbs. Cumulative impacts to moist forest habitat where canopy cover has not been significantly reduced would be low.

Cumulative impacts resulting from recent insect and disease activity in moist forest habitat could include high-intensity, duff-replacing wildfires from predicted high fuel loading in untreated areas. Such a fire, if it were to occur, would be detrimental to obligate mycorrhizal species such as the moonworts, phantom orchid, clustered lady's slipper, and round-leaved rein orchid. Populations of these species could be destroyed if such a fire were intense enough to remove a significant amount of duff and organic material. The prospect of recolonization of affected habitat by any of these species would depend on the extent and duration of habitat alteration and the availability of an adjacent seed source. Cumulative impacts to these species related to stand-replacing wildfire would be predicted to be low to moderate.

*Dry Forest and Grassland Guilds*

Cumulative effects to dry forest and grassland guild species and habitat with Alternative 1 are expected to be low. Dry forest habitats would be inherently more at risk of stand replacing wildfire with fire suppression, and in the absence of harvest or fuels reduction treatments. Since dry forest species are adapted to habitats, which, historically, experienced a greater fire frequency, some would likely survive a stand replacing fire in scattered microsites. Successful recolonization for species after such disturbance events would be more difficult than it was historically due to fragmentation and overall habitat reduction.

**Effects to TES Plants Under Alternatives 2 and 3**

***Direct and Indirect Effects to TES Plants Under Alternatives 2 and 3***

Activities proposed under Alternative 2 and 3 would directly affect moist forest, dry forest, and grassland guild habitat. Effects to plant guilds due to specific treatments are described below under effects common to the action alternatives. Commercial timber harvesting in the form of regeneration treatments and thinning would have approximately the same level of impact to rare plant guilds in both alternatives. Regeneration harvesting accompanied by reforestation with seral species would contribute to restoring dry site, fire adapted vegetation that is more resilient and similar to historic forest conditions.

The effects of new road construction to suitable rare plant habitat would be the same under both alternatives. The primary difference, between the alternatives is the greater amount of skyline and corresponding lesser amount of helicopter yarding system to be used. The effects of fuels treatments would be approximately the same.

The indirect effects of Alternative 2 would be greater than those of Alternative 3 in terms of the acreage of suitable habitat affected by ground disturbing activities. Ground-based yarding and new road construction present a greater risk of impacts in the form of soil displacement and introduction and spread of noxious weeds, than non-ground disturbing systems.

***Cumulative Effects to TES Plants Under Alternatives 2 and 3***

The cumulative effects of Alternatives 2 and 3 for Grassland, Moist, and Dry Forest Plant Guilds and species would be low to moderate. These alternatives would treat the same units and utilize similar treatment methods, differing mainly by timber yarding systems and road construction.

**Effects to TES Plants Under Alternative 4**

***Direct and Indirect Effects to TES Plants Under Alternative 4***

Alternative 4 would have the lowest direct and indirect effects on rare plants and habitat of the action alternatives. No commercial harvesting would take place. Fuels treatments would encompass approximately 1/3 the acreage of treatments in Alternatives 2 and 3. Fuels treatments would consist mainly of hand slashing and underburning.

Indirectly, this alternative would be the least effective at trending vegetation cover more toward the desired long-lived seral tree species composition. A smaller percentage of the Resource Area would be treated to reduce the risk of high severity fire, which could be detrimental to rare plant communities and habitat.

### *Cumulative Effects to TES Plants Under Alternative 4*

The cumulative effects of Alternative 4 are predicted to be low because no timber would be commercially harvested. The cumulative effects of fuels treatments would be the least of any action alternative due to the extent and characteristics of this activity. Slashing and underburning present a risk to rare plants and habitat from escaped fires, however, overall the risk level is lower from this type treatment than from regeneration harvest and site preparation.

## Direct and Indirect Effects to TES Plants Common to the Action Alternatives

The following section describes the direct and indirect effects to rare plant guilds for specific activities proposed in the action alternatives. Note that not every activity would occur with each alternative. Refer to Chapter 2 and Appendix D for a list of activities by alternative.

### *Direct and Indirect Effects to Threatened Plants Common to the Action Alternatives*

No suitable habitat exists in the Resource Area for the listed Threatened species water howellia (*Howellia aquatilis*) and Ute ladies tresses (*Spiranthes diluvialis*). There would be **No Effect** to these species as a result of activities proposed in any action alternative.

Approximately 537 acres of potential habitat for the Threatened species Spalding's catchfly (*Silene spaldingii*) has been identified in the Twomile Resource Area. Treatment units are proposed in Spalding's catchfly habitat under all action alternatives, the majority of which have been field surveyed. No Spalding's catchfly populations were found during field survey, and low suitability habitat was confirmed. All remaining potential habitat in proposed activity areas would be field surveyed prior to project implementation. If occurrences are found prior to or during the implementation process, protective measures would be designed and carried out as described under the alternative design features and mitigation measures described in Chapter 2. Table 3-TES 4 displays the Rare Plant Guild acreage potentially affected by each alternative. A complete list of Grassland Guild stands and units that may support Spalding's catchfly is located in the Project File (PF Doc. TES-35).

For further information on effects to Threatened plants, please refer to the Biological Assessment in the Project Files.

### *Direct and Indirect Effects of Project-Related Activities on TES Plants Common to the Action Alternatives*

*Timber Harvesting:* Direct impacts of timber harvest can include elimination of individual plants through ground disturbance. Indirect impacts to sensitive plants can include changes in fuel loading, duff levels, moisture regime, and light levels. Effects to sensitive plants would vary according to species and harvest prescription. Most timber harvest would take place in moist forest habitats, so most of the effects would be confined to moist forest guild species. Fewer acres of dry and wet, as opposed to moist forest guild habitat, would be potentially impacted by harvest in any alternative. Since Riparian Habitat Conservation Area guidelines would be followed for all action alternatives, most wet forest habitat would be excluded from harvest activities. Stream restoration work, road construction and road obliteration activities could potentially impact wet forest habitat. The Table G-TES-4 displays the acres of suitable sensitive plant habitat potentially affected by timber harvest.

The effects of timber harvesting on deerfern are not yet fully understood. Blake and Ebrahimi (PF Doc. TES-7) noted that deerfern populations in Washington state have withstood timber harvest and related treatment. Although populations studied in Idaho have been found to be genetically and phenologically similar to plants studied on the west coast, disjunct and peripheral populations may behave differently.

*Commercial Thinning:* Selective harvesting would take place in all action alternatives, except Alternative 4. The effects of selective harvest would be similar to the effects of mortality induced by insect and disease agents, as in Alternative 1, No Action. The main difference would be the change in fuel loadings in untreated stands and resulting increased risk to sensitive plants from future stand-replacing wildfires. There would be some direct effects from selective harvest in suitable habitats for sensitive plants of the moist, dry, and wet guilds, especially those that are intolerant of changes in the moisture and light regime (i.e. mycotrophic species, moonworts and orchids). The other species are not likely to be adversely affected by selective harvest treatment. Commercial thinning of larch would take place in some alternatives. Commercial thinning, as an intermediate harvest method, is similar to selective harvest in the amount of tree canopy cover removed, but it differs in that it would

result in a more uniform spacing of trees than with selective harvest. The effects of commercial thinning on sensitive plants would generally be the same as selective harvest.

*Regeneration Harvest:* Approximately 80% of the overstory canopy would be removed with regeneration treatments. Regeneration harvest would take place in all action alternatives except Alternative 4. Live green trees, as well as dead and dying trees would be cut in order to provide conditions suitable for reforestation with long-lived seral tree species. Fuels treatment would occur in most regeneration units, consisting of slashing, underburning, top attached yarding, or hand or machine piling and burning. Regeneration harvest would directly affect moist, dry, and only slightly wet guild sensitive plant habitat. The limited data and observations available indicate that most species in these Rare Plant Guilds are intolerant of major canopy removal. Bank monkey flower, while not likely to be affected by an increase in sunlight due to canopy removal, could be impacted by excessive ground disturbance. Mycotrophic species such as moonworts and sensitive orchids are very vulnerable to regeneration harvest. The most detrimental sort of regeneration harvest treatment appears to be with ground based equipment, followed by a hot burn, which consumes a lot of the organic matter on the site, or with mechanical fuels treatment. The least detrimental would be that in which top attached yarding was used as the fuels treatment, though the potential for impacts due to alteration of the moisture regime would still be high. The action alternatives display various fuels treatment and harvest combinations.

*Yarding System Methods:* The yarding methods proposed for the action Alternatives consist of helicopter, skyline, and tractor yarding. Helicopter yarding would have an insignificant effect on sensitive plants and habitat because there would be little or no ground disturbance. Some damage to the live crowns of leave trees would be expected, but it would be minimal. The effects of skyline yarding would be intermediate between helicopter and tractor yarding. Skyline would necessitate construction of corridors for yarding purposes in which long narrow canopy openings would be created. Some ground disturbance would result from the yarding process. Tractor yarding would cause the most detrimental and long lasting impacts to the sensitive habitat, but mainly on designated skid trails. Here, compaction and soil displacement would be the primary negative effects. In all alternatives, Forest Plan Standards and Guidelines would be met for woody debris retention on site and minimizing soil displacement and compaction.

*New Road Construction, Road Reconstruction, and Reconditioning:* New road construction, road reconstruction, and reconditioning would take place in all action alternatives. These activities vary in the potential for effects to moist, wet, and dry forest guild habitats and species. New road construction is a high ground disturbance activity, constituting a high risk to sensitive species in these guilds. Prior to new road construction, previously unsurveyed, highly suitable habitat in the activity area would be surveyed and any new occurrences deemed critical to species/population viability would be protected. In contrast, road reconstruction and reconditioning are low risk activities in terms of direct or indirect effects to sensitive plants and habitat. For these activities, existing road prisms would be treated which are already disturbed and of very low habitat suitability. While there are a few sensitive plant occurrences on the IPNF on old roads or cutbanks, they are, in general, individuals isolated from the main occurrence.

*Fuels Treatment:* Various methods of fuels reduction are proposed under action alternatives, all having the potential to directly and indirectly impact sensitive plants. Slashing, yarding tops and lop and scatter fuels treatments would have a negligible effect on sensitive plant species. Underburning for fuels reduction would be done within harvest unit boundaries only. Spring burning has the potential to impact rare plant individuals, particularly clustered lady's slipper, bank monkeyflower, and moonwort species. Specific mitigation measures (identified in Chapter 2) would protect populations and highly suitable habitat that may be discovered during field surveys prior to project implementation. There would be a risk of increasing certain noxious weed species with burning, depending on the proximity to existing infestations and the cover type of the area treated (refer to Project Files, Noxious Weeds). Regeneration units would generally have control lines constructed to contain the fire (refer to Chapter 3, Fire and Fuels). Fire line construction has the potential to impact sensitive plants and habitat through vegetation and ground disturbance. There would be no underburning within designated Riparian Habitat Conservation Areas, effectively buffering riparian wet forest habitats from this type of activity. Impacts to moist forest habitat would be very low. Specific features of all action alternatives (described in Chapter 2) would protect documented populations and mitigate for new ones discovered prior to implementation.

*Watershed Rehabilitation, Including In-stream Work, Road Decommisioning, and Replacement of Road Channel Crossings:* Watershed rehabilitation activities have the potential to directly and indirectly impact moist, wet and dry forest guild habitats. Road channel crossing removal would have effects mainly to moist and wet forest habitat and is considered to be a low to moderate risk activity for sensitive plants, depending on the amount of ground disturbance. Road channel crossing upgrades that would be done during reconstruction are considered to be lower risk activities to sensitive plants. In-stream channel work would constitute a short term risk to sensitive plant habitat, but would have long term benefits because channel stability and riparian community habitat would be improved. Stream rehabilitation and road reclamation work have the potential to impact deerfern habitat. The deerfern occurrence in the East Fork of Twomile Creek would be protected according to the features for TES plants outlined in Chapter 2.

*Weed Treatment and Prevention:* Noxious weed treatment and prevention would be performed according to guidelines outlined in the Coeur d'Alene River Ranger District Noxious Weed Final Environmental Impact Statement and Record of Decision (USDA Forest Service, 2000, PF Doc. TES-33). As described in this document, integrated weed control methods would be used, including herbicide spraying, manual, cultural (seeding/fertilizing) and biological. Weed treatment and prevention measures would reduce, but not eliminate the risk of weed spread in the project area. Effects to Threatened, Sensitive plants and Forest Species of Concern (FSOC) would be very low because of mitigation measures to protect these species as outlined in the Noxious Weeds FEIS. Additional information on the noxious weed treatment is contained in the Project File (PF Doc. NW-1).

*Tree Planting:* Tree planting would result in a minor amount of soil disturbance with hand tools. Risk of incidental effects to sensitive plants as a result of tree planting are predicted to be very low.

**Cumulative Effects to TES Plants Common to All Alternatives**

Past activities on Federal lands prior to policies affording protection of rare plants, have affected populations and habitat of sensitive plant species. Current activities proposed on Federal lands are required by law and policy to address sensitive plant species. Populations, when found, are managed for. Activities on State and private lands are not required to protect these species; therefore, loss of populations and modification of habitat is likely occurring.

***Cumulative Effects to TES Plants as a Result of Reasonably Foreseeable and Ongoing Activities Common to All Alternatives***

Reasonably foreseeable and ongoing projects in the cumulative effects analysis area are identified in Chapter 2. Projects include timber harvest on federal lands, timber stand improvement, repairs on National Forest System roads, prescribed fire, noxious weed treatment, recreation, road access, and fuels treatment.

Weed control is a reasonably foreseeable future action. Guidelines for weed treatment would be consistent with those contained in the Coeur d'Alene River Ranger District Noxious Weeds FEIS, 2000. There is an increased risk of weed spread under all action alternatives, particularly in regard to certain species such as St. Johns wort and spotted knapweed, in susceptible habitats where prescribed fire is proposed. Weed increase may indirectly impact sensitive plants and highly suitable habitat where present in proposed treatment areas. Features Designed to reduce the spread of Noxious Weeds (Chapter 2) would reduce the risk of weed spread.

Implementation of projects on National Forest System lands would contribute insignificant impacts to sensitive plants or suitable habitat, since Federal lands are managed to maintain sensitive plant populations. Sensitive plant and habitat assessment are conducted for all ground and/or vegetation disturbing on in the District. While individuals of some sensitive plants may occasionally be impacted, cumulative impacts to species and habitats are expected to be low.

***Cumulative Effects To TES Plants As A Result Of Implementing Opportunities***

It should be noted that accomplishment of additional watershed/wildlife restoration projects, weed treatment and prevention other than those under contract clauses and timber stand improvement work would be subject to availability of funding. The direct and indirect effects would be the same for these potential activities, as discussed above.

*Timber stand improvement work:* Timber stand improvement projects would occur in stands with overall low potential to support sensitive plant species. Individual sensitive moonworts could be impacted, with a low level of cumulative impacts expected.

*Fuels reduction:* Fuels reduction work is a reasonably foreseeable opportunity proposed on Bureau of Land Management and private lands in the Resource Area. A specialist would review activities on federal lands to assess potential effects to rare plants. There may be effects to rare plant guilds from activities taking place on private lands, as the Forest Service has no control over such activities.

*Aquatic improvement work:* Implementation of watershed rehabilitation opportunities including road obliteration, road channel crossing removal and culvert upgrades would be subject to the availability of funding. Watershed rehabilitation activities have the potential to directly impact primarily the moist and wet forest guild species. Indirectly, watershed rehabilitation activities would carry long-term benefits to restoring plant communities and potential TES plant habitat. Effects to plant populations would be avoided by application of the mitigation measures for TES plants outlined in Chapter 2. All watershed improvement activities would be reviewed by a Botanist, field surveyed as necessary, and have the appropriate mitigation measures enacted prior to project implementation.

*Noxious Weed Treatment:* Noxious weed treatment is proposed as a feature of Alternatives 2 and 3 and is also an opportunity under all action alternatives. Weed treatments would be implemented according to available funding. Integrated weed control methods, including herbicide spraying, manual, cultural (seeding/fertilizing) and biological, would be conducted according to the provisions provided by the Coeur d'Alene River Ranger District Noxious Weeds FEIS, 2000. As these guidelines provide for the protection of Threatened, Endangered, and Sensitive plants, these activities may affect individuals or habitat, but would not contribute to a trend toward federal listing and/or loss of population viability.

**Determination of Effects for Sensitive Plant Species**

Based on the above analysis, and with the provisions for surveys and protection of sensitive plant populations (Features Designed to Protect Rare Plants, Chapter 2), the following table represents the determination of effects to sensitive plants for each alternative. A description of habitat guilds and list of sensitive species is included in the Project Files (PF Doc. TES-5).

***Table 3-TES-5. Summary of determination of effects on Sensitive plant species, by guild, for each alternative.***

| Species Guild | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|---|---|---|---|
| Moist Forest Guild | NI | MIIH | MIIH | MIIH |
| Dry Forest Guild | NI | MIIH | MIIH | MIIH |
| Wet Forest Guild | NI | MIIH | MIIH | MIIH |
| Subalpine Guild | NI | NI | NI | NI |
| Peatland Guild | NI | NI | NI | NI |
| Deciduous Riparian Guild | NI | NI | NI | NI |

*NI = No Impact*
*MIIH = May Impact Individuals or Habitat with no trend to federal listing or loss of species or population viability*
*WIIH = Will Impact Individuals or Habitat with a likely trend to federal listing and/or loss of population or species viability*
*BI = Beneficial Impact*

## 3.10. 5 Consistency With Forest Policy and Legal Mandates Related to TES Plants

All of the proposed activities with the requirements for surveys and implementation of mitigation measures would meet the intent of the Forest Plan. The No Action Alternative would also meet the intent of the Forest Plan.

**A Forest Plan management goal is to "manage habitat to maintain populations of identified sensitive species of animals and plants" (Forest Plan, II-1, TES-34).**

**A Forest Plan standard for sensitive species is to "manage the habitat of species listed in 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, PF Doc. TES-34).**

Alternatives in the EA have analyzed the distribution of habitat for rare plants, including Region 1 Forest Service Sensitive plants, Forest Species of Concern, and Threatened plants. The Idaho Conservation Data Center was consulted for information on rare plant occurrence in the State. Alternative design considered the documented occurrence of rare plant species in the Resource Area, and the potential effects of proposed activities. Features Designed to Protect Rare Plants (EA, Ch II) provide for rare plant surveys to be conducted in all areas of suitable habitat where activities would occur prior to project implementation. Mitigation measures for rare plants would protect occurrences that may be discovered during surveys. Documentation of field surveys for rare plants are included in the Project File in TES-16.

**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, PF Doc. TES-34).**

Three species of Threatened plants are listed by the USFWS for the Coeur d'Alene River Ranger District (USDI 2003; PF Doc. TES-11). Although there is potentially suitable habitat, no Threatened species have been discovered on Forest Service lands. There are no Endangered plant species currently listed for the IPNF or Coeur d'Alene River Ranger District. All projects on the Coeur d'Alene River Ranger District are analyzed for effects to Threatened plant species. Potentially suitable habitat is surveyed prior to project implementation. Projects that may have effects to Threatened plants are consulted on with the U.S. Fish and Wildlife Service according to Section 7 Guidelines under the Endangered Species Act, 1999.

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## ACRONYMS/GLOSSARY

| | |
|---|---|
| ATV | All-terrain vehicle |
| BA | Basal Area |
| BACT | Best Available Control Technology |
| BEHAVE | Fire Behavior Model |
| BF | Board foot* |
| BMP | Best Management Practices* |
| CCF | Cunit (hundred cubic feet)* |
| CDA | Coeur d'Alene |
| CFR | Code of Federal Regulations* |
| CNF | Colville National Forest |
| cfsm | Cubic feet per second per square mile (referring to water flow) |
| COR | Contractor's Officer Representative |
| dbh | Diameter at breast height |
| DEIS | Draft Environmental Impact Statement |
| DEQ | Department of Environmental Quality |
| DF | Douglas-fir |
| EAWS | Environmental Assessment at the Watershed Scale |
| ECA | Equivalent Clearcut Acres |
| EIS | Environmental Impact Statement |
| EPA | Environmental Protection Agency |
| FAR | Functioning at risk (referring to watersheds) |
| FEIS | Final Environmental Impact Statement |
| FFE | Fire and Fuels Extension |
| FOFEM | First Order Fire Effects Model |
| FPA | Forest Practices Act |
| FSH | Forest Service Handbook |
| FSM | Forest Service Manual |
| FVS | Forest Vegetation Simulator |
| GA | Geographic Assessment |
| GAO | Government Accounting Office |
| ICBEMP | Interior Columbia Basin Ecosystem Management Project |
| IDFG | Idaho Department of Fish and Game |
| IDL | Idaho Department of Lands |
| IDT | Interdisciplinary Team* |
| IFPA | Idaho Forest Practices Act |
| IFTNP | Intermountain Forest Tree Nutrition Cooperative |
| INFS | Inland Native Fish Strategy |
| IPNF | Idaho Panhandle National Forests |
| KV | Knutson-Vandenburg Act of 1924 |
| LAU | Lynx Analysis Unit |
| LP | Lodgepole pine |
| MA | Management Area* |
| MBF | Thousand Board Foot |
| MMBF | Million Board Foot |
| MOU | Memorandum of Understanding |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act* |
| NFMA | National Forest Management Act |
| NFS | National Forest System |
| NPFC | Not properly functioning condition (referring to watersheds) |
| OSHA | Occupational Safety & Health Administration |
| PFC | Properly functioning condition (referring to watersheds) |
| PM | Particulate Matter |
| PP | Ponderosa pine |
| PWC | Public works contract |
| Q2 | level of instantaneous discharge expected to occur on average of every 2 years (referring to watershed conditions) |
| Q50 | level of instantaneous discharge expected to occur on average of every 50 years (referring to watershed conditions) |
| Q100 | level of instantaneous discharge expected to occur on average of every 100 years (referring to watershed conditions) |
| R1 | Region 1--the Northern Region of the Forest Service |
| R6 | Region 6--the Pacific Northwest Region of the Forest Service |
| RD | Ranger District |
| RHCA | Riparian Habitat Conservation Area* |
| RMO | Riparian Management Objective |
| ROD | Record of Decision |
| RPA | (Forest and Rangeland) Renewable Resources Planning Act |
| SAF | Subalpine fir |
| SAM | Sale area map |
| SCA | Stream Channel Alteration (Act) |
| SMU | Streamside Management Unit |
| SMZ | Streamside management Zone* |
| SPCC | Spill Prevention Control and Countermeasure |
| SPS | Special project specifications |
| SWCP | Soil and Water Conservation Practices |
| TES | Threatened, Endangered and Sensitive |
| TMDL | Total Maximum Daily Load |
| TML | Timber Marginal Lands |
| TSA | Timber Sale Administrator |
| TSC | Timber Sale Contract |
| TSI | Timber Stand Inventory |
| TSMRS | Timber Stand Management Records System |
| TSP | Total Suspended Particulate |
| USFWL | U.S. Fish & Wildlife Service |
| WBP | White-bark pine |
| WDNR | Washington State Department of Natural Resources |
| WH | Western hemlock |
| WL | Western larch |
| WP | White pine |
| WQLS | Water Quality Limited Stream |
| WRC | Western red cedar |
| WSDFW | Washington State Department of Fish and Wildlife |
| WSDOE | Washington State Department of Ecology |

**** These terms are defined in the Glossary below.***

# A

**Activity**. A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives.

**Activity Fuels.** The residue left on the ground after human-caused disturbances.

**Adfluvial –** Pertaining to fishes where adults from lake environments (i.e. Coeur d'Alene Lake) migrate up rivers and/or streams to spawn. When fry emerge they may reside in these nursery rivers or streams for a period of 1-6 years until migrating downstream to rear in the connected lake environment until capable of spawning as an adult.

**Aesthetics.** Generally, the study, science, or philosophy dealing with beauty and with judgments concerning beauty. In scenery management, it describes landscapes that give visual and sensory pleasure.

**Affected Environment.** The natural, physical, and human-related environment that exists at the time of the analysis.

**Age Class** (Scenery/Visual definition). An age grouping of trees according to an interval of years, usually 20 years. A single age class would have trees that are within 20 years of the same age, such as 1 - 20 years or 21 - 40 years.

**Air Quality.** Refers to standards for various classes of land as designated by the Clean Air Act, P.L. 88-206: Jan. 1978

**Airshed.** A geographical area that, because of topography, meteorology, and climate, shares the same air.

**Alluvial.** Materials transported and deposited by water.

**Aquatic –** Pertaining to water.

**Area Transportation Plan.** A plan that identifies the transportation facilities needed to manage the lands and resources for a given area.

**Armoring.** Protective coverings or structures used to displace the erosive force of water. Rip-rapping is a type of armoring.

**Aspect.** The direction a slope faces. For example, a hillside facing east has an eastern aspect.

# B

**Background (Visual Distance Zone).** That part of a scene, landscape, etc., which is furthest from the viewer; The distant part of a landscape. The IPNF defines background as the landscape area located from three miles to infinity from the observer. The Newport Ranger District defines background as the landscape area located from 4 miles to infinity from the viewer.

**Basal Area.** In forests, the cross-sectional area of a tree trunk measured at breast height (4.5 feet), usually expressed in square feet per acre.

**Baseline Data.** Data representative of a particular base period or concurrent control sample. Normally representative of the undisturbed, undeveloped state.

**Basin (river) –**In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems.

**Bedload –** Sediment moving in or near a streambed.

**Beneficial Uses –** The many various uses that may be made of water including, but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife

habitat, and aesthetics. The beneficial use depends on actual use, the ability of the water to support a non-existing use either now or in the future, and its likelihood of being used in a given manner. The use of water for the purpose of wastewater dilution or as a receiving water for a waste treatment facility effluent is not considered a beneficial use.

**Best Management Practices (BMPs) –** Practices determined by the State of Idaho to be the most effective and practicable means of preventing or reducing erosion, and water pollution to meet water quality goals.

**Big Game.** Those species of large mammals normally managed as a sport-hunting resource.

**Biological Diversity (biodiversity) –** The variety and variability among living organisms and the ecological complexes in which they occur.

**Biomass.** Total weight or quantity of organic material on a given area over a defined period.

**Biophysical Setting.** Areas with similar vegetation characteristics, fire frequencies, moisture regimes and geological and topographical characterizes.

**Board Foot (BF).** A unit of measurement equal to an unfinished board one foot square by one inch thick.

**Broadcast Burn.** Allowing a controlled fire to burn over a designated area within well-defined boundaries for reduction of fuel hazard, as a silvicultural treatment, or both.

# C

**Canopy.** In a forest, the branches from the uppermost layer of trees; on rangeland, the vertical projection downward of the aerial portion of vegetation.

**Canopy Closure.** The amount of ground surface shaded by tree canopies, as seen from above. Used to describe how open or dense a stand of trees is, often expressed in percent.

**Canopy Cover.** The amount of ground surface shaded by tree canopies as seen from above. Used to describe how open or dense a stand of trees is, often expressed in ten percent increments.

**Capability.** The potential of an area of land and/or water to produce resources, supply goods and services, and allow resource uses under a specified set of management practices and at a given level of management intensity. Capability depends on current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices, such as silviculture or protection from fires, insects, and disease.

**Capable Habitat.** 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 are usually soils (or parent material, or landtype), slope, aspect, elevation, and habitat type. The vegetation on the site may not be currently suitable for a given species because of variable stand attributes such as inappropriate seral stage, cover type or stand density. See also Suitable Habitat.

**Cavity Habitat.** Snags, broken-topped live trees and down logs used by wildlife species that excavate and/or occupy cavities in these trees.

**Channel (stream) –** A stream or riverbed through which the main current of water flows.

**Characteristic.** When used in terms of scenery or visuals, this refers to the qualities that constitute a character, that characterize a landscape; a distinguishing trait, feature, or quality; uniqueness; or attribute.

**Classified Road** – A road wholly or partially within or next to National Forest lands determined to be needed for long-term motor vehicle access.

**Clearcut Harvest.** An even aged regeneration harvest method that removes all merchantable trees in a single cutting except for wildlife trees or snags.

**Climate –** The composite or generally prevailing weather conditions of a region throughout the year, averaged over a series of years.

**Climax Vegetation.** The culminating stage in plant succession for a given habitat, that develops and perpetuates itself in the absence of disturbance, natural or otherwise (in temperate ecosystems this rarely occupies large portions of the natural landscape because of the frequency of natural disturbances).

**Coarse Woody Debris (CWD).** Pieces of woody material having a diameter of at least three inches and a length greater than three feet (also referred to as Large Woody Debris, or LWD).

**Code of Federal Regulations (CFR).** The listing of various regulations pertaining to management and administration of the National Forests.

**Color.** The property of reflecting light of a particular wavelength that enables the eye to differentiate otherwise indistinguishable objects. A hue (red, green, blue, yellow, and so on), as contrasted with a value (black, white, or gray).

**Commodity.** Commercial item that can be bought, sold, and transported, such as mineral, agricultural, timber or other forest products.

**Compaction.** Making soil hard and dense, decreasing its ability to support vegetation because the soil can hold less water and air and because roots have trouble penetrating the soil.

**Competition –** An interaction that occurs when two or more individuals make demands on the same resources that are in short supply.

**Component.** A part of a system.

**Composition (species).** The mix of difference species that make up a plant or animal community, and their relative abundance.

**Conifer.** Any of a group of needle and cone-bearing evergreen trees.

**Connectivity.** The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. The opposite of fragmentation.

**Contract Provisions.** Controls constraints, and/or general direction included in Contracts offered by the Forest Service.

**Contrast.** A term used in regard to scenery or visuals, referring to the diversity or distinction of adjacent parts, or the effect of striking differences in form, line, color, or texture of a landscape.

**Contour map feature.** A term used in regard to scenery or visuals, referring to a line drawn on a map that connects points of the same elevation.

**Corridor (landscape).** Landscape elements that connect similar patches of habitat through an area with different characteristics. For example, streamside vegetation may create a corridor of willows and hardwoods between meadows or through a forest.

**Council on Environmental Quality (CEQ).** An advisory council to the President, established by NEPA. It reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

**Cover –** (1) Trees, shrubs, rocks, or other landscape features that allow an animal to partly or fully conceal itself. (2) The area of ground covered by plants of one or more species.

**Cover/Forage Ratio.** The ratio, in percent, of the amount of area in cover conditions to that in forage conditions.

**Cover Type –** A vegetation classification depicting a genus, species, group of species, or life form of tree, shrub, grass, or sedge. The present vegetation of an area.

**Created Opening.** A term used in regard to scenery or visuals, referring to an opening in the forest cover created by the application of even-aged silvicultural practices.

**Cross Drain/Ditch.** A man made ditch or channel constructed to intercept surface water runoff and divert it before the runoff concentrates to erosive volumes and velocities.

**Crown.** The part of a tree containing live foliage; treetops.

**Crown Fire.** A forest fire that burns in the crowns of trees.

**Crowning.** Forming a convex road surface that allows runoff to drain from the running surface to both sides of the road prism.

**Cultural or Heritage Resources.** The physical remains of human activity (artifacts, ruins, burial mounds, pertroglyphs, etc.) having scientific, prehistoric, or social values.

**Cultural Landscape.** A term used in regard to scenery or visuals, referring to human-altered landscapes, especially those slowly evolving landscapes with scenic vegetation patterns or scenic structures. Addition of these elements creates a visually pleasing complement to the natural character of a landscape.

**Cumulative Effect.** The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or nonFederal) or person undertakes such other actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time. ***In this EA, potential cumulative effects include those that were assessed for all ownerships, including lands administered by other federal entities and non-federal lands, especially regarding terrestrial and aquatic species.***

**Cunit (CCF).** One hundred cubic feet. A measurement for timber volume.

# D

**Data –** Facts used in analysis.

**Debris (organic) –** Logs, trees, limbs, branches, leaves, bark, etc., that accumulate, often in streams or riparian areas.

**Decay (decomposition) –** The breakdown of organic matter, usually as a result of bacterial or fungal actions.

**Decommission (roads)** – Activities that result in the stabilization and restoration of unneeded roads to a more natural state. May include removal of all stream crossings and full recontour of the entire road prism, introduction of woody debris, and revegetation as needed. Fully decommissioned roads would be removed from the transportation system.

**Degradation –** (1) General lowering of the earth's surface by erosion or moving of materials from one place to another. (2) Reduction in value or quality.

**Degrade (habitats) –** Measurably change a feature at a defined scale in a way that: further reduces habitat quality, where existing conditions meet or are worse than the objective; reduces habitat quality, where existing conditions are better than the objective.

**Density (fish) –** The number of fish inhabiting a given area, usually expressed in terms of numbers per one hundred meters squared (i.e. #/100m$^2$).

**Density (stand).** The number of trees growing in a given area, usually expressed in terms of trees per acre.

**Desired Landscape Character.** A term used in regard to scenery or visuals, referring to the appearance of the landscape to be retained or created over time, recognizing that a landscape is a dynamic and constantly changing community of plants and animals. Combination of landscape design attributes and opportunities, as well as biological opportunities and constraints.

**Developed Recreation.** Recreation dependent on facilities provided to enhance recreation opportunities in concentrated use areas. Examples are ski areas, resorts and campgrounds.

**Direct Effects –** Impacts on the environment that are caused by the action and occur at the same time and place.

**Dispersed Recreation.** Recreation that occurs outside of developed recreation sites; requiring few, if any, facilities or other improvements. Includes such activities as hunting, hiking, viewing scenery and cross-country skiing.

**Distance Zones**. Landscape areas denoted by specified distances from the observer. Used as a frame of reference in which to discuss landscape attributes or the scenic effect of human activities in a landscape (Immediate Foreground, Foreground, Middleground, and Background).

**Distinctive**. Refers to extraordinary and special landscapes. These landscapes are attractive, and they stand out from common landscapes.

**Disturbance –** Refers to events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, and insects and diseases. Human-caused disturbances include, among others, actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species.

**Dominance Elements.** In scenery management, the dominance elements are form, line, color, and texture. They are the attributes that make up the landscape character.

**Dominant.** A group of plants that by their collective size, mass, or number exert a primary influence on other ecosystem components.

**Dominant Human Alterations.** In scenery management, dominant human alterations override the natural character of the landscape and are very noticeable.

**Down or Downed Wood.** A tree or part of a tree that is dead or dying and is laying on the ground.

# E

**Ecological integrity.** In general, ecological integrity refers to the degree to which the elements of biodiversity and the functions that link them together and sustain the entire system are complete and capable of performing desired functions; the quality of being complete; a sense of wholeness. Absolute measures of integrity do not exist. Proxies provide useful measures to estimate the integrity of major ecosystem components (forestland, rangeland, aquatic, and hydrologic). Estimating these integrity components in a relative sense across the project area helps to explain current conditions and to prioritize future management. Thus, areas of high integrity would represent areas where ecological functions and processes are better represented and functioning than areas rated as low integrity.

**Ecological Processes.** The flow and cycling of energy, materials, and organisms in an ecosystem.

**Ecology.** The science of the interrelationships between organisms and their environment; from the Greek *Oikos* meaning "house" or "place to live."

**Ecosystem.** A complete, interacting system of organisms and the land and water that make up their environment; the home places of all living things, including humans.

**Ecosystem Health.** A condition where the parts and functions of an ecosystem are sustained over time and where the system's capacity for self-repair is maintained, such that goals for uses, values, and services of the ecosystem are met.

**Ecosystem/Wildlife Burning.** This is the application of prescribed fire to fire-dependent ecosystems in order to meet multi-resource objectives (for example, to improve forage habitat for wildlife).

**Edge.** The line where an object or area begins or ends. Edge serves to define borders, limits or boundaries. In this analysis, edge often refers to where plant communities meet or where successional stage or vegetation conditions within the plant community come together.

**Effects (or impacts).** Environmental consequences (the scientific and analytical basis for comparison of alternatives) as a result of a proposed action. Effects may be either direct, which are caused by the action and occur at the same time and place; indirect, which are caused by the action and are later in time or farther removed in distance; but are still reasonably foreseeable, or cumulative.

**Endangered Species.** Any plant or animal species that is in danger of extinction throughout all or a significant portion of its range. (Endangered Species Act of 1973).

**Endemic.** The population of plants, animals, or diseases that are at their normal, balanced level, in contrast to epidemic.

**Endemic Species.** Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality. "Endemism" is the occurrence of endemic species in an area.

**Environment –** The combination of external physical, biological, social, and cultural conditions affecting the growth and development of organisms and the nature of an individual or community.

**Ephemeral Streams.** Streams that flow only as a direct response to rainfall or snowmelt events. They have no baseflow.

**Epidemic.** The rapid spread, growth, or development of pathogen or insect populations that affect large numbers of a host population throughout an area at the same time.

**Erosion –** The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities; can be accelerated or intensified by human activities that reduce the stability of slopes or soils.

**Even-aged System.** A silvicultural system that produces stands in which all trees are about the same age; that is, the difference in age between trees forming the main canopy level will usually not exceed 20 percent of the rotation.

**Even-aged Stands.** Stands of trees of approximately the same age. Silvicultural methods that generate even-aged stands include clearcutting, shelterwood, and seed tree.

**Evident.** That which is noticeable, apparent, conspicuous, or obvious.

**Existing Scenic Integrity.** Current state of the landscape, considering previous human alterations; existing visual condition.

**Exotic –** A plant or animal species introduced from a distant place; not native to the area (e.g. eastern brook trout).

**Expected Image.** A term used in regard to scenery or visuals, referring to a mental picture of what a person expects to see in a national forest.

# F

**Feature.** A visually distinct or outstanding part, quality, or characteristic of a landscape.

**Fines (sediment).** Sediment particles smaller than 0.2 inch. Excessive fines can trap newly hatched fish and decrease the amount of water percolating through spawning gravels.

**Fire Regime.** The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire.

**Floodplain –** The portion of river valley or level lowland next to streams that is covered with water when the river or stream overflows its banks.

**Fluvial –** Pertaining to fishes where adults from large river environments (i.e. Kootenai River) migrate upstream to smaller river tributaries to spawn. When fry emerge they may reside in these nursery streams for a period of 1-6 years until they migrate downstream to spend adulthood in the connected large river environment until capable of spawning as an adult.

**Forage.** Vegetation used for food by wildlife, particularly big game wildlife and domestic livestock.

**Forage Areas.** Vegetated areas with less than 60 percent combined canopy closure of tree and tall shrubs (greater than seven feet in height).

**Foreground (Visual Distance Zone).** That part of a scene, landscape, etc., which is nearest to the viewer, and in which detail is evident. The IPNF defines foreground as the landscape area located from one-quarter to one-half mile from the observer. The Newport Ranger District defines foreground as the landscape area located from the observer to one-half mile away.

**Forest Cover Type.** A category of forest described by the dominant tree species present in a stand (either by basal area dominance in stands older than seedlings or by trees per acre in seedling stands).

**Forest Health –** The condition in which forest ecosystems sustain their complexity, diversity, resiliency, and productivity to provide for specified human needs and values. It is a useful way to communicate about the current condition of the forest especially with regard to resiliency, a part of forest health that describes the ability of the ecosystem to respond to disturbances. Forest health and resiliency can be described, in part, by species composition, density, and structure.

**Form.** Structure, mass, or shape of a landscape or of an object. Landscape form is often defined by edges or outlines of landforms, rockforms, vegetation patterns, or waterforms, or the enclosed spaces created by these attributes.

**Fragmentation (habitat) –** The break-up of a large land area (such as a forest) into smaller patches isolated by a different land type and lacking corridors of appropriate vegetation to allow organisms and ecological processes to move across the landscape. The opposite of connectivity.

**Fry –** A recently hatched fish, after the yolk sac has been absorbed.

**Frame of Reference.** An area or framework against which various parts can be judged or measured.

**Fuel (fire).** Combustible materials present in the forest (dry dead parts of trees, shrubs and other vegetation) which contribute to the intensity of a fire.

**Fuel ladder.** Vegetative structures or conditions such as low-growing tree branches, shrubs, and other vegetation that can burn readily.

**Fuel load.** The dry weight of combustible materials per unit area; usually expressed as tons per acre.

**Fuelbreak.** A strategically-located strip or block of land where the fuel is modified to reduce fire intensity potential. Fuelbreaks are designed to interrupt the continuity of heavy, hazardous fuel so fires burning to them can be readily controlled. They are pre-attack installations that provide safer, easier, and faster control efforts for fighting fire. Generally, this treatment provides holding area and accessibility for fire-suppression forces and reduces potential fire damage to adjacent resources.

**Fuels Management.** Manipulation or reduction of fuels to meet Forest protection and management objectives while preserving and enhancing environmental quality.

# G

**Game Species –** Wild animals that people hunt or fish for food or recreation according to prescribed seasons and limits.

**Geographic Information System (GIS).** An information processing technology to input, store, analyze and display data; a system of computer maps with corresponding site-specific information that can be combined electronically to provide reports and maps.

**Gradient.** A rate of vertical elevation change per unit of horizontal distance; also called slope.

**Group Selection Cutting.** An uneven-aged cutting method in which small groups of trees, usually no more that 2 acres in size, are removed to meet a predetermined goal of size distribution and species in the remaining stands.

# H

**Habitat –** A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community or population of plants or animals.

**Habitat Guild** – An artificial assemblage of rare plants that have similar habitat requirements. Rare plant habitat guilds occurring in the IPNF include aquatic, peatland, deciduous riparian, wet forest, moist forest, dry forest, subalpine and cold forest.

**Habitat Type –** A group of plant communities having similar habitat relationships.

**Hardwoods.** A conventional term for broadleaf trees.

**Harvest.** (1) Felling and removal of trees from the forest. (2) Removal of game animals or fish from a population, typically by hunting or fishing.

**Hazardous Substance.** Materials which by their nature are toxic or dangerous to handle or dispose of, such as radioactive materials, petroleum products, pesticides, chemicals and biological wastes.

**Headwaters –** Beginning of a watershed; unbranched tributaries of a stream.

**Healthy Landscape Systems.** Those landscapes whose processes are in balance. The balance is dynamic; humans have the opportunity to work with changing landscape conditions to receive a predictable and reliable flow of both commodities and amenities. Healthy landscape systems show resiliency and have predictable responses to disturbance while providing human values. Key ecological systems that interact in dynamic balance include: human, hydrologic-land, carbon-nutrient, food web, and evolutionary systems.

**Heterogeneous –** Irregular, dissimilar, not uniform throughout.

**Hiding Cover.** Vegetation capable of hiding 90 percent of a standing adult deer or elk at 200 feet or less. Includes some shrub stands and all forested stand conditions with adequate tree stem density or shrub layer to hide animals. In some cases, topographic features also can provide hiding cover.

**High Integrity Area.** Those areas within the drainage which are functioning the best in terms of providing security, late successional forests, current carnivore sightings, and key habitats. See also Secondary Integrity Area.

**High Scenic Integrity Level.** A scenic integrity level meaning human activities are not visually evident. In high scenic integrity areas, activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.

**Historical Range of Variability (HRV) –** The natural fluctuation of ecological and physical processes and functions that would have occurred during a specified period of time. ***In this EA, refers to the range of conditions that are likely***

***to have occurred prior to settlement of the project area by Euro Americans (approximately the mid-1800s), which would have varied within certain limits over time. HRV is discussed in this document only as a reference point, to establish a baseline set of conditions for which sufficient scientific or historical information is available to enable a comparison to current conditions.***

**Homogeneous –** Regular, similar, uniform throughout.

**Human Impact or Influence.** A term used in regard to scenery or visuals, referring to a disturbance or change in ecosystem composition, structure, or function caused by humans.

**Hydrologic –** Refers to the properties, distribution, and effects of water. "Hydrology" refers to the broad science of the waters of the earth-their occurrence, circulation, distribution, and physical properties, and their reaction with the environment.

**Hydrologic Unit Code (HUC) –** A hierarchical coding system developed by the U.S. Geological Survey to identify geographic boundaries of watersheds of various sizes.

# I

**Immediate Foreground (Visual Distance Zone).** That part of the foreground which is extremely critical for visual detail. The IPNF defines immediate foreground as the landscape area located usually within 400 feet of the observer. The Newport Ranger District defines immediate foreground as the landscape area within the first few hundred feet of the observer, usually within 300 feet of the observer. Distance zones are normally used in project-level planning rather than broad-scale planning.

**Implement –** To carry out, put into action.

**Improvement Cutting.** The removal of less desirable trees of any species in a stand of poles or larger trees, primarily to improve composition and quality.

**In-Service.** Pertains to activities, actions or personnel within the USDA Forest Service.

**Indicator Species –** A species that is presumed to be sensitive to habitat changes; population changes of indicator species are believed to best indicate the effects of land management activities.

**Indirect Effects –** Impacts on the environment that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable.

**Individual Tree Selection Harvest.** A cutting method to develop and maintain uneven-aged stands by the removal of selected trees from specified age classes over the entire stand area in order to meet a predetermined goal of age distribution and species in the remaining stand.

**INFS –** Inland Native Fish Strategy for the Intermountain, Northern and Pacific Northwest Regions (1995; Forest Service).

**Instream (flow).** Flow of water in its natural setting (as opposed to waters diverted for "offstream" uses such as industry or agriculture. Instream flow levels provided for environmental reasons enhance or maintain the habitat for riparian and aquatic life, with timing and quantities of flow characteristic of the natural setting.

**Intactness.** A term used in regard to scenery or visuals, referring to something untouched or unaltered, especially by anything that harms or diminishes its character.

**Interdisciplinary Approach.** Use of one or more individuals representing areas of knowledge and skills focusing on the same task, problem, or subject. Team member interaction provides needed insight to all stages of the process.

**Interdisciplinary Team (IDT).** A group of two or more individuals, with different training or skills, assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. The members of the team proceed to solution with frequent interaction, so that each discipline may provide insights to any stage of the problem and disciplines may combine to provide new solutions. This is different form a multidisciplinary team, where each specialist is assigned a portion of the problem and their partial solutions are linked together at the end to provide the final solution. The forming of the team, the data collection and analysis, team discussions, interactive evaluation, and joint resolution of the problem in the Interdisciplinary Process.

**Intermediate Harvest.** Any removal of trees from a stand between the time of its formation and the regeneration cut. Most commonly applied intermediate cuttings are release, thinning, improvement, and salvage.

**Intermittent Stream.** A stream that flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow.

**Irretrievable.** Applies to losses of production, harvest, or a commitment of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports (recreation) site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

**Irreversible.** Applies primarily to the use of nonrenewable resources, such as minerals, or cultural resources, or to those factors that are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.

**Issue.** A point, matter, or question of public discussion or interest, to be addressed or resolved through the planning process.

**Issue Indicator.** A specific, measurable element that expresses some feature or attribute relative to an issue.

# J

**Jackpot Burning.** A modified method of broadcast burning used primarily to burn concentrations of fuels where the fuelbed is not continuous.

# L

**Land Allocation.** The assignment of a management emphasis to particular land areas with the purpose of achieving goals and objectives. Land allocation decisions are documented in environmental analysis documents, such as the Forest Plan for the Idaho Panhandle National Forests.

**Landform.** One of the attributes or features that make up the Earth's surface, such as a plain, mountain, or valley.

**Landscape.** All the natural features such as grasslands, hills, forest, and water, which distinguish one part of the earth's surface from another part; usually that portion of land which the eye can comprehend in a single view, including all its natural characteristics.

**Landscape Character.** Particular attributes, qualities, and traits of a landscape that make it identifiable or unique.

**Landscape Character Goal.** A management prescription designed to maintain or modify the existing landscape character to a desired future state. (See Desired Landscape Character.)

**Landscape Composition.** The types of stands or patches present across a given area of land.

**Landscape Ecology.** The study of the ecological effects of spatial patterns in ecosystems.

**Landscape Setting.** The context and environment in which a landscape is set; a landscape backdrop.

**Landscape Structure.** The mix and distribution of stand or patch sizes across a given area of land. Patch sizes, shapes, and distributions are a reflection of the major disturbance regimes operating on the landscape.

**Landscape Visibility.** Accessibility of the landscape to viewers, referring to one's ability to see and perceive landscapes.

**Landtype.** A unit of land with similar designated soil, vegetation, geology, topography, climate and drainage. The basis for mapping units in the land systems inventory.

**Large Woody Debris –** Pieces of wood that are of a large enough size to affect stream channel morphology.

**Lethal fires.** Fires that kill 90% or more of the dominant tree canopy. These are often called "stand-replacing" fires. They are commonly crown fires, burning with high severity. In general, lethal fires have long return intervals (140 to 250 years or more apart), but affect large areas when they occur. Local examples of these types of fires would be the Sundance and Trapper Peak Fires of 1967 that burned over 80,000 acres in a relatively short time period during late summer drought conditions. Refer to mixed severity fires and nonlethal fires.

**Liberation Cutting.** A form of release cutting that removes older, larger trees that overtop a more desirable younger stand.

**Line.** An intersection of two planes; a point that has been extended; a silhouette of form. In terms of landscapes, features such as ridges, skylines, structures, changes in vegetation, or individual trees and branches may be perceived as line.

**Line Officer.** Management personnel within the Forest Service Organization consisting of: Secretary of Agriculture, Chief of Forest Service, Regional Foresters, Forest Supervisors, and District Rangers. Refers to the line of authority and responsibility.

**Log Landing.** An area where logs are skidded or yarded prior to loading and transportation to a mill.

**Lop and Scatter.** Branches are cut from felled trees to a predetermined height then scattered to reduce fuel concentrations. The objective is to re-arrange the fuel so as to eliminate concentrations and break up vertical and horizontal continuity. Generally, this treatment hastens natural decomposition and improves esthetic qualities of the treated area.

**Low Scenic Integrity.** A scenic integrity level meaning human activities must remain visually subordinate to the attributes of the existing landscape character. Activities may repeat form, line, color, or texture common to these landscape characters, but changes in quality of size, number, intensity, direction, pattern, and so on, must remain visually subordinate to these landscape characters.

# M

**Maintain –** (1) To continue. ***(2) For this document, the term is intended to convey the idea of keeping ecosystem functions, processes, and/or components (such as soil, air water, vegetation) in such a condition that the ecosystem's ability to accomplish current and future management objectives is not weakened. Management activities may be compatible with ecosystem maintenance if actions are designed to maintain or improve current ecosystem condition.***

**Maintenance.** See Road Maintenance.

**Management Area (MA).** Geographic areas, not necessarily contiguous, which have common management direction, consistent with the Forest Plan allocations.

**Management Direction.** A statement of multiple use and other goals and objectives, along with the associated management prescriptions and standards and guidelines to direct resource management.

**Management Prescription.** A set of land and resource management policies that, as expressed through Standards and Guidelines, trends toward a Desired Future Condition over time.

**Management Activity.** An activity humans impose on a landscape for the purpose of managing natural resources.

**Mass Failure (erosion) –** A large land slump, in which a mass of rock or soil slips in one unit down from a cliff or slope.

**Mature Timber.** Individual trees or stands of trees that in general are at their maximum rate in terms of the physiological processes expressed as height, diameter, and volume growth.

**Mean Annual Increment.** The total volume increase in a tree or stand of trees up to a given age, divided by that age.

**Merchantable timber.** Timber that can be bought or sold.

**Metapopulation.** Clustered, non-contiguous populations that interact at times through geneflow and dispersal.

**Middleground. (Visual Distance Zone).** The IPNF defines middleground as that part of a scene or landscape which hits between the foreground and background zones. The Newport Ranger District defines middleground as the zone between the foreground and the background in a landscape, usually located from one-half mile to four miles from the observer.

**Mitigate/mitigation measures.** To offset or lessen real or potential impacts of effects through the application of additional controls or actions. Counter measures are employed to reduce or eliminate undesirable or unwanted results.

**Mixed Conifer.** See Timber Types.

**Mixed severity fires.** Fires that kill more than 10% but less than 90% of the dominant tree canopy. These fires are commonly patchy, irregular burns, producing a mosaic of different burn severities. Return intervals on mixed severity fires may be quite variable. Refer to nonlethal and lethal fires.

**Monitoring –** A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring allows detection of undesirable and desirable changes so that management actions can be modified or designed to achieve desired goals and objectives while avoiding adverse effects to ecosystems.

**Morphology –** Form and structure.

**Mosaic.** A pattern of vegetation in which two or more kinds of communities are interspersed in patches, such as clumps of shrubs with grassland between.

**Multiple-use Management.** The management of public lands and their various resource values so they are used in the combination that best meets the present and future needs of the American people.

# N

**National Environmental Policy Act (NEPA) –** An act of Congress passed in 1969 declaring a national policy to encourage productive and enjoyable harmony between people and the environment, to promote efforts that will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of people, and to enrich the understanding of the ecological systems and natural resources important to the nation, among other purposes.

**National Forest Management Act (NFMA).** Law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring preparation of Regional Guides and Forest Plans, and the preparation of regulations to guide that development.

**Native –** (1) one born or reared in a particular place. (2) an entity original or indigenous to a particular locality.

**Native Species –** Species that normally live and thrive in a particular ecosystem or region (e.g. In fishes – westslope cutthroat trout).

**Natural Disturbance.** Periodic impact or natural events such as fire, severe drought, insect or disease attack or wind.

**Natural Landscape Character.** Landscape character that originated from natural disturbances such as wildfires, glaciation, succession of plants from pioneer to climax species, or indirect activities of humans, such as inadvertent plant succession through fire prevention.

**Natural-Appearing Landscape Character.** Landscape character that has resulted from human activities, yet appear natural, such as historic conversion of native forests into farmlands, pastures, and hedgerows that have reverted back to forests through reforestation activities or natural regeneration.

**Natural Regeneration.** Renewal of a tree crop by natural means using natural seed fall.

**Natural Resources –** Water, soil, wild plants and animals, air, minerals, nutrients, and other resources produced by the earth's natural processes.

**No-Action Alternative.** The No-Action Alternative is required by regulations of the National Environmental Policy Act (NEPA) (40 CFR 1502.14). The No-Action Alternative provides a baseline for estimating the effects of other alternatives. Where a project activity is being evaluated, the No-Action Alternative is defined as one where current management direction would continue unchanged.

**Nongame Species.** All wild animals not subject to sport-hunting and fishing regulations.

**Nonlethal fires.** Fires that kill 10% or less of the dominant tree canopy. A much larger percentage of small understory trees, shrubs and forbs may be burned back to the ground line. These are commonly low-severity surface and understory fires, often with short-return intervals (a few decades). Refer to mixed severity and lethal fires.

**Non-point Source Pollution –** Pollution whose source is not specific in location; the sources of the pollutant discharge are dispersed, not well defined or constant. Examples include sediments from logging activities and runoff from agricultural chemicals.

**Nonstocked.** A stand of trees or aggregation of stands that have a stocking level below the minimum specified for meeting the prescribed management objectives.

**Normal Operating Season.** A portions of a year when normal timber harvesting operations are expected to take place uninterrupted by adverse weather conditions.

**Noxious Weeds.** Rapidly spreading plants which can cause a variety of major ecological impacts to both agriculture and wild lands.

# O

**Objective.** A concise, time specific statement of measurable planned results that respond to predetermined goals. An objective forms the basis for further planning, to define the precise steps to be taken and the resources to be used in achieving identified goals.

**Obliteration –** By definition designation under the mandated Roads Analysis Process (RAP) this term has been replaced by the use of the word "***Decommission***" (see definition previous). Hence, it no longer applies in subscribing it to roads related work.

**Observer Position**. Specific geographic position in the landscape where the viewer is located. Also known as viewer platform.

**Old-growth Forest.** Old-growth forests are considered ecosystems that are distinguished by old trees and related structural attributes. They encompass the later stages of stand development that typically differ from earlier stages in

characteristics such as tree age, tree size, number of large trees per acre and basal area. Attributes such as decadence, dead trees, the number of canopy layers and canopy gaps are also important, but are more difficult to describe because of high variability. (See also Potential or Recruitment Old Growth.)

**Older Capable Habitat.** Stands that are nearing the age at which they would provide "suitable" wildlife habitat. Canopy closures in older capable habitat may not currently meet the needs of flammulated owls.

**Open Park-Like Stand.** A single stratum of large trees is present. Large trees are common. Young trees are absent or few in the understory. Park-like conditions may exist. (Applies to Newport Ranger District Only)

**Open Road Density.** A measure of the roads accessible to motorized use which affects wildlife, expressed as miles of road per square mile of area.

**Outputs.** The goods and services produced from and offered on National Forest lands.

**Outsloping.** Shaping a road to cause drainage to flow toward the outside shoulder (generally the fill slope), as opposed to insloping which encourages drainage to flow to the inside shoulder (generally the cut slope). Emphasis is on avoiding concentrated water flow.

**Overstory.** The portion of trees in a forest which forms the uppermost layer of foliage.

# P

**Park-like Structure.** Stands with large scattered trees and open growing conditions, usually maintained by ground fires.

**Partial Retention.** A visual quality objective which, in general, means man's activities may be evident but must remain subordinate to the characteristic landscape.

**Patch.** An area of uniform vegetation that differs from what surrounds it in structure and composition. Examples might include a forest surrounded by a cut over area or a patch of dense young forest surrounded by a patch of open old growth.

**Pathogen.** An agent such as a fungus, virus, or bacterium that causes disease.

**Pattern.** The spatial arrangement of landscape elements (patches, corridors, matrix) that determines the function of a landscape as an ecological system.

**Payments to Counties.** The portion of receipts derived from Forest Service resource management that is distributed to State and county governments, such as the Forest Service's 25 percent fund payments.

**Perennial Stream** – A stream that flows water year-round.

**Permitted Grazing.** Use of a National Forest range allotment under the terms of a grazing permit.

**Permittee.** Individual or entity that has received a grazing or Special Use Permit from the Forest Service.

**Pesticide.** A general term applied to a variety of chemical materials including insecticides, herbicides, fungicides and rodenticides.

**Pile Burning.** Employing top-attached yarding methods, woody debris is removed from a site to a roadside landing or hand-piled on site, where the woody debris can be burned safely and inexpensively. Pile burning is conducted in late fall.

**Point Source.** Originating from a discrete identifiable source or conveyance.

**Pool.** Portion of a stream where the current is slow, often with deeper water than surrounding areas and with a smooth surface texture. Often occurs above and below riffles and generally is formed around stream bends or obstructions such as logs, root wads, or boulders. Pools provide important feeding and resting areas for fish.

**Population.** Spatially-discreet groups of individuals that can freely interbreed.

**Potential Vegetation.** Vegetation that would likely develop if all successional sequences were completed without human interference under present site conditions.

**Precommercial Thinning.** The selective felling, deadening, or removal of trees in a young stand primarily to accelerate diameter increment on the remaining stems, maintain a specific stocking or stand density range, and improve the vigor and quality of the trees that remain.

**Preferred Alternative.** The alternative recommended for implementation in an EIS (40 CFR 1502.14).

**Preparatory Cut.** Removal of trees near the end of a rotation so as to permanently open the canopy and enlarge the crowns of seed bearers, with a view to improving conditions for seed production and natural generation, as typically in shelterwood systems.

**Prescribed Burning.** The intentional application of fire to wildland fuels in either their natural or modified state under such conditions as to allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (i.e., silviculture, wildlife management, reduction of fuel hazard, etc.).

**Prescribed Fire.** Any fire ignited by management actions to meet specific objectives. Prescribed fire can rejuvenate forage for livestock and wildlife or prepare sites for natural regeneration of trees.

**Prescription.** Management practices selected and scheduled for application on a designated area to attain specific land and resource management goals and objectives.

**Productivity.** (1) *Soil productivity:* the capacity of a soil to produce plant growth, due to the soil's chemical, physical, and biological properties (such as depth, temperature, water holding capacity, and mineral, nutrient and organic matter content). (2) *Vegetative productivity:* the rate of production of vegetation within a given period. (3) *General:* the innate capacity of an environment to support plant and animal life over time.

**Programmatic Document.** An environmental document that establishes a broad management direction for an area by establishing a goal, objective, standard, management prescription and monitoring and evaluation requirements for different types of activities which are permitted. It also can establish what activities are not permitted within the specific area(s). This type of document does not mandate or authorize the permitted activities to proceed.

**Proper Functioning Condition (PFC) –** Riparian and wetland areas achieve Proper Functioning Condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. Attainment of Proper Functioning Condition reduces erosion and improves water quality; filters sediment, captures bedload, and aids floodplain development; improves floodwater retention and groundwater recharge; develops root masses that stabilize streambanks against cutting action; develops diverse ponding and channel characteristics to provide habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and supports greater biodiversity. The functioning condition of riparian and wetland areas is a result of the interaction of geology, soil, water, and vegetation.

**Purchaser.** The entity which is awarded a USDA Forest Service contract after bidding, usually with competition. As used in timber, the entity which has purchased timber as identified in a timber sale contract.

# Q

**Qualitative –** Traits or characteristics that relate to quality and can't be measured with numbers.

**Quantitative –** Traits or characteristics that can be measured with numbers.

# R

**Rain-on-Snow Event.** A winter storm that is characterized by precipitation falling as rain, rather than snow, and melting of existing snowpack.

**Range of Alternatives.** An alternative is one way of managing the National Forest, expressed as management emphasis leading to a unique set of goods and services being available to the public. A range of alternatives is several different ways of managing the Forest, offering many different levels of goods and services.

**Range of Variability.** The spectrum of conditions possible in ecosystem composition, structure, and function considering both temporal and spatial factors.

**Reconstruction.** See Road Reconstruction.

**Recovery –** (1) Return of an ecosystem to a specified condition after a disturbance; (2) return of a previously threatened or endangered species to a condition of population viability.

**Redd –** Spawning nest made by salmonid fish species in the gravel bed of a river.

**Reforestation.** The renewal of forest cover by seeding, planting, and natural means.

**Regeneration.** The process of establishing a new crop of trees on previously harvested land; also refers to the new crop of trees that have become established.

**Rehabilitate.** To repair and protect certain aspects of a system so that essential structures and functions are recovered, even though the overall system may not be exactly as it was before.

**Release Treatment.** An intermediate treatment or cutting designed to free a young stand of desirable trees, not past the sapling stage, from the competition of undesirable trees that threaten to suppress them. Cleaning and liberation cutting are types of release.

**Resident** – Pertaining to fishes where fish within a streams spend there entire life-cycle within the watershed.

**Residual Stand.** Trees remaining standing after some disturbance event, such as fire or logging.

**Resilient, Resilience, Resiliency –** (1) The ability of a system to respond to disturbances. Resiliency is one of the properties that enable the system to persist in many different states or successional stages. (2) In human communities, refers to the ability of a community to respond to externally induced changes such as larger economic or social forces.

**Restoration –** Holistic actions taken to modify an ecosystem to achieve desired, healthy and functioning conditions and processes. Generally refers to the process of enabling the system to resume acting or continue acting following disturbance as if the disturbance were absent. Restoration management activities can be either active (such as control of noxious weeds, thinning of over-dense stands of trees, or redistributing roads) or more passive (more restrictive, hands-off management direction that is primarily conservation-oriented).

**Restricted Road.** A National Forest road or segment which is restricted from a certain type of use or all uses during certain seasons of the year or yearlong. The use being restricted and the time period must be specified. The closure is legal when the Forest Supervisor has issued and posted an order in accordance with 36 CFR 261.

**Revegetation.** Establishing or reestablishing desirable plants on areas where desirable plants are absent or of inadequate density, by management alone (natural revegetation) or by seeding or transplanting (artificial revegetation).

**Riffle.** Relatively shallow section of a stream or river with rapid current and a surface broken by gravel, rubble, or boulders.

**Riparian Area –** Area with distinctive soil and vegetation characteristics between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

**Riparian Habitat Conservation Areas (RHCAs).** Portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems.

**Rip Rapping.** The use of a large rock, boulders, concrete chunks or similar non-erosive, heavy objects as an armoring device.

**Road Work/Maintenance -** Includes, as needed, installation of rolling dips, installation of relief culverts, rolling the road grade for increased drainage, armoring of culvert catch basins and outlets, and adding gravel surfacing, replacing existing stream crossings, cut and fill slope stabilization, and removal of encroaching road fills.

**Road Maintenance Plan.** A document schedule and program for upkeep of roads to provide a level of service for the user and protection of resources. There are five levels of maintenance; Level I being the least intense and Level V being the most intensive.

**Road Obliteration.** There are varying degrees of road obliteration. **Level 1 Obliteration** includes removal and recontour of all stream crossings and, as needed, recontour of unstable fill slopes, cutslope stabilization, ripping the road tread, installation of no-maintenance cross ditches, and revegetation. Obliteration also includes some kind of road closure method such as with a guard rail barrier, gate, an earthen berm, or a short section of full recontour, called "front end" obliteration. Front End Obliteration includes recontouring of the first site distance, or about 250 feet of the road, to stop motorized traffic from entering onto the road. Culverts that pose a high risk of failure because of lack of maintenance would be removed and recontoured concurrently with the closure of the road. **Level 2 Obliteration** includes removal of all stream crossings and full recontour of the entire road prism, introduction of woody debris, and revegetation as needed.

**Road Reconstruction.** There are varying degrees of road reconstruction. **Light Road Reconstruction** includes, as needed, installation of rolling dips, installation of relief culverts, rolling the road grade for increased drainage, armoring of culvert catch basins and outlets, and adding gravel surfacing. **Heavy Road Reconstruction** includes, as needed, changing the road design, replacing existing stream crossings, cut and fill slope stabilization using gabions or other means, subgrade reinforcements, road prism realignment, and removal of encroaching road fills.

**Road Stabilization.** Stabilization includes the use of vegetation and geotextiles to control or reduce surface erosion.

**Rocking.** The application of aggregate to a roadbed to provide strength and a more stable erosion resistant surface.

**Runoff.** Fresh water from precipitation and melting ice that flows on the earth's surface into nearby streams, lakes, wetlands and reservoirs.

# S

**Sale Area Map.** A map of suitable scale and detail to be legible which part of a timber sale contract. The map identifies sale area boundaries and contract requirements specific to the sale.

**Salmonid** – One of a number of fishes of the genus *Onchorhynchus* of the North Pacific, which ascend freshwater streams to spawn.

**Salvage Harvest.** The removal of dead trees or trees damaged or dying because of injurious agents other than competition, for the purpose of recovering economic value that would otherwise be lost.

**Sanitation Harvest.** An intermediate harvest that removes dead, damaged, or susceptible trees, essentially to prevent the spread of pests or pathogens and so promote forest hygiene.

**Sawtimber.** Trees containing at least one twelve foot sawlog or two noncontiguous eight foot logs, and meeting regional specifications for freedom from defect. Softwood trees must be nine inches in diameter and hardwood trees eleven inches in diameter at breast height.

**Scale.** (1) The level of resolution under consideration, such as broad scale or fine scale. (2) The ratio of length on a map to true length.

**Scenery.** General appearance of a place, general appearance of a landscape, or features of a landscape.

**Scenery Management.** The art and science of arranging, planning, and designing landscape attributes relative to the appearance of places and expanses in outdoor settings.

**Scenic.** Of or relating to landscape scenery; pertaining to natural or natural appearing scenery; constituting or affording pleasant views of natural landscape attributes or positive cultural elements.

**Scenic Attractiveness.** The scenic importance of a landscape based on human perceptions of the intrinsic beauty of land form, rockform, waterform, and vegetation pattern. Reflects varying visual perception attributes of variety, unity, vividness, intactness, coherence, mystery, uniqueness, harmony, balance, and pattern. It is classified as a), distinctive; b) typical or common; or c) undistinguished.

**Scenic Class.** A system of classification describing the importance or value of a particular landscape or portions of that landscape.

**Scenic Integrity.** State of naturalness or, conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from the existing landscape character in a national forest. "**Very High**" (unaltered) refers to landscapes where the valued landscape character is intact with only minute, if any, deviations. The existing landscape character and sense of place is at the highest possible level. "**High**" (appears unaltered) refers to landscapes where the valued landscape character appears intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident. "**Moderate**" (slightly altered) refers to landscapes where the valued landscape character "appears slightly altered". Noticeable deviations must remain visually subordinate to the landscape character being viewed. "**Low**" (moderately altered) refers to landscapes where the valued landscape character "appears moderately altered". Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles outside the landscape being viewed. "**Very Low**" (heavily altered) refers to landscapes where the valued landscape character "appears heavily altered". Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles within or outside the landscape being viewed. "**Unacceptably Low**" (extremely altered) refers to landscapes where the valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern or scale from the landscape character.

**Scenic Quality.** The essential attributes of landscape that when viewed by people, elicit psychological and physiological benefits to individuals and therefore, to society in general.

**Scenic Resource.** Attributes, characteristics, and features of landscapes that provide varying responses from, and varying degrees of benefits to humans.

**Scoping.** The procedures by which the Forest Service determines the extent of analysis necessary for a proposed action, i.e., the range of actions, alternatives, and impacts to be addressed, identification of significant issues related to a proposed action, and establishing the depth of environmental analysis, data, and task assignments needed.

**Secondary Integrity Area.** Those areas which contain slightly higher amounts of mature or old forest when compared to other areas in the drainage, yet are highly fragmented and typically have high total road and open road and/or motorized trail densities.

**Security.** The inherent protection that provides minimal human disturbance and minimal threat of mortality for species that either avoid human disturbance or are directly threatened by trapping, hunting, and/or other forms of mortality.

**Sediment –** Solid materials, both mineral and organic, in suspension or transported by water, gravity, ice, or air; they may be moved and deposited away from their original position and eventually will settle to the bottom of the stream.

**Seed Trees.** Mature trees left standing after timber harvest to provide seeds to regenerate the new stand; a harvest prescription.

**Seed Tree Harvest.** An even-aged cutting method in which most of the mature timber from an area is removed in one cut except for a small number of desirable trees retained to provide seed or shelter for regeneration.

**Seed Trees With Reserves.** Harvest where some or all of the shelter trees are retained after regeneration has become established to attain goals other than regeneration.

**Seedling/Sapling.** A size category for forest stands in which trees less than five inches in diameter are the predominant vegetation.

**Seen Area.** The total landscape area observed based upon land-form screening. Seen areas may be divided into zones of immediate foreground, foreground, middleground, and background. Some landscapes are seldom seen by the public.
**Selective Harvest.** Cutting of intermediate aged, mature, or diseased trees in an uneven aged forest stand, either singly or in small groups. This encourages growth of younger trees and maintains an uneven aged stand.

**Sense of Place.** A concept that focuses on the subjective and often shared experience or attachment to the landscape emotionally or symbolically. It refers to the perception people have for a physical area with which they interact, whether for a few minutes or a lifetime that gives that area special meaning to them, to their community, or to their culture.

**Sensitivity Level.** Measure of people's concerns for the scenic quality of the National Forest. Sensitivity levels are determined for land areas viewed by people who are: traveling through the forest on developed roads and trails; using areas such as campgrounds and visitor centers; or recreating at lakes, streams and other water bodies. There are three sensitivity levels for identifying the different levels of concern a visitor/user has for the visual scenic quality they experience. They are classified as: Level I - Highest Sensitivity, Level II - Average/Moderate Sensitivity, and Level III - Lowest Sensitivity.

**Sensitive Species –** Species identified by a Forest Service Regional Forester for which population viability is a concern either (a) because of significant current or predicted downward trends in population numbers or density, or (b) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. For example, torrent sculpin and westslope cutthroat trout.

**Seral.** Refers to the sequence of transitional plant communities during succession. Early seral refers to the plants that are present soon after a disturbance or at the beginning of a new successional process, such as seedling or sapling growth stages within a forest; midseral in a forest would refer to pole or medium sawtimber growth stages; late seral refers to plants present during a later stage of plant community succession, such as mature and old growth forest stages.

**Seral Stage.** The developmental phase of a forest stand or rangeland with characteristic structure and plant species composition.

**Shade Intolerant.** Tree species which grow best in direct sunlight.

**Shade Tolerant.** Tree species which can tolerate a shaded environment.

**Shape.** Contour, spatial form, or configuration of a figure. Shape is similar to form, but shape is usually considered to be two-dimensional.

**Shelterwood Harvest.** An even-aged cutting method in which a stand of trees is removed through a series of cuttings designed to establish a new crop with seed and protection provided by a portion of the stand.

**Shelterwood with Reserves.** Harvest unit where some or all of the shelter trees in a shelterwood harvest unit are retained after regeneration has become established to attain goals other than regeneration.

**Significant Disturbance.** Disturbance of surface resources, including soil, water and vegetation, which has the potential to degrade water quality to a level requiring corrective action.

**Silviculture.** The practice of manipulating the establishment, composition, structure, growth, and rate of succession of forests to accomplish specific objectives.

**Silvicultural Examination.** The process used to gather the detailed onsite field data needed to determine management opportunities and direction for the timber resource within a small subdivision of a forest area, such as a stand. Also called stand exam or common stand exam.

**Silvicultural System.** The entire process by which forest stands are tended, harvested, and replaced. It includes all cultural practices performed during the life of the stand, such as regeneration cutting, fertilization, thinning, improvement cutting, and use of genetically improved sources of tree seeds and seedlings.

**Site –** A specific location of an activity or project, such as a campground, a lake, or a stand of trees to be harvested.

**Site Potential.** A measure of resource availability based on interactions among soils, climate, hydrology, and vegetation.

**Site Preparation.** A general term for a variety of activities that remove or treat competing vegetation, slash, and other debris that may inhibit the establishment of regeneration.

**Site Specific.** Pertains to a discernible, definable area of point on the ground where a project or activity would (or is proposed) to occur.

**Slash.** The residue left on the ground after felling and other silvicultural operations and/or accumulating there as a result of storm, fire, girdling, or poisoning of trees.

**Snag.** A standing dead tree, usually greater than five feet tall and six inches in diameter at breast height. Snags are important as habitat for a variety of wildlife species.

**Soil and Water Conservation Practice (SWCP).** The set of practices which, when applied during implementation of a project, ensures that soil productivity is maintained, soil loss and water quality impacts are minimized, and water related beneficial uses are protected. These practices can take several forms. Some are defined by state regulation or Memoranda of Understanding between the Forest Service and the States and thus are recognized as Best Management Practices (BMPs). Others are defined by the Forest Service interdisciplinary teams or described in Forest Service Handbooks for application Forest-wide. Both kinds of SWCP are included in the Forest Plan as Forest-wide standards or are referenced in the plans. A third kind of SWCP is identified by the interdisciplinary team for application to specific management areas; these are included as Management Area Standards in the appropriate management areas in the Forest Plan. A fourth kind, project level SWCPs, are based on site specific evaluations and represent the most effective and practical means of accomplishing the soil and water resource goals of the specific area involved in the project. These project level conservation practices can either supplement or replace the Forest Plan for specific projects. This handbook would aid in the development of the fourth kind of SWCP.

**Soil Productivity.** The capacity of the soil to produce a specific crop such as fiber and forage, under defined levels of management. It is generally dependent on available soil moisture and nutrients and length of growing season.

**Spatial –** Related to or having the nature of space (for example, a geographic area).

**Spawning Habitat –** Areas used by adult fish for laying and fertilizing eggs.

**Special Use Permit.** A permit issued under established laws and regulations to an individual, organization, or company for occupancy or use of National Forest land for some special purpose.

**Species –** A population or series of populations of organisms that can interbreed freely with each other but not with members of other species.

**Specified Road –** A road with specific features designed by Forest Service engineers and included in the timber sale contract.

**Stability.** Ability of a living system to withstand or recover from externally imposed changes and stresses.

**Stand.** A group of trees in a specific area that are sufficiently alike in composition, age, arrangement and condition so as to be distinguishable from the forest in adjoining areas.

**Stand Composition.** The vegetative species that make up a stand.

**Stand Conversions.** Application of silvicultural practices that change the species composition of trees in a stand, including planting a variety of species, discrimination against undesirable species during thinning, and other practices that naturally discriminate against undesirable species, such as specific site preparation and harvest methods.

**Stand Density.** Refers to the number of trees growing in a given area, usually expressed in trees per acre.

**Stand Structure.** The mix and distribution of tree sizes, layers, and ages in a forest. Some stands are all one size (single story), some are two story, and some are a max of trees of different sizes and ages (multistory).

**Stocking.** The degree to which trees occupy the land, measured by basal area and/or number of trees by size and spacing, compared with a stocking standard; that is, the basal area and/or number of trees required to fully utilize the land's growth potential.

**Storage (roads) -** Includes removal and recontouring of all stream crossings and, as needed, recontour of unstable fill slopes, cutslope stabilization, ripping the road tread, installation of no-maintenance cross ditches, and revegetation. Storage also includes some kind of road closure method such as with a guardrail barrier, gate, an earthen berm, or a short section of full recontouring. These roads would remain as classified roads on the transportation system.

**Stream order.** It is often convenient to classify streams within a drainage basin by systematically defining the network of branches. Each nonbranching channel segment (smallest size) is designated a first-order stream. A stream which receives only first-order segments is termed a second-order stream, and so on. The order of a particular drainage basin is determined by the order of the principle or largest segment.

**Stream morphology.** The study of the form and structure of streams.

**Streamside Management Zone (SMZ).** A designated zone that consists of the steam and an adjacent area of varying width where management practices that might affect water quality, fish, or other aquatic resources are modified. The SMZ is not a zone of exclusion, but a zone of closely managed activity. It is a zone which acts as an effective filter and absorptive sone for sediment, maintains shade, projects aquatic and terrestrial riparian habitats, protects channel and streambanks, and promotes floodplain stability. The SMZ may be wider than the riparian area.

**Structural Stages.** Category of successional stage based on stand age and tree size class. Three structural stages are used in this analysis. The shrub/seedling/sapling stage includes forest stands that are less than 35 years old; the pole/small to medium stage stands are 36 to 100 years old and the mature/large timber stage stands are over 100 years old.

**Structure.** How the parts of ecosystems are arranged, both horizontally and vertically. Structure might reveal a pattern, or mosaic, or total randomness of vegetation.

**Subordinate.** A term used in regard to scenery or visuals, referring to landscape features that are inferior to, or placed below, another in size, importance, brightness and so on. Features that are secondary in visual impact or importance.

**Subbasin –** A drainage area of approximately 800,000 to 1,000,000 acres, equivalent to a $4^{th}$-field hydrologic unit code (HUC). Hierarchically, subwatersheds ($6^{th}$-field HUC), which in turn are contained within a watershed ($5^{th}$-field HUC), which in turn are contained within a subbasin ($4^{th}$-field HUC). This concept is shown graphically in Figure 2-1.

**Substrate –** The soil or underlying rock on which an organism is growing or to which it is attached.

**Subwatershed –** A drainage area of approximately 20,000 acres, equivalent to a 6th-field Hydrologic Unit Code (HUC). Hierarchically, subwatersheds (6th-field HUC) are contained within watershed (5th-field HUC), which in turn contained within a subbasin (4th-field HUC). This concept is shown graphically in Chapter 2.

**Succession –** A predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages in succession are often referred to as seral stages.

**Successional Stage.** A phase in the gradual supplanting of one community of plants by another.

**Suitable forest/timber land.** Forest land (as defined in CFR 219.3, 219.14) for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions; for which there is reasonable assurance that such lands can be adequately restocked (as provided in CFR 219.4); and for which there is management direction that indicates that timber production is an appropriate use of that area.

**Suitable Habitat.** Wildlife habitat that currently has both the fixed and variable stand attributes that enable it to produce the habitat requirements for a given species. Fixed attributes of a stand do not change over time, and may include elevation, aspect, landtype, slope, and habitat type. Variable attributes change over time and may include seral stage, cover type, stand density, tree size, stand age, or stand condition. See also Capable Habitat.

**Sustainability.** (1) Meeting the needs of the present without compromising the abilities of future generations to meet their needs; emphasizing and maintaining the underlying ecological processes that ensure long term productivity of goods, services, and values without impairing productivity of the land. (2) In commodity production, refers to the yield of a natural resource that can be produced continually at any given intensity of management.

**Sustainability –** Meeting the needs of the present without compromising the abilities of future generations to meet their needs; emphasizing and maintaining the underlying ecological processes that ensure long-term productivity of goods, services, and values without impairing productivity of the land.

# T

**Temporary Roads -** Those roads not intended to be retained for long-term management.

**Terrestrial.** Pertaining to the land.

**Texture.** Visual interplay of light and shadow created by variations in the surface of an object. Grain or nap of a landscape or a repetitive pattern of tiny forms. Visual texture can range from smooth to coarse.

**Thermal Cover.** Vegetation used by animals to modify the adverse effects of weather. A forest stand that is at least 40 feet in height with tree canopy cover of at least 70 percent provides thermal cover. These stand conditions are achieved in closed sapling-pole stands and by all older stands unless the canopy cover is reduced below 70 percent. Deciduous stands may serve as thermal cover in summer, but not in winter.

**Thinning.** An intermediate cutting made to stimulate the growth of the trees that remain, change species composition, and/or to increase the total yield of useful material from the stand.

**Threatened Species –** Species listed under the Endangered Species Act (1973; i.e. bull trout) that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

**Three-step Shelterwood.** An even aged silvicultural system in which the old crop (the shelterwood) is removed in three successive cuttings in order to provide a source of seed and/or protection for regeneration.

**Tiering**. Refers to the coverage of general matters in broader Environmental Impact Statements or Environmental Assessments with subsequent other related statements in Environmental Assessments incorporated, by reference, the discussions contained in the previous document, solely on the issues specific to the statement subsequently prepared.

**Timber Types.** A descriptive classification of forestland based on present occupancy of an area by tree species (i.e., lodgepole, mixed conifer). More appropriately called forest cover types, this category is further defined by the composition of its vegetation and/or environmental factors that influence its locality.

**Tractor.** Any logging system which uses ground-based machines.

**Trampling.** Fuel is treated by crushing it. Trampling is utilized in areas where fuels are relatively light and the area is limited by slope (usually areas that are harvested with a machine). The objective is to mix fuel with soil to hasten decomposition and provide for nutrient cycling.

**Typical or Common Landscape.** A term used in regard to scenery or visuals, referring to prevalent, usual, or widespread landscapes within a landscape province. It also refers to landscapes with ordinary and routine scenic attractiveness.

**Travel Corridor.** The habitat pathway that allows an animal to move from one place to another.

# U

**Unclassified Road** – A road on National Forest land that is not managed in the forest transportation system.

**Underburning.** A prescribed fire method designed to meet various resource objectives where a tree canopy is present and is to be preserved. The treatment reduces woody debris, provides site-preparation for natural or artificially-planted regeneration and eliminates unwanted vegetation. Underburning can also improve wildlife habitat.

**Understory.** Plants that grow beneath the canopy of other plants. Usually refers to grasses, forbs, and low shrubs under a tree or shrub canopy.

**Uneven-age Management.** The application of a combination of actions needed to simultaneously maintain continuous high-forest cover. Cutting methods that develop and maintain uneven-aged stands are individual-tree and group selection.

**Uneven-aged Stand.** Stand of trees in which there are considerable difference in the age classes of individual trees.

**Uneven-age System.** A silvicultural system involving manipulation of a forest to simultaneously maintaining: continuous high forest cover; recurring regeneration of desirable species and orderly growth; and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Individual tree selection and group selection cutting are examples of uneven-aged management methods.

**Unique.** Unequalled, very rare, or uncommon.

**Unplanned Ignition.** A fire started at random by either natural or human causes or a deliberate incendiary fire.

**Unroaded**. Area characterized by its lack of existing roads, but not designated as a Roadless Area or Wilderness.

**Unsuitable Forest Land.** The IPNF defines unsuitable forest land as lands not selected for timber production in Step II and III of the suitability analysis during the development of the Forest Plan due to: (1) the multiple-use objectives for the alternative precludes *scheduled* timber production; (2) other management objectives for the alternative limit timber production activities to the point where management requirements set forth in 36 CFR 219.27 cannot be met; and (3) the lands are not cost-efficient over the planning horizon in meeting forest objectives that include timber production. Land not appropriate for timber production shall be designated as unsuitable in the Forest Plan.

# V

**Variety**. An intermixture, diversity, or succession of different things, forms, or qualities in the landscape.

**Variety Class.** A term from the Visual Management System. See "Scenic Attractiveness."

**Very High Scenic Integrity Level.** A scenic integrity level that generally provides for ecological change only.

**Very Low Scenic Integrity Level.** A scenic integrity level meaning human activities of vegetative and landform alterations may dominate the original, natural landscape character but should appear as natural occurrences when viewed at background distances.

**Viability.** In general, the ability of a population of plant or animal species to persist for some specific time into the future. For planning purposes, a viable population is one that has the estimated numbers and distribution of reproductive individuals to ensure that its continued existence will be well distributed in the planning area.

**Viable Population –** A population that is regarded as having the estimated numbers and distribution of reproductive individuals to ensure that its continued existence is well distributed in the project area.

**Viewshed.** Subunits of the landscape where the visitor's view is contained by topography similar to a watershed.

**Visual.** A mental image attained by sight.

**Visual Absorption Capability.** A classification system used to denote relative ability of a landscape to accept human alterations without loss of character of scenic quality.

**Visual Quality Objective (VQO).** The IPNF defines Visual Quality Objective as a system of indicating the potential expectations of the visual resource by considering the frequency an area is viewed and the type of landscape. The Newport Ranger District defines Visual Quality Objective as a desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area, referring to the degree of acceptable alterations of the characteristic landscape. Under the Newport definition, all VQO's except "Preservation" imply that there will be management activities: "**Preservation**": In general, human activities are not detectable to the visitor; usually provides for ecological change only. "**Retention**:" Human activities are not evident to the casual Forest visitor. "**Partial Retention**": Human activities may be evident, but must remain subordinate to the characteristic landscape. "**Modification**": Human activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground. "**Maximum Modification**": Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background. "**Rehabilitation**": A short-term management alternative used to return existing visual impacts that are undesirable or do not meet adopted VQO's to a desired visual quality. "**Enhancement**": A short-term management alternative that is done with the express purpose of increasing positive visual variety where little variety now exists.

**Visual Resource.** The IPNF defines visual resource as the composite of landforms, water features, vegetative patterns and cultural features which create the visual environment. The Newport Ranger District defines visual resource as the composite of basic terrain, geologic features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

# W

**Water Quality Limited Segment (WQLS) –** A Clean Water Act classification for waters where application of best management practices or technology-based controls are not sufficient to achieve designated water quality standards.

**Watershed –** (1) The region draining into a river, river system, or body of water. (2) In this EA, a watershed also refers specifically to a drainage area of approximately 50,000 to 100,000 acres, which is equivalent to a 5$^{th}$-field Hydrologic

Unit Code (HUC). Hierarchically, subwatersheds (6th-field HUC) are contained within a watershed (5 th-field HUC), which in turn is contained within a subbasin (4th-field HUC). This concept is shown graphically in Figure 2-1.

**Wetland –** In general, an area soaked by surface or groundwater frequently enough to support vegetation that requires saturated soil conditions for growth and reproduction; generally includes swamps, marshes, springs, seeps, bogs, wet meadows, mudflats, natural ponds, and other similar areas.

**Wildfire.** A human or naturally caused fire that does not meet the land management objectives.

**Windrowing.** To pile slash or debris is a row along the contour of the slope.

**Wildland Fire.** Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

**Wildlife Burning.** See Ecosystem/Wildlife Burning.

**Wildlife Diversity.** The relative degree of abundance of wildlife species, plant species, communities, habitats or habitat features per unit area.

**Windthrow.** Trees blown over by the wind.

# Y

**Yarding.** A method of bringing logs in to a roadside area or landing, for truck transport. Methods may include forms of skyline cable logging systems, ground-based skidding, balloon, helicopter, etc.

**Yield.** Measured output; for example, timber yield or water yield.

# Appendix A – Best Management Practices

## Introduction

The Forest Service is required by law to comply with water quality standards developed under authority of the Clean Water Act. The Environmental Protection Agency and the State of Idaho are responsible for enforcement of these standards. The Idaho Panhandle National Forest Plan states (Chapter II, p. 27) that the Forest will "maintain high quality water to protect fisheries habitat, water based recreation, public water supplies and be within state water quality standards". The use of BMP's is also required in the Memorandum of Understanding between the Forest Service and the State of Idaho as part of our responsibility as the Designated Water Quality Management Agency on National Forest System lands. The State's water quality standards regulate nonpoint source pollution from timber management and road construction activities through application of Best Management Practices (BMPs). The BMPs were developed under authority of the Clean Water Act to ensure that Idaho's waters do not contain pollutants in concentrations, which adversely affect water quality or impair a designated use. State recognized BMPs that will be used during project design and implementation are contained in these documents:

a. Rules and Regulations Pertaining to the Idaho Forest Practices Act, (IFPA), as adopted by the Idaho Land Board; and

b. Rules and Regulations and Minimum Standards for Stream Channel Alterations, as adopted by the Idaho Water Resources Board under authority of the Idaho Stream Channel Protection Act (ISCPA).

Many of the rules and regulations for stream channel alterations are contained, in slightly different forms, in two Memorandum of Understandings (MOU) between the USFS and the State of Idaho. These MOUs are incorporated into the Forest Manual and R-1 Supplement 31, contains provisions which are not currently state recognized BMPs.

The practices described herein are tiered to the practices in FSH 2509.22. They were developed as part of the NEPA process, with interdisciplinary involvement, and meet state and Forest water quality objectives. The purpose of this appendix is to: 1) establish the connection between the Soil and Water Conservation Practice (SWCP) employed by the Forest Service and BMP's identified in Idaho Water Quality Standards (IDAPA 16.01.2300.05) and 2) identify how the SWCP Standard Specifications for the Construction of Roads, and the Timber Sale Contract provisions meet or exceed the Rules and Regulations pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code. The relevant portions of the Rules and Regulations developed under the Idaho Stream Protection Act are also covered.

The objective of this appendix is to provide conservation practices for use on National Forest Lands to minimize the effects of management activities on soil and water resources. The conservation practices were compiled from Forest Service manuals, handbooks, contract and permit provisions, to directly or indirectly improve water quality, reduce losses in soil productivity and erosion, and abate or mitigate management effects, while meeting other resource goals and objectives. They are of three basic forms: administrative, preventive and corrective. These practices are neither detailed prescriptions nor solutions for specific problems. They are purposely broad. These practices are action initiating process mechanisms, which call for the development of requirements and considerations to be addressed prior to and during the formulation of alternatives for land management actions. They serve as checkpoints, which are considered in formulating a plan, a program and/or a project.

Although some environmental impacts may be characteristic of a management activity, the actual effects on soil and water resources will vary considerably. The extent of these management effects on soil and water resources is a function of:

1. The physical, meteorological and hydrologic environment where the activity takes place (topography, physiography, precipitation, channel density, geology, soil type, vegetative cover, etc.);

2. The type of activity imposed on a given environment (recreation, mineral exploration, timber management, etc.) and its extent and magnitude;

3. The method of application and the duration of the activity (grazing system used, types of silvicultural practice used, constant vs. seasonal use, recurrent application or onetime application, etc.);

4. The season of the year that the activity occurs or is applied.

These factors vary within the National Forests in the Northern Region and from site to site. It follows then that the extent and kind of impacts are variable, as are the abatement and mitigation measures. No solution prescription, method, or technique is best for all circumstances. Thus the management practices presented in the following include such phrases as "according to the design", "as prescribed," "suitable for," "within acceptable limits," and similar qualifiers. The actual prescriptions, specifications, and designs are the result of evaluation and development by professional personnel through interdisciplinary involvement in the NEPA process. This results in specific conservation practices that are tailored to meet site specific resource requirements and needs.

## BMP Implementation Process

In cooperation with the States, the USDA Forest Service's primary strategy for the control of nonpoint sources is based on the implementation of BMP's determined necessary for the protection of the identified beneficial uses. The Forest Service Nonpoint Source Management System consists of:

1. BMP selection and design based on site-specific conditions; technical, economic and institutional feasibility; and the designated beneficial uses of the streams;

2. BMP Application;

3. BMP monitoring to ensure that they are being implemented and are effective in protecting designated beneficial uses;

4. Evaluation of BMP monitoring results;

5. Feeding back the results into current/future activities and BMP design.

The District Ranger is responsible for insuring that this BMP feedback loop is implemented on all projects. The Practices described herein are tiered to the practices in the R1/R4 FSH 2509.22. They were developed as part of the NEPA process, with interdisciplinary involvement, and meet State and Forest water quality objectives. The purpose of this appendix document is to: 1) establish the connection between the SWCP employed by the Forest Service and BMP's identified in Idaho Water Quality Standards (IDAHO APT 16.01.2300.05) and 2) identify how the SWCP, Standard Specifications for the Construction of Roads, and the Timber Sale Contract provisions meet or exceed the Rules and Regulations Pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code (BMP's). The relevant portions of the Rules and Regulations developed under the Idaho Stream Protection Act are also included.

## FORMAT OF THE BMPS

Each Soil and Water Conservation Practice (SWCP) is described as follows:

**Title**: Includes the sequential number of the SWCP and a brief title.

OBJECTIVE: Describes the SWCP objective(s) and the desired results for protecting water quality.

*EFFECTIVENESS:* Provides a qualitative assessment of expected effectiveness that the implemented BMP will have on preventing or reducing impacts on water quality. The SWCP effectiveness rating is based on: 1) literature and research (must be applicable to area 2) administrative studies (local or within similar ecosystem); and 3) professional experience (judgment of an expert by education and/or experience). The expected effectiveness of the SWCP is rated either High, Moderate or Low.

**High**: Practice is highly effective (>90%) and one or more of the following types of documentation are available:

a) Literature/Research - must be applicable to area;

b) Administrative studies - local or within similar ecosystem;
c) Experience - judgment of an expert by education and/or experience;
d) Fact - obvious by reasoned (logical response).

**Moderate**: Documentation shows that the practice is effective less than 90% of the time, but at least 75% of the time.

Or

Logic indicates that this practice is highly effective, but there is little or no documentation to back it up.

Or

Implementation and effectiveness of this practice will be monitored and the practice will be modified if necessary to achieve the objective of the BMP.

**Low**: Effectiveness unknown or unverified, and there is little to no documentation

Or

Applied logic is uncertain in this case, or the practice is estimated to be less than 75% effective.

Or

This practice is speculative and needs both effectiveness and validation monitoring.

The effectiveness estimates given here are general, given the range of conditions throughout the Forest. More specific estimates are made at the project level when the BMPs are actually prescribed.

COMPLIANCE: Provides a qualitative assessment of how the implementation of the specific measures will meet the Forest Practice Act Roles and Regulations pertaining to water quality.

***IMPLEMENTATION:*** This section identifies: (1) the site-specific water quality protection measures to be implemented and (2) how the practices are expected to be applied and incorporated into the Timber Sale Contract.

## ITEMS COMMON TO ALL SOIL AND WATER CONSERVATION PRACTICES

**Responsibility For Implementation**: The District Ranger (through the Presale Forester) is responsible for insuring the factors identified in the following SWCP's are incorporated into: Timber Sale Contracts through the inclusion of proper B and/or C provisions; or Public Works Contracts through the inclusion of specific contract clauses.

The Contracting Officer, through his/her official representative (Sale Administrator and/or Engineering Representatives for timber sale contracts; and Contracting Officers Representative for public works contracts) is responsible for insuring that the provisions are properly administered on the ground.

**Monitoring**: Implementation and effectiveness of water quality mitigation measures are also monitored annually. This includes routine monitoring by timber sale administrators, road construction inspectors, and resource specialists which is documented in diaries and project files. Basically, water quality monitoring is a review of BMP implementation and a visual evaluation BMP effectiveness. Any necessary corrective action is taken immediately. Such action may include modification of the BMP, modification of the project, termination of the project, or modification of the state water quality standards.

| **Table 1.1: Key to abbreviations.** | |
|---|---|
| **TSC** = Timber Sale Contract | **SAM** = Sale Area Map |
| **TSA** = Timber Sale Administrator | **COR** = Contracting Officer Representative |
| **PWC** = Public Works Contract | **IFPA** = Idaho Forest Practices Act |
| **SCA** = Stream Channel Alteration Act | **SWCP**= Soil and Water Conservation Practices |
| **BMP** = Best Management Practices | **SMZ** = Streamside Management Zone |
| **SPS** = Special Project Specifications | **EPA** = Environmental Protection Zone |
| **CFR** = Code of Federal Regulations | |

# KEY SOIL AND WATER CONSERVATION PRACTICES

**Class * Soil and Water Conservation Practice (FSH 2509.22)**

**11 WATERSHED MANAGEMENT**

W 11.05 - Wetlands Analysis and Evaluation
W 11.07 Oil and Hazardous Substance Spill Contingency Planning
W 11.09 Management by Closure to Use
W 11.11 Petroleum Storage & Delivery Facilities & Mgt

**13 VEGETATION MANIPULATION**

G 13.02 Slope Limitations for Tractor Operation
G 13.03 Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows
E 13.04 Revegetation of Surface Disturbed Areas
E 13.05 Soil Protection During and After Slash Windrowing
E 13.06 Soil Moisture Limitations for Tractor Operation

**14 TIMBER**

A 14.02 Timber Harvest Unit Design
A 14.03 Use of Sale Area Maps for Designating Soil and Water Protection Needs
A 14.04 Limiting the Operating Period of Timber Sale Activities
E 14.05 Protection of Unstable Areas
A 14.06 Riparian Area Designation
G 14.07 Determining Tractor Loggable Ground
E 14.08 Tractor Skidding Design
E 14.09 Suspended Log Yarding in Timber Harvesting
A 14.10 Log Landing Location and Design
E 14.11 Log Landing Erosion Prevention and Control
E 14.12 Erosion Prevention and Control Measures During Timber Sale Operations
E 14.13 Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities
E 14.14 Revegetation of Areas Disturbed by Harvest Activities
E 14.15 Erosion Control on Skid Trails
E 14.16 Meadow Protection During Timber Harvesting
S 14.17 Streamcourse Protection (Implementation and Enforcement
E 14.18 Erosion Control Structure Maintenance
A 14.19 Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
E 14.20 Slash Treatment in Sensitive Areas
A 14.22 Modification of the Timber Sale Contract

**15 ROADS AND TRAILS**

A 15.02 General Guidelines for Road Location/Design
E 15.03 Road and Trail Erosion Control Plan
E 15.04 Timing of Construction Activities
E 15.05 Slope Stabilization and Prevention of Mass Failures
E 15.06 Mitigation of Surface Erosion and Stabilization of Slopes
E 15.07 Control of Permanent Road Drainage
E 15.08 Pioneer Road Construction
E 15.09 Timely Erosion Control Measures on Incomplete Road and Streamcrossing Projects
E 15.10 Control of Road Construction Excavation & Sidecast Material
S 15.11 Servicing and Refueling of Equipment
S 15.12 Control of Construction In Riparian Areas
S 15.13 Controlling In-Channel Excavation
S 15.14 Diversion of Flows Around construction Sites
S 15.15 Stream crossings on Temporary Roads
S 15.16 Bridge & Culvert Installation (Disposition of Surplus Material and

Protection of Fisheries)
E. 15.17 Regulation of Borrow Pits, Gravel Sources, and Quarries
E 15.18 Disposal of Right-of-Way and Roadside Debris
S 15.19 Streambank Protection
E 15.21 Maintenance of Roads
E 15.22 Road Surface Treatment to Prevent Loss of Materials
E 15.23 Traffic Control During Wet Periods
G 15.24 Snow Removal Controls
E 15.25 Obliteration of Temporary Roads
E 15.27 Trail Maintenance and Rehabilitation

**18 FUELS MANAGEMENT**
E 18.02 Formulation of Fire Prescriptions
E 18.03 Protection of Soil and Water from Prescribed Burning Effects

| **Table 1.2: Classes of SWCP (BMP)** | |
|---|---|
| **A** = Administrative | **G** = Ground Disturbance Reduction |
| **E** = Erosion Reduction | **W** = Water Quality Protection |
| **S** = Stream Channel Protection/Stream Sediment Reduction | |

# SITE SPECIFIC BEST MANAGEMENT PRACTICES

**PRACTICE 11.05 - Wetlands Analysis and Evaluation;**

OBJECTIVE: To delineate wetlands within sale areas in order do o facilities or degradation of soil and water resources.

*EFFECTIVENESS:* High

COMPLIANCE: FPA Rule 4.d.v(c) - Meets

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

OBJECTIVE: To prevent contamination of waters from accidental spills of fuels, lubricants, bitumen's, raw sewage, wash water, and other harmful materials by prior planning and development of Spill Prevention Control and Countermeasure Plans.

*EFFECTIVENESS:* Although SPCC Plans cannot eliminate the risk of materials being spilled and escaping into waters, they can if followed be effective at reducing adverse effects to tolerable levels. Depending on the location and quantity of a spill, a properly implemented Plan can provide for up to 100 percent containment of a spill.

COMPLIANCE: FPA Rule 2.j.i,ii - Meets

***IMPLEMENTATION:*** This TSC provision holds the purchaser responsible for taking appropriate preventive measures to insure that any spill of oil or oil products does not enter any stream or other waters of the United States. If the total oil or oil products storage exceeds 1,320 gallons or if any single container exceeds a capacity of 660 gallons, the purchaser will prepare a Spill Prevention Control and Countermeasures Plan. The plan shall meet EPA requirements including certification by a registered professional engineer. If necessary, specific requirements for transporting oil to be used in conjunction with the contract will be specified in the TSC.

The Contracting Officer Representative will designate the location, size and allowable uses of service and refueling areas. The criteria below will be followed at a minimum:

1. Petroleum product storage containers with capacities of more than 200 gallons, stationary or mobile, will be located no closer than 100 feet from stream, water course, or area of open water. Dikes, berms, or embankments will be constructed to contain the volume of petroleum products stored within the tanks. Diked areas will be sufficiently impervious and of adequate capacity to contain spilled petroleum products. [FPA RULE 2(j)]

2. Transferring petroleum products: During fueling operations or petroleum product transfer to other containers, there shall be a person attending such operations at all times [FPA Rule 2(j)(i)].

3. Equipment used for transportation or storage of petroleum products shall be maintained in a leak proof condition. If the Forest Service Representative determines there is evidence of petroleum product leakage or spillage he/she shall have the authority to suspend the further use of such equipment until the deficiency has been corrected. [FPA Rule 2(j)(ii)]

4. For longer-term storage, a sump pond lined with plastic will be constructed equal to the volume of fuel stored on the site.

In the event any leakage or spillage enters any stream, water course or area of open water, the operator will immediately notify the COR who will be required to follow the actions to be taken in case of hazardous spill, as outlined in the Forest Hazardous Substance Spill Contingency Plan.

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**PRACTICE 11.09 - Management by Closure to Use**
**PRACTICE 15.23 - Traffic Control During Wet Periods**

OBJECTIVE: To reduce the potential for road surface disturbance during wet weather and to reduce sedimentation probability by excluding activities that could result in damages to facilities or degradation of soil and water resources.

*EFFECTIVENESS:* Moderate

COMPLIANCE: FPA Rule 4.d.v(c) - Meets

***IMPLEMENTATION:*** Specific guidelines for closure of roads during the period of the contract and at the end of the purchasers operations will be spelled out in the TSC (Closure to Use by Others). Roads that must be used during wet periods should have a stable surface and sufficient drainage to allow such use with a minimum of resource impact. Rocking, paving and armoring are measures that may be necessary to protect the road surface and reduce erosion potential. Roads not constructed for all weather use should be closed during the wet season. Where winter field operations are planned, roads may need to be upgraded and maintenance intensified to handle the traffic without

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**PRACTICE 13.02 - Slope Limitations for Tractor Operation**
**PRACTICE 14.07 - Determining Tractor Loggable Ground**

OBJECTIVE: To reduce gully and sheet erosion and associated sediment production by restricting tractor operation to slopes where corrective measures for proper drainage are easily installed and effective.

*EFFECTIVENESS:* In general, the lower the slope percentage, the less are the chances of rilling, gullying, and soil displacement as a consequence of tracked or wheeled skidding.

COMPLIANCE: FPA Rules 3.c.i. & c.ii

***IMPLEMENTATION:***

Example 1:

1) Tractor or wheel skidding shall not be conducted on geologically unstable, saturated, or easily compacted soils. On slopes exceeding 35 percent gradient, tractor or wheel skidding shall be conducted during the winter with a minimum of 18 inches of snow cover or with a softtrack skidding machine. On slopes exceeding 45 percent gradient and which are immediately adjacent to a class I or II stream, tractor or wheel skidding shall not be conducted unless the operation can be done without causing accelerated erosion. Where slopes in the area to be logged exceed 45 percent gradient, skidding shall be done in the winter with a minimum of 18 inches of snow cover and a softtrack skidding machine shall be used. [FPA Rule 3.c.i.]

2) Constructed skid trails on geologically unstable, saturated, or highly erodible or easily compacted soils on slopes over 20 percent will be prohibited [FPA Rule 3.c.ii and in the TSC].

Example 2:

1) Tracked or wheel skidding shall not be conducted on geologically unstable, saturated, or easily compacted soils or on slopes exceeding 30 percent. Constructed skid trails on geologically unstable, saturated, or highly erodible or easily compacted soils on slopes over 20 percent will be prohibited [FPA Rules 3.c.i and ii and in the TSC].

**Mandatory**: When tractor skid trails are required on geologically unstable, saturated, or highly erodible or easily compacted soils, the maximum grade of the trail shall be limited to 30 percent. The Forest Service shall document any differences from the FPA Rule requirements in a variance and so note the variance in the Decision Document.

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**PRACTICE 13.03 - Tractor Operation Excluded from Wetlands, Bogs, & Wet Meadows**

OBJECTIVE: To maintain wetland functions and avoid adverse soil and water resource impacts associated with the destruction or modification of wetlands, bogs and wet meadows.

*EFFECTIVENESS:* Much of this mitigation consists of avoiding the impact [40 CFR 1508.20(a)]. The Forest Service has near-complete control over construction operations. Effectiveness is expected to be high.

COMPLIANCE: FPA Rule 3.h.iii - Meets

***IMPLEMENTATION:*** At a minimum, the following specific protective requirements for wetlands identified on the Sale Area Map (SAM) will be incorporated into the TSC (Wetlands Protection):

1. Soil and vegetation along lakes, bogs, swamps, wet meadows, springs, seeps, or other sources where the presence of water is indicated will be protected from disturbance which would cause adverse effects on water quality, quantity, and wildlife and aquatic habitat (FPA Rule 3.h.iii].

2. An equipment exclusion zone shall extend a minimum of 65 feet from the wetlands, bogs, and wet meadows or as directed by INFS (1995) Standards and Guidelines under category 4 definitions.

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**PRACTICE 13.04 - Revegetation of Surface Disturbed Areas**

**PRACTICE 14.14 - Revegetation of Areas Disturbed by Harvest Activities**

OBJECTIVE: To protect soil productivity and water quality by minimizing soil erosion.

*EFFECTIVENESS:* Revegetation can be moderately effective at reducing surface erosion after one growing season following disturbance and highly effective in later years. Effectiveness has been shown to vary from 10 percent on 3/4:1 slopes to 36 percent on 1:1 slopes to 97 percent on 1:1 slopes in later years (King, John G. and E. Burroughs. Reduction of Soil Erosion on Forest Roads. Intermountain Research Station General Technical Report, 1988).

COMPLIANCE: FPA Rules 3.d.iii & e.i, ii - Meets

***IMPLEMENTATION:*** All temporary roads, landings, and skid trails in the sale area will be seeded within one year after harvesting is completed. Seed mixes and fertilizer specifications will be incorporated into the TSC (Erosion Control Seeding). The TSC (Temporary Road, Skid Trail/Skid Road and Landing) will identify that scarification/ripping of compacted landings and closed roads will be a minimum of 4 inches, not to exceed 2 feet.

a. All temporary roads, landings, and skid trails will also be fertilized to give the new plants extra support in becoming established.

b. The standard Idaho Panhandle National Forests moist site erosion control seed mix will be used.

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**PRACTICE 13.05 - Soil Protection During and After Slash Windrowing**

OBJECTIVE: To reduce erosion and sedimentation from road surfaces and fill slopes, slash is windrowed below the fill slope.

*EFFECTIVENESS:* Slash filter windrows are logging slash placed at the base of fill slopes and below culverts where fish passage is not required has been shown to reduce sediment leaving fill slopes by 75 to 85 percent (Cook and King, "Construction Cost and Erosion Control Effectiveness of Filter Windrows on Fill Slopes," Research Paper INT-335, Intermountain Research Station, 1983; Burroughs, *et al.*, "Relative Effectiveness of Fillslope Treatment in Reducing Surface Erosion, Horse Creek Road, Nez Perce National Forest" Intermountain Research Station, 1985.) Slash filter windrows are effective immediately and during the first few years thereafter; they may later be near capacity and in some cases would have begun to decompose. By that time, though, revegetation would have become more effective.

COMPLIANCE: No directly related FPA Rule.

***IMPLEMENTATION:*** Slash windrows will be installed 100 feet on both sides of all new stream crossings where sediment delivery from the fill slope can be expected. Slash filter windrows will also be used on fill slopes where there is a possibility of erosion or sedimentation into a nearby stream or channel (STD FS Spec 201).

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**PRACTICE 13.06 - Soil Moisture Limitations for Tractor Operation**

OBJECTIVE: To minimize soil compaction, puddling, rutting, and gulling with resultant sediment production and loss of soil productivity by ensuring that activities are done when ground conditions are such that erosion and sedimentation can be controlled.

*EFFECTIVENESS:* Responsible implementation and enforcement are required for high effectiveness.

COMPLIANCE: No Related FPA Rule

***IMPLEMENTATION:***

1. Tractor operations will be limited to periods when the soil moisture content is 18% or less, the ground is frozen, or there is at least 18 inches of snow depth. Tractor operations will only be allowed outside of these specifications through the use of designated skid trails. These requirements will be incorporated into the TSC.

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**PRACTICE 14.02 - Timber Harvest Unit Design**;
**PRACTICE 14.08 - Tractor Skidding Design**;
**PRACTICE 14.10 - Log Landing Location and Design**

OBJECTIVE: To insure that timber harvest unit design will maintain water quality and soil productivity by locating/designing landings and skidding patterns to best fit the terrain and avoid soil erosion.

*EFFECTIVENESS:* Restricting tractor skidding to designated skid trails can reduce the areal extent of soil disturbance from the typical 18-36 percent to 10 percent or less. Properly located landings and skid trails produce similar results. Effectiveness is expected to be moderate.

COMPLIANCE: FPA Rules 3.c.iii; 3.d.i & ii - Meets

***IMPLEMENTATION:*** The TSC (Landings and Skid Trails) requires that the location of all skid trails and landings must be agreed upon before construction. Specific criteria that will be addressed during sale-layout and pre-work with the operator will include:

General: All new or reconstructed landings, skid trails, and fire trails shall be located on stable areas outside riparian areas. Side casting will be held to a minimum [FPA Rule 3.d.i].

Skid Trails:

a. Skid trails shall be kept to the minimum feasible width and number [FPA Rules 3.c.iii];

b. Located skid trails to avoid concentrating runoff and provide breaks in grade and waterbars;

c. Use existing skid trails wherever possible as long as the existing trails meet INFISH requirements.

Landings:

1. Landing sizes will be the minimum necessary for safe, economical operation [FPA Rule 3.d.ii];
2. Landings and log decks will not be located within Riparian Areas;

Landings, log decks, and/or burn piles will be located a minimum of 100 feet from streams, far enough away that direct (unfiltered) entry of sediment, bark, or ash and burning products, will not occur.

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**PRACTICE 14.03 - Use of Sale Area Maps for Designating Soil & Water Protection Needs**

OBJECTIVE: To delineate the location of protection areas and special treatment areas, to insure their recognition, proper consideration, and protection on the ground.

*EFFECTIVENESS:* High

COMPLIANCE: No related FPA rule.

***IMPLEMENTATION:*** The following features will be designated on the SAM:

1. The stream courses (Category 1, 2, and 4) listed below will be designated as Stream Course Protection areas to be protected under the TSC. During layout of the units these areas will be excluded where possible. Where these areas cannot be easily excluded from the unit, these areas will be excluded by designating the timber as leave trees. INFS (1995) standards and and guidelines using buffer categories will be applied to the following areas:
    a) Twomile Creek - The entire mainstem length and its tributaries as delineated on project GIS maps for all alternatives;
    b) Terror Gulch - The entire mainstem length and its tributaries as delineated on project GIS maps for all alternatives;
    c) Nuckles Gulch - The entire mainstem length and its tributaries as delineated on project GIS maps for all alternatives;
    d) Dago - The entire mainstem length and its tributaries as delineated on project GIS maps for all alternatives;
    e) Revenue Gulch - The entire mainstem length and its tributaries as delineated on project GIS maps for all alternatives;
    f) Any unnamed channels that are shown on the sensitive landtype map;

2. Wetlands (meadows, lakes, potholes, etc.) to be protected per the timber sale contract clauses are those designated on the Fish and Wildlife Service 1:24000 scale wetland maps;

3. Ephemeral channels will be protected through unit layout, marking plans, and/or designation on sale area maps;

The Purchaser and the Sale Administrator prior to harvesting will review these features on the ground.

***MONITORING:*** An IPNF or District Watershed Specialist will insure that the above features have been designated on the Sale Area Map during contract development.

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**PRACTICE 14.04 - Limiting the Operating Period of Timber Sale Activities;**
**PRACTICE 15.04 - Timing of Construction Activities**

OBJECTIVE: To minimize soil erosion, sedimentation and soil productivity loss by insuring activities, including erosion control work, road maintenance, etc., are done: (1) within the time period specified in the TSC; or (2) when ground conditions are such that erosion and sedimentation can be prevented.

*EFFECTIVENESS:* Moderate

COMPLIANCE: FPA 4.c.ix - Meets

***IMPLEMENTATION:*** Within the sale area, the following specifications relating to operating periods have been identified and recommended by the IDT:

1. Earthwork shall be postponed during wet periods if, as a result, erodible material would enter streams (FPA 4(c)(ix));

TSC provision B6.31 allows operations to occur outside Normal Operating Season subject to requirements in B6.6, B6.65, and C5.23.

G. The following requirements apply to operations outside the Normal Operating Season (see H-1, 2 for specific winter operations):

1. Drain dips will be built into skidtrails and temporary roads at the time of construction, where feasible. Where draindips are not feasible, or are not functioning, trails and temporary roads will be waterbarred and maintained as necessary and/or prior to any prolonged shutdown;

2. Pioneering on specified road construction will be limited to 1,000 feet after October 31;

3. Temporary Roads will be seeded immediately following construction;

4. All surface erosion and stabilization activities will be placed prior to November 1 of each year.

H. The following requirements apply to winter operations:

1. Skid trails will be constructed with waterbars and/or draindips, and allowed to freeze prior to skidding operations;

2. Prior to spring shutdown, slash and/or cull logs will be placed into skidtrails to approximate waterbars;

3. Breaks will be provided in the snow berm during snowplowing activities;

Winter operations will also require the following language in the referenced TSC provisions:

a. All streams and channels within harvest units will be flagged or otherwise identified (predesignated);
b. During all snowplowing activities, breaks will be maintained in the snow berm along the outside of roads, particularly in the areas where needed for road drainage.

Operations will be discontinued if conditions change and activities are no longer operating on frozen or snow covered ground, the intent of winter logging.

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**PRACTICE 14.05 - Protection of Unstable Areas**
**PRACTICE 15.05 - Slope Stabilization and Prevention of Mass Failures**

OBJECTIVE: To identify and protect unstable areas and to avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.

*EFFECTIVENESS:* Avoidance is the most effective measure on high-risk landforms. Risk assessment based on experience is essential. Effectiveness is expected to be moderate

COMPLIANCE: FPA Rule 3.d.iii - Meets

***IMPLEMENTATION:*** Unstable areas will be avoided by project design within the sale area. The following are guidelines that will be followed:

1. Avoid road locations or timber harvesting on or adjacent to active landslides, slump blocks and other mass wasting processes;

2. To prevent landslides, fill material used in landing construction shall be free of loose stumps and excessive accumulations of slash. On slopes where sidecasting is necessary, landings shall be stabilized by use of seeding, compaction, riprapping, benching, mulching, or other suitable means [FPA Rule 3.d.iii];

3. If road construction is necessitated in an area of moderate instability, the embankment should be layer placed or as recommended by a geotechnical engineer;

Identify any opportunities to stabilize existing unstable areas or minimize the adverse impacts associated with the unstable areas.

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**PRACTICE 14.09 - Suspended Log Yarding in Timber Harvesting**

OBJECTIVE: To protect the soil from excessive disturbance and accelerated erosion and to maintain the integrity of the Riparian Area and other sensitive watershed areas.

*EFFECTIVENESS:* The more suspended log yarding can be used, the less soil disturbance will result. Effectiveness is expected to be moderate

COMPLIANCE: FPA Rule 3.g.ii - Meets

***IMPLEMENTATION:*** The TSC (Skidding and Yarding) requires that areas requiring special yarding be identified on the SAM. Cable yarding (partial or full suspension) will be used on all areas identified for such logging on the SAM. Uphill cable yarding is preferred. Where downhill yarding is used, reasonable care shall be taken to lift the leading end of the log to minimize downhill movement of slash and soils [FPA Rule 3.c.iv].

The following requirement will be included in the TSC (Conduct of Logging):

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**PRACTICE 14.11 - Log Landing Erosion Prevention and Control;**

**PRACTICE 14.12 - Erosion Prevention & Control During Timber Sale Operations;**

**PRACTICE 14.15 - Erosion Control on Skid Trails.**

OBJECTIVE: To protect water quality by minimizing erosion and subsequent sedimentation derived from log landings and skid trails.

*EFFECTIVENESS*: Moderate

COMPLIANCE: FPA Rules 3.e.i, ii; 3.d.iii - Meets

***IMPLEMENTATION:*** The following criteria will be used in controlling erosion and restoring landings and skid trails to minimize erosion:

General:

1. Deposit waste material from construction or maintenance of landings and skid and fire trails in geologically stable locations outside of Riparian Habitat Conservation Areas.

2. Skid trails and landings, seeding will be done with a seed/fertilizer mix specified in the contract.

Landings:

1. During period of use, landings will be maintained in such a manner that debris and sediment are not delivered to any streams. Landings will not be located in ephemeral draws or swales that were created by or are prone to landslides.

2. Landings shall be reshaped as needed to facilitate drainage prior to fall and spring runoff. Landings shall be stabilized by establishing ground cover or by some other means within one year after harvesting is completed [FPA Rule 3.e.ii].

3. Landings will drain in a direction and manner that will minimize erosion and will preclude sediment delivery to any stream.

4. After landings have served the Purchaser's purpose, the Purchaser shall ditch or slope them to permit the water to drain or spread [TSC. Landings].

Skid Trails:

1. Skid trails and fire trails shall be stabilized whenever they are subject to erosion, by waterbarring, cross-draining, outsloping, scarifying, seeding, or other suitable means. This work shall be kept current to prevent erosion prior to fall and spring runoff [FPA Rule 3.e.i].

2. The sale administrator and/or watershed specialist will designate the spacing of water bars on skid trails. [FSH 7709.56].

3. Unit design and location will facilitate logging with a minimum amount of excavated skid trails. Where excavated trails are constructed they will be kept to a minimum and must be decommissioned by the purchaser following completion of the logging activities. The decommissioning will include restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding where needed.

4. Skid trails and fire trails shall be stabilized whenever they are subject to erosion, by waterbarring, cross draining, outsloping, scarifying, seeding, or other suitable means. This work shall be kept current to prevent erosion prior to fall and spring runoff.

5. Spacing of water bars on skid trails will be based on guides for controlling sediment from secondary logging roads (no date). If necessary, additional water bars will be prescribed by the sale administrator and/or watershed specialist.

6. All skid trail and landing locations will be approved by the Forest Service prior to harvesting and will be rehabilitated as necessary to assure that normal drainage patterns are maintained, and that exposed soil surfaces are seeded or covered with slash. This will minimize the potential for sediment production and delivery.

7. Skid trail distance will average 100 feet or greater on ground skidded units, except where the trails converge to landings and as terrain dictates otherwise. This measure will help assure that no more than 15 percent of the activity area will be detrimentally disturbed per Region 1 soil standards;

8. Mechanical fellers will only be allowed off skidtrails if they travel on 18 inches of snow, frozen ground, or a slash mat (to avoid soil compaction levels that exceed Region 1 standards).

Corridors:

1. Corridors that have become entrenched below the litter layer into the top soil and could channel water will be water-barred and/or covered with debris.

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**PRACTICE 14.13 - Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities**
**PRACTICE 14.14 - Revegetation of Areas Disturbed by Harvest Activities**

OBJECTIVE: To establish a vegetative cover on disturbed sites in order to reduce erosion and sedimentation on disturbed areas where **normal revegetation** **methods where other contract provisions will not apply**.

*EFFECTIVENESS:* Moderate

COMPLIANCE: FPA Rules 3.e.i and 3.d.iii - Meets

***IMPLEMENTATION:*** Revegetation by seeding and fertilization to control erosion is planned for all temporary roads, skid trails, and landings. If erosion problems still occur on these areas, or other problem areas are discovered or are brought to the attention of the Sale Administrator, KV Plans will be revised to reseed and/or fertilize, or provide for other control measures. If KV Funds are not available, Appropriated Funds will be used.

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**PRACTICE 14.16 - Meadow Protection During Timber Harvesting**

OBJECTIVE: To avoid damage to the ground cover, soil and water in meadows.

*EFFECTIVENESS:* High

COMPLIANCE: No Related FPA Rule

***IMPLEMENTATION:*** Vehicular or skidding equipment shall not be used on meadows except where roads, landings, and tractor roads are approved. In all cases, soil and vegetation will be protected from disturbance which would cause adverse affects on water quality, quantity and aquatic habitat. The TSC Provision B6.61 (Meadow Protection) is a standard provision in all contracts.

Unless otherwise agreed, trees felled into meadows shall be removed by end lining, and resulting logging slash shall also be removed. Damage to meadows, stream courses, and riparian areas caused by unauthorized Purchaser's operations shall be repaired by the Purchaser in a timely manner to restore and prevent further damage.

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**PRACTICE 14.17 - Stream Channel Protection (Implementation and Enforcement).**
**PRACTICE 15.19 - Streambank Protection**

OBJECTIVE: To protect stream beds and streamside vegetation, during and after forest practice operations and road construction, by (1) maintaining unobstructed passage of stormflows; and (2) reducing sediment and other pollutants from entering streams.

*EFFECTIVENESS:* Much of this mitigation consists of avoiding the impact, minimizing the impact, or rectifying the impact [40 CFR 1508.20 (a-c)]. The Forest Service has near-complete control over construction operations. Effectiveness is expected to be high.

COMPLIANCE: FPA Rules 3.f.i, ii; 3.g.i,ii – Meets SCA Rules

***IMPLEMENTATION:*** To reduce sediment and channel bank degradation at sites disturbed by construction of stream crossing or roadway fill, it may be necessary to incorporate "armoring" in the design of a structure to allow the water course to stabilize after construction. Riprap, gabion structures, and other measures are commonly used to armor stream banks and drainage ways from the erosive forces of flowing water. These measures must be sized and installed in such a way that they effectively resist erosive water velocities. Stone used for riprap should be free from weakly structured rock, soil, organic material and materials of insufficient size, all of which are not resistant to stream flow and would only serve as sediment sources. Outlets for drainage facilities in erodible soils commonly require rip-rapping for energy dissipation (FSH 7709.56B, and Std. FS Spec. 619).

The intent of the regulations and clauses is to protect the integrity of stream channels, and minimize adverse impacts to the channel and downstream resources and beneficial uses. To list all of the regulations that would be implemented to protect and restrict channel alterations, would require a small book. The following items however, highlight some of the principal provisions incorporated into the TSC that will govern channel protection in the sale area.

1. Care shall be taken to cause only the minimum necessary disturbance to the natural appearance of the area. Streambank vegetation shall be protected except where its removal is absolutely necessary for completion of the work [SCPA Rule 9,1(c) and TSC Provisions B6.3 and C6.50];

    a. All streambanks will be avoided by design.

2. If the channel is damaged during construction, it will be restored as nearly as possible to its original configuration without causing additional damage to the channel;

3. Purchaser shall repair all damage to a stream course if the Purchaser is negligent in their operations, including damage to banks and channel, to an acceptable condition as agreed to by the certified Sale Administrator and Purchaser's representative;

4. All project debris shall be removed from stream course, in an agreed manner that will cause the least disturbance. (B6.5 Stream course Protection). Specifically:

    a. Whenever possible trees shall be felled, bucked, and limbed in such a manner that the tree or any part thereof will fall away from any Class I streams. Slash that enters Class I streams as a result of harvesting operations shall be continuously removed, as will other debris that enters Class I streams whenever there is a potential for stream blockage or if the stream has the ability for transporting such debris. Material removed shall be placed five feet slope distance above the ordinary high water mark [FPA Rule 3.f.i];

    b. Material to be removed will be all logging debris that is less than six inches in diameter and less than six feet long;

        ii. Slash and other debris that enters Class II streams whenever there is a potential for stream blockage or if the stream has the ability for transporting the debris shall be removed immediately following skidding and placed above the ordinary high water mark [FPA Rule 3(f)(ii)].

Material to be removed will be all logging debris that is less than six inches in diameter and less than six feet long.

**PRACTICE 14.18 - Erosion Control Structure Maintenance**

OBJECTIVE: To insure that constructed erosion control structures are stabilized and working effectively.

*EFFECTIVENESS:* High

COMPLIANCE: No directly related FPA Rule

***IMPLEMENTATION:*** TSC provision B6.66 requires that during the period of the contract, the Purchaser shall provide maintenance of soil erosion control structures constructed by the Purchaser until they become stabilized, but not for more than one year after their construction. After 1 year, any erosion control work needed is accomplished through performance bond earmarked for that use. TSC provision C6.6(F) requires the Purchaser to maintain erosion control structures concurrently with his operations under the sale and in any case not later than 15 days after completion of skidding each unit or subdivision.

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**PRACTICE 14.19 - Acceptance of Timber Sale Erosion Control Measures Before Sale Closure**

OBJECTIVE: To assure the adequacy of required timber sale erosion control work.

*EFFECTIVENESS*: High

COMPLIANCE: No directly related FPA Rule

***IMPLEMENTATION AND RESPONSIBILITY:*** Timber Sale Contract provision B6.35 requires that upon the purchaser's written request and assurance that work has been completed, the Forest Service shall perform an inspection. Areas that the purchaser might request acceptance for are specific requirements such as logging, slash disposal, erosion control, or snag felling. In evaluating acceptance the following definition will be used by the Forest Service: "Acceptable" erosion control means only minor deviation from established standards, provided no major or lasting impact is caused to soil and water resources. Certified Timber Sale Administrators will not accept as complete erosion control measures that fail to meet these criteria.

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**PRACTICE 14.22 - Modification of the Timber Sale Contract**

OBJECTIVE: To modify the Timber Sale Contract if new circumstances or conditions indicate that the timber sale will cause irreversible damage to soil, water, or watershed values.

*EFFECTIVENESS:* High

COMPLIANCE: No directly related FPA Rule

***IMPLEMENTATION:*** Over time, the Forest Service adopts new policies and direction that amend how we address timber harvest operations. An example is the recent change in direction to leave some large organic debris in stream channels instead of removing it all. In cases such as this, modifications to the TSC would occur.

If evidence indicates that unacceptable impacts would occur to soil and water resources if the sale was harvested as planned, the Forest Service Representative will request the Contracting Officer to gain Regional Forester advice and approval to proceed with a resource environmental modification, mutual cancellation, or unilateral cancellation of the Timber Sale Contract. If the decision is for a resource environmental modification, once the action is approved by the Regional Forester, the appropriate Line Officer will assign an interdisciplinary team to make recommendations of

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**PRACTICE 15.02 - General Guidelines for the Location and Design of Roads and Trails**

OBJECTIVE: To locate and design roads and trails with minimal soil and water resource impact while considering all design criteria.

*EFFECTIVENESS:*

1. Route location ground-truths the results of transportation planning and provides site-specific information on possible problem areas (Gray and Megahan, 1981; Cline et. al., 1981; Megahan and Kidd, 1972; King and Gonsior, 1980);

2. Designed and controlled cut slopes, fill slopes, road width, and road grades effectively reduce sediment production by fitting the roads to the land (Bethalmy and Kidd, 1966; Burroughs, Watts, King, and Hanson, 1985; King, 1979; Megahan, 1978).

COMPLIANCE: FPA Rules 4.b.i,ii,iii & 4.c.i – Meets SCA Rules 9,7 - Meets

***IMPLEMENTATION:*** The following listed items are incorporated in general road location and design guidelines for minimizing impacts on water quality:

Design:

1. Roads shall be planned no wider than necessary to safely accommodate the anticipated use and equipment needs . Cut and fill volumes shall be minimized by designing the road to fit natural terrain features as closely as possible. As much of the excavated material as possible shall be used in fill sections. Minimum cuts and fills shall be planned, particularly near stream channels [FPA Rule 4.b.ii]

Location:

1. Utilize natural benches, follow contours, avoid long, steep road grades. Balance cut/fill where possible to avoid waste areas;

2. Embankments and waste shall be designed so that excavated material may be disposed of on geologically stable sites [FPA Rule 4.b.iii];

3. Avoid slumps and slide-prone areas, and steep sidehills;

4. Road construction shall be minimized within stream protection zones. Areas of vegetation shall be left or re-established between roads and streams [FPA Rule 4.b.i and Standard Road Specifications-Special Project Specification 204.01];

5. Where possible, locate turnouts and turn-arounds at least 200 feet from water bodies or riparian zones. Where placement within 200 feet is necessary due to safety considerations, emphasize erosion control measures to protect water quality; i.e additional windrowing, seeding, etc.

Stream crossing sites:

1. Minimize the number of stream crossings, and choose stable sites. Major culverts will be sized, based on hydrologic analysis, to function effectively at 50-year peak flows, without water backing up. These culverts will be tested to withstand 100-year peak flows without failing. All other live streams will be sized, based on hydrologic analysis, for 20 year peak flows with maximum headwater depth ratios of 1.2, and withstand 50 year peak flows without failing;

Road drainage: SEE SWCP 15.07

1. Locate and design roads and trails to drain naturally by appropriate use of out-sloping, rolling dips, and grade changes, where possible. Cross drains will be installed in ditched areas to 1) carry intercepted flow across constructed areas; 2) to relieve the length of undrained ditch; and 3) to reduce disruption of normal drainage

patterns. Road and trail drainage should be channeled to effective buffer areas, either natural or manmade, to maximize sediment deposition prior to entry into live water;

2. Ditch lines and road grades will be designed to minimize unfiltered flow into streams. A rolling dip, relief culvert or similar structure will be installed as close as practical to crossings to minimize direct sediment and/or water input directly into streams. Route the drainage through SMZ, buffer strips, or other sediment settling structures where possible;

3. Roads shall be planned to drain naturally by out-sloping or in-sloping with cross drainage and by grade changes where possible. Dips, water bars and/or cross drainage will be planned when necessary [FPA Rule 4(b)(iv)];

Relief culverts and roadside ditches shall be planned whenever reliance upon natural drainage would not protect the running surface, excavation, or embankment. Culvert installations shall be designed to prevent erosion of the fill. Drainage structures shall be planned to achieve minimum direct discharge of sediment into streams [FPA Rule 4.b.v].

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**PRACTICE 15.03 - Road and Trail Erosion Control Plan**

OBJECTIVE: To minimize the effects of erosion and the degradation of water quality through erosion control work and road design.

*EFFECTIVENESS:* Moderate

COMPLIANCE: No Related FPA Rule

***IMPLEMENTATION:*** Prior to the start of construction, the Contractor shall submit a schedule for proposed erosion control work as required in the Standard Specifications. The schedule shall include all erosion control items identified in the specifications. Erosion control work to be done by the Contractor will be defined in Standard Specification 204 and/or in the Drawings. The schedule shall consider erosion control work necessary for all phases of the project. The Engineer will certify that the Contractors Erosion Control Plan meets the specifications of Std. FS Spec. Section 204.

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**PRACTICE 15.06 - Mitigation of Surface Erosion and Stabilization of Slopes:**

OBJECTIVE: To minimize soil erosion from road cutslopes, fillslopes, and travelway.

*EFFECTIVENESS:* Moderate

COMPLIANCE: FPA Rule 4.c.iii & d.ii - Meets

***IMPLEMENTATION:*** Areas requiring mitigation of surface erosion will occur during the life of the timber sale contract. When these are found, the following provisions will be implemented.

a. All disturbed areas associated with road construction and reconstruction will be seeded. The first seeding will be applied as soon as practical after cuts and fills are brought to grade within seeding seasons as established in specification 625. A second seeding in the fall or spring season following road construction will be required where original seeding did not adequately revegetate exposed soil area;

b. Where surface erosion is occurring because of inadequate vegetative cover, additional seeding and re-fertilization will occur using recommended seed and fertilizer mixes. A T108 specification covers re-seeding of cut slopes if bared by the purchaser's maintenance operation. If the purchaser has done his required seeding, or bare spots are not caused by the purchaser, revise the KV Plan to cover costs;

c. Where ditches are carrying erosion products into stream channels, straw bale and erosion cloth ditch blocks will be installed to "short-circuit" the delivery. Seeding of the eroding surfaces, and seeding of the stored sediment in the ditch will also be accomplished. If problem areas are known before contract award, the TSC would require cross ditching on segments of road;

d. Where either straw bale/erosion cloth structures are not felt to be effective, underdrains or other measures will be installed to drain the ditches onto suitable ground, or at least reduce erosion impacts to the stream. If problem areas are known before contract award, the TSC would require cross ditching on segments of road;

e. Slumping of cutslopes will require a combination of both mechanical and vegetative controls. If/when this problem is found, a solution will be determined in consultation with Engineers and resource specialists and appropriate actions taken to remedy the situation or minimize adverse impacts.;

Additional underdrains and/or French drains will be constructed where intercepted moisture is encountered on incised stream approaches. Erosion control blankets and straw bales will be used to dissipate ditch scour and stabilize fill slopes.

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**PRACTICE 15.07 - Control of Permanent Road Drainage**

OBJECTIVE: To minimize the erosive effects of concentrated water and the degradation of water quality by proper design and construction of road drainage systems and drainage control structures.

*EFFECTIVENESS:* Moderate. Designed and controlled ditches, cross drain spacing, and culvert discharge prevent water from running long distances over exposed ground.

COMPLIANCE: FPA Rules 4.c.viii; 4.d.iii(a) & (b) - Meets

***IMPLEMENTATION:*** The following items will be included in the timber sale contract provisions or road contract special project specifications.

1. Drainage ways shall be cleared of all debris generated during construction and/or maintenance that potentially interfere with drainage or water quality [IFPA Rule 4(c)(ii), Standard Road Specifications-Special Project Specification 204.04], and the Timber Sale Contract.

2. During and following operations on out-sloped roads, out-slope drainage shall be retained and berms shall be removed on the outside edge except those intentionally constructed for protection of road grade fills [IFPA Rule 4(c)(vi) and Timber Sale Contract].

3. Cross drains and relief culverts shall be constructed to minimize erosion of embankments. The time between road construction and installation of erosion control devices shall be minimized. Drainage structures or cross drains shall be installed on uncompleted roads which are subject to erosion prior to fall or spring runoff. Relief culverts shall be installed with a minimum grade of 1 percent [IFPA Rule 4(c)(viii) and Standard Road Specifications-Special Project Specification 204.1].

4. Cross drains and relief culverts will be installed so as to minimize concentrations of intercepted water (see also Practice 15.02 f.(3)).

5. For New Construction and Reconstruction - The following criteria will be incorporated into the road:

   a. Design:

   i. The temporary road will be constructed as an outsloped road that follows the natural terrain. Following use: the purchaser will obliterate this road by restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding if needed. The purpose of this requirement is to minimize potential for increasing sediment production and delivery.

   ii. The reconstruction will include increasing pipe sizes or changing design on many of the existing stream crossings to provide fish passage (if needed) and pass 100 year flood discharges and prevent diversion of streamflow by the road.

   iii. Unstable cut and fill slopes will be stabilized.

   iv. Additional relief culverts will be installed to very frequently cross drain the road. Distances between relief pipes will generally not exceed 200 to 250 feet.

v. The grade of outsloped and insloped roads will be varied with graded rolling dips, drivable dips, or drivable waterbars to frequently cross drain surface water and to safely return water to stream channels in the event the culvert plugs.

vi. Gravelling will be used on native road surfaces to reduce surface erosion - especially near stream crossings. A minimum of a 4 inch lift is recommended.

vii. During and following operations on out sloped roads, retain out slope drainage and remove berms on the outside except those intentionally constructed for protection of road grade fills.

viii. Construct cross drains and relief culverts to minimize erosion of embankments. Minimize the time between construction and installation of erosion control devices. Use riprap, vegetative matter, downspouts and similar devices to minimize erosion of the fill.

ix. Prior to fall or spring runoff, install drainage structures or cross drain uncompleted roads that are subject to erosion;

x. Install relief culverts at a minimum grade of 1 percent greater than road gradient;

xi. Energy dissipaters or downspouts will be placed below problem culvert outlets (Reconstruction item).

xii. Roads restricted after use will also have erosion control measures in place prior to final pull-out. Roads to be closed by any closure device other than a gate will be decommissioned.

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**PRACTICE 15.08 - Pioneer Road Construction**

OBJECTIVE: To minimize sediment production and mass wasting associated with pioneer road construction.

*EFFECTIVENESS:* Moderate

COMPLIANCE: No directly related FPA Rule

***IMPLEMENTATION:*** The following contract specifications will be required:

1. Construction of pioneer roads shall be confined to the designed location of the road prism unless otherwise approved by the Contracting Officer (Std. FS Spec. 203.11).
2. Pioneering shall be conducted so as to prevent undercutting of the designated final cut slope, and to prevent avoidable deposition of materials outside the designated roadway limits (Std. FS Spec. 203).
3. Permanent culverts will be installed at wet crossings during the pioneer phase unless positive control of sediment can be accomplished during installation, use, and removal of the temporary structure.

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**PRACTICE 15.09 - Timely Erosion Control Measures on Incomplete Road and Stream crossing Projects**

OBJECTIVE: To minimize erosion of, and sedimentation from, disturbed ground on incomplete projects.

*EFFECTIVENESS:* Moderate

COMPLIANCE: FPA Rules 4.c.ii,iii,iv; & 4.d.iii - Meets

***IMPLEMENTATION:*** The following measures will be implemented during projects:

1. Temporary culverts, side drains, flumes, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, debris racks, or other facilities needed to control erosion will be installed as necessary. The removal of temporary culverts, culvert plugs, diversion dams, or elevated stream crossing causeways will be completed as soon as practical;
2. The removal of debris, obstructions, and spoil material from channels and floodplains;

3. Seeding with an erosion control seed mix approved for use on the Idaho Panhandle National Forests to minimize erosion.

4. Install drainage structures or cross drain uncompleted roads that are subject to erosion prior to fall or spring runoff. (Std Spec 204)

Erosion control measures must be kept current with ground disturbance, to the extent that the affected area can be rapidly "closed," if weather conditions deteriorate. Areas must not be abandoned for the winter with remedial measures incomplete.

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**PRACTICE 15.10 - Control of Road Construction Excavation and Sidecast Material**

**PRACTICE 15.18 - Disposal of Right-of-Way and Roadside Debris**

See also Practice 13.05

OBJECTIVE: To insure that unconsolidated excavated and sidecast material, construction slash, and roadside debris, generated during road construction, is kept out of streams and to prevent slash and debris from subsequently obstructing channels.

*EFFECTIVENESS:* High

COMPLIANCE: FPA Rule 4.c.iii,iv; & 4.d.i,ii,iii

The slash windrow and other erosion control devices will not be placed in existing stream channels or obstruct culvert outfalls. Large limbs and cull logs may be bucked into manageable lengths and piled alongside the road for fuelwood.

***IMPLEMENTATION:*** In the construction of road fills near streams, compact the material to reduce the entry of water, minimize the amount of snow, ice, or frozen soil buried in the embankment. No significant amount of woody material shall be incorporated into fills. Slash and debris may be windrowed along the toe of the fill, but in such a manner as to avoid entry into a stream and culvert blockage.

Where slash windrows are not desirable or practical, other methods of erosion control such as erosion mats, mulch, and straw bale or fabric sediment fences will be used. Where exposed material (excavation, embankment, borrow pits, waste piles, etc.) is potentially erodible, and where sediments would enter streams, the material will be stabilized prior to fall or spring runoff by seeding, compacting, rip-rapping, benching, mulching or other suitable means.

The following standard specs will be included in all road contracts that include clearing and excavation.

1. Standard Specification 201 (Slash Treatment)

2. Standard Specification 203 (Excavation and Embankments)

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**PRACTICE 15.13 - Controlling In-Channel Excavation**

OBJECTIVE: To minimize downstream sedimentation by insuring that all in-channel excavations are carefully planned.

*EFFECTICENESS:* High

COMPLIANCE: SCA Rule 9,1(a) - Meets

***IMPLEMENTATION:*** Location and method of stream crossings will be designed and agreed to prior to construction. The following items highlight some of the principal provisions incorporated into the TSC that will govern channel protection:

1. Construction equipment may cross, operate in, or operate near stream courses only where so agreed to and designated by the Forest Service prior to construction (B6.5, B6.422). Crossing of perennial stream channels

will be done in compliance with the specifications in the Stream Channel Alteration Act Rules and Regulations and included in the project specifications.

2. No construction equipment shall be operated below the existing water surface except that fording the stream at one location only will be permitted, and work below the water level that is necessary for culvert bedding or footing installations will be permitted to the extent that it does not create unnecessary turbidity or stream channel disturbance [SCA Rule 9,1 (a) and Standard Road Specifications-Special Project Specification 204.04].

3. Wheeled or track laying equipment shall not be permitted to operate within 5 feet slope distance of the apparent high water mark of Class II streams and 75 feet of Class I streams. (C6.6 Erosion Prevention and Control).

4. Construction of any hydraulic structures in stream channels will be in compliance with the Rules and Regulations pertaining to the Stream Channel Protection Act, Title 42, Chapter 38, Idaho Code).

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**PRACTICE 15.14 - Diversion of Flows Around Construction Sites**

***(See also Practice 15.13)***

OBJECTIVE: To restore the natural course of any stream as soon as practical if the stream is diverted as a result of timber management activities.

*EFFECTIVENESS:* High

COMPLIANCE: Meets SCA Rule

***IMPLEMENTATION:*** Flow in stream courses may only be diverted if the Forest
Service deems it necessary for the contractor to do the job. Such a diverted flow shall be restored to the natural stream course as soon as practicable and, in any event, within the period stated in Stream Channel Alteration Act Rules and Regulations. Stream channels impacted by construction activity will be restored to their natural grade, condition, and alignment. (Std. FS Spec. 206, 206A).

1. On perennial Class I and II streams dewatering shall be accomplished prior to excavation for culvert installation;

2. Filter cloth, erosion control blankets, plastic, straw bales, and rip-rap can be used to keep live water from contacting new fill during culvert installations;

When dewatering of stream crossings is required, a non-erodeable conduit, flex pipe or geotextile fabric will be used. Diversion dams above the crossing shall be hand constructed. Sediment traps shall be constructed below the stream crossing.

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**PRACTICE 15.15 - Stream Crossings on Temporary Roads**

***(See also Practice 15.13)***

OBJECTIVE: To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.

*EFFECTIVENESS:* Moderate

COMPLIANCE: SCA Rules - Meets

***IMPLEMENTATION:*** Culverts, temporary bridges, low-water crossings, or log-fords will be required on all temporary roads and crossings. Streams that will have flowing water during the life of the temporary crossing will normally use culverts or a bridge. Under the TSC, the number of temporary crossings will kept to the minimum needed for access.

a. Temporary crossings on temporary roads will be removed when no longer needed, and any fills will be removed and the channel restored to pre-project condition (TSC );

b. Material from temporary road and skid trail stream crossings will be removed and streambanks restored to an acceptable condition. (Temporary Roads);

Temporary crossings on temporary roads will only be allowed where anticipated or calculated flow is 40 CFS or less (approx. 48" CMP). Flow situations greater than this will normally not allow temporary crossings. Larger temporary crossing structures may be allowed following IDT review.

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**PRACTICE 15.16 - Bridge and Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)**

***(See also Practice 15.13)***

OBJECTIVE: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

*EFFECTIVENESS:* High

COMPLIANCE: SCA Rule - Meets

***IMPLEMENTATION:*** The following preventive measures will be included in contract specifications for such installations:

1. Diverting stream flow through or around project sites if needed during construction in order to minimize erosion and downstream sedimentation. Active streams will be de-watered or diverted during culvert installations;

2. Erodible material shall not be deposited into live streams;

3. Any material stockpiled on floodplains shall be removed before rising waters reach the stockpiled material;

4. During excavation in or near the stream course, it may be necessary to use suitable cofferdams, caissons, cribs or sheet piling. This will usually be the case where groundwater is contributing a significant amount of water to the immediate excavation area. If any of the aforementioned devices are used, they will be practically watertight and no excavation will be made immediately outside of them;

5. Water pumped from foundation excavation shall not be discharged directly into live streams, but shall be pumped into settling ponds or into locations where water will not re-enter water;

All fill material shall be placed and compacted in horizontal lifts. Areas to be filled shall be cleared of all vegetation, debris, and other materials that would be objectionable in the fill [SCPA Rule 9,1(d) and Standard Road Specifications-Special Project Specification 203.15].

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**PRACTICE 15.17 - Regulation of Borrow Pits, Gravel Sources and Quarries**

OBJECTIVE: To minimize sediment production from borrow pits, gravel sources, and quarries, and limit channel disturbances in those gravel sources suitable for development in floodplains.

*EFFECTIVENESS:* High

COMPLIANCE: No Related FPA Rule

***IMPLEMENTATION:*** Minimize opportunities for erosion from Borrow pits and gravel sources from entering streams.

1. Complete any crushing and/or screening of excavated bedload away from any active stream channels and minimize future opportunities for waste materials to enter area streams, even under flood conditions;

2. Identify opportunities to minimize erosion from existing borrow pits within the drainage;

If development of new rock sources are needed within the watershed, complete a pit development plan or rock source development plan which outlines all mitigation measures needed to control future erosion at the rock source.

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**PRACTICE 15.21 - Maintenance of Roads**

OBJECTIVE: To conduct regular preventive maintenance operations to avoid deterioration of the roadway surface and minimize disturbance and damage to water quality, and fish habitat.

*EFFECTIVENESS:* Moderate

COMPLIANCE: FPA Rule 4.d.i, ii, iii, iv, v - Meets

***IMPLEMENTATION:*** For roads in active timber sale areas standard TSC provision B5.4 (Road Maintenance) requires the purchaser to perform or pay for road maintenance work commensurate with the purchasers use. Purchaser's maintenance responsibility shall cover the before, during, and after operation period during any year when operations and road use are performed under the terms of the timber sale contract (C5.4 - Road Maintenance). Purchaser shall perform road maintenance work, commensurate with purchaser's use, on roads controlled by Forest Service and used by purchaser in connection with this sale except for those roads and/or maintenance activities which are identified for required deposits in the TSC. All maintenance work shall be done concurrently, as necessary, in accordance with T-specifications set forth herein or attached hereto, except for agreed adjustments (TSC).

1. Sidecast all debris or slide material associated with road maintenance in a manner to prevent their entry into streams [IFPA Rule 4(d)(i), Timber Sale Contract Clause C5.4, and Standard Road Specification-Special Project Specification T108].

2. Repair and stabilize slumps, slides, and other erosion features causing stream sedimentation [IFPA Rule 4(d)(ii), Timber Sale Contract, and Special Project Specification T108].

3. Active Roads. An active road is a forest road being used for hauling forest products, rock and other road-building materials. The following maintenance shall be conducted on such roads.

    (a) Culverts and ditches shall be kept functional.

    (b) During and upon completion of seasonal operations, the road surface shall be crowned, out-sloped, in-sloped or water barred, and berms removed from the outside edge except those intentionally constructed for protection of fills.

    (c) The road surface shall be maintained as necessary to minimize erosion of the subgrade and to provide proper drainage.

    (d) If road oil or other surface-stabilizing materials are used, apply them in such a manner as to prevent their entry into streams [IFPA Rule 4(d)(iii)] and the Timber Sale Contract].

***EFFECTIVENESS:*** These measures should effectively minimize erosion from roads.

4. Inactive roads. An inactive road is a forest road no longer used for commercial hauling but maintained for access (e.g., for fire control, forest management activities, recreational use, and occasional or incidental use for minor forest products harvesting). The following maintenance shall be conducted on inactive roads.

(a) Following termination of active use, ditches and culverts shall be cleared and the road surface shall be crowned, out-sloped or in-sloped, water barred or otherwise left in a condition to minimize erosion. Drainage structures will be maintained thereafter as needed.

(b) The roads may be permanently or seasonally blocked to vehicular traffic [FPA Rule 4.d.iv].

(c) Roads will be seeded and fertilized.

(d) The roads may be permanently or seasonally blocked to vehicular traffic.

5. Abandoned Roads. An abandoned road is not intended to be used again. No subsequent maintenance of an abandoned road is required after the following procedures are completed:

(a) The road is left in a condition suitable to control erosion by out-sloping, water barring, seeding, or other suitable methods.

(b) Ditches are cleaned.

(c) The road is blocked to vehicular traffic.

(d) The department may require the removal of bridges and culverts except where the owner elects to maintain the drainage structures as needed.

For roads not in an active timber sale area, road maintenance must still occur at sufficient frequency to protect the investment in the road as well prevent deterioration of the drainage structure function. This will be accomplished by scheduling periodic inspection and maintenance, including cleaning dips and cross drains, repairing ditches, marking culvert inlets to aid in location, and cleaning debris from ditches and culvert inlets to provide full function during peak runoff events (FSH 7709.15).

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**PRACTICE 15.22 - Road Surface Treatment to Prevent Loss of Materials**

OBJECTIVE: To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production.

*EFFECTIVENESS:* Stabilization of road surface and ditch lines over 6 percent with competent rock (rock that does not rapidly disintegrate) is often over 90 percent effective (Burroughs, et.al., 1983a, 1983b, 1984, 1985; King and Burroughs, 1988). High

COMPLIANCE: No directly related FPA Rule

***IMPLEMENTATION:*** On timber sale roads, the Purchaser shall undertake measures to prevent excessive loss of road material if the need for such action has been identified. Road surface treatments may include: watering, applying magnesium chloride, sealing, aggregate surfacing, chip-sealing, or paving.

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**PRACTICE 15.24 - Snow Removal Controls**

Objective: To minimize the impact of snow melt on road surfaces and embankments and to reduce the probability of sediment production resulting from snow removal operations.

*Effectiveness:* Moderate

Compliance: No directly related FPA Rule

Implementation: For Forest roads that will be used throughout the winter, the following measures will be employed:

1. The Purchaser is responsible for snow removal in a manner that will protect roads and adjacent resources.

2. Rocking or other special surfacing and/or drainage measures may be necessary before the operator is allowed to use the roads.

3. During snow removal operations, banks shall not be undercut nor shall gravel or other selected surfacing material be bladed off the roadway surface. Ditches and culverts shall be kept functional during and following roadway use. If the road surface is damaged, the Purchaser shall replace lost surface material with similar quality material and repair structures damaged in blading operations.

4. Snow berms shall not be left on the road surface or shall be placed to avoid channelization or concentration of melt water on the road or erosive slopes. Berms left on the shoulder of the road shall be removed and/or drainage holes opened at the end of winter operations and before the spring breakup. Drainage holes shall be spaced as required to obtain satisfactory surface drainage without discharge on erodible fills. On insloped roads, drainage holes shall also be provided on the ditch side, but care taken to insure that culverts and culvert inlets are not damaged.

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**PRACTICE 15.25 - Obliteration of Temporary Roads**

**"OBLITERATION IS NO LONGER AN EXCEPTABLE WORD USED IN THE TERMINOLOGY OF ROAD RELATED DECONSTRUCITON ACTIVITIES. DECOMMISSIONING OR STORAGE IS NOW UTILIZED VIA THE RAP – PROCESS."**

OBJECTIVE: To reduce sediment generated from temporary roads by obliterating them at the completion of their intended use.

*EFFECTIVENESS:* High

COMPLIANCE: FPA Rule 4.d.v. - Meets

***IMPLEMENTATION:*** Effective obliteration is generally achieved through a combination of the following measures: (TSC B6.62, C6.62#, C6.622, C6.623#)

1. Road effectively drained and blocked;

2. Temporary culverts and bridges removed and any modified channel slopes stabilized and revegetated;

3. Road returned to resource production through revegetation (native species, or trees);

Sideslopes reshaped and stabilized.

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**PRACTICE 18.02 - Formulation of Fire Prescriptions**

OBJECTIVE: To provide for soil and water resource protection while achieving the management objective through the use of prescribed fire.

*EFFECTIVENESS:* High

COMPLIANCE: No Related FPA Rule

***IMPLEMENTATION:*** The prescription elements are defined by the interdisciplinary team during the environmental analysis. Field investigations are conducted to identify site-specific conditions, which may affect the prescription. Both the optimum and tolerable limits for soil and water resource needs should be established. Prescription elements will include such factors as fire weather, slope aspect, soil moisture and fuel moisture, which influence the fire intensity. These elements have a direct effect on whether or not a litter layer remains after burning and whether or not a water repellent layer is formed. The amount of remaining litter significantly affects erosion rates, water quality and runoff volumes.

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**PRACTICE 18.03 - Protection of Soil and Water from Prescribed Burning**

OBJECTIVE: To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris form entering surface water.

*EFFECTIVENESS:* High

COMPLIANCE: No Related FPA Rule

***IMPLEMENTATION:*** Forest Service and/or other crews are used to prepare the units for burning. This includes water barring firelines and reducing fuel concentrations. The interdisciplinary team identifies Riparian Areas and soils with water repellant tendencies as part of the environmental analysis. Some of the techniques used to prevent soil erosion and water quality degradation are: (1) construct water bars in fire lines; (2) reduce fuel loadings in drainage channels; (3) maintain the integrity of the Riparian Area; (4) avoid intense fires, which may promote water repellency, nutrient leaching, and erosion; (5) retain or plan for sufficient ground cover to prevent erosion of the burned sites and (6) removal of all debris added to stream channels as a result of prescribed burning, unless debris is prescribed to improve fisheries habitat.

1. Foaming agents will not be used for water control lines where any of the category INFS buffers have been applied nearer units which these channels could carry the material to intermittent or perennial streams;

2. Machine constructed firelines will not be used on the sensitive landtypes displayed in Figures 3.5;

3. Firelines must be frequently waterbarred (not to exceed 50 foot spacing when going up and down the hill);

4. Maintain large organic debris appropriate to the habitat type (see "Managing Coarse Woody Debris in the Forests of the Rocky Mountains" by Graham et. al. 1994);

5. Limit prescribed burning to those times when surface soil moisture is above 25 percent to reduce the potential for damage from hot burns (Guideline developed by J. Neihoff, USDA Forest Service – IPNF).

# Appendix B – Aquatics Management Direction and Guidelines

## INFS Standards and Guidelines (USDA A7-13; 1995)

Only INFS standards and guidelines that apply to the range of alternatives for the Twomile Project Area are addressed here; those standard and guidelines that do not apply are in the INFS document located in the project file. These INFS standards and guidelines are addressed with comments in italics as follows:

### Timber Management (A-7)

**TM-1**. Prohibit timber harvest, including fuelwood cutting, in Riparian Habitat Conservation Areas, except as described below.

a. Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in Riparian Habitat Conservation Areas only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other Riparian Management Objectives, and where adverse effects can be avoided to inland native fish. For priority watersheds, complete watershed analysis prior to salvage cutting in RHCAs.

b. Apply silvicultural practices for Riparian Habitat Conservation Areas to acquire desired vegetation characteristics where needed to attain Riparian Management Objectives. Apply silvicultural practices in a manner that does not retard attainment of Riparian Management Objectives and that avoid adverse effects on inland native fish.

*Using "Standard Widths Defining Interim RHCAs," no commercial timber harvest activities are proposed under the action alternatives within RHCAs in the project area. In some units, non-commercial (i.e. ladder fuel reduction) treatments were deemed necessary in order to reduce fuel hazards and loading (Specifically Units 1,2,3,6,10,32, and 34). This form of activity would meet the intent of silvicultural practices that would not retard RMOs and avoid adverse effects to inland native fish (see Fire/Fuels) by preventing long-term RMO damage or reduction.*

***Effectiveness*:** *High. No commercial harvest is to occur within the RHCAs.*

### Roads Management (A-7-8)

**RF-1**. Cooperate with Federal, Tribal, State, and county agencies, and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain Riparian Management Objectives.

*The proposed activities are all on National Forest lands, but have been coordinated with all those listed where applicable (i.e. RAC projects).*

***Effectiveness*:** *High. This coordination is standard policy.*

**RF-2**. For each existing or planned road, meet the Riparian Management Objectives and avoid adverse effects to inland native fish by:

a. Completing watershed analyses prior to construction of new roads or landings in Riparian Habitat Conservation Areas (RHCAs) within priority watersheds.

*This project area is not within an INFS priority watershed nor are any activities (e.g. roads, landings, etc.) proposed within RHCAs so no watershed analysis is required.*

b. Minimizing road and landing locations in Riparian Habitat Conservation Areas.

*No new roads or landings are proposed within RHCAs under any of the action alternatives.*

***Effectiveness*:** *High.*

c. Initiating development and implementation of a Road Management Plan or a Transportation Management Plan. At a minimum, address the following items in the plan:
    1. Road design criteria, elements, and standards that govern construction and reconstruction.
    2. Road management objectives for each road.
    3. Criteria that govern road operation, maintenance, and management.
    4. Requirements for pre-, during-, and post-storm inspections and maintenance
    5. Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives such as protection of the road surface.
    6. Implementation and effectiveness monitoring plans for road stability, drainage, and erosion control.
    7. Mitigation plans for road failures.

*The interdisciplinary team (IDTeam) evaluated access and road improvement needs within the project area (i.e. RAP process). Several access options were critically reviewed and selected on based on the implementation of these actions having the least impact on all resources. The project includes several opportunities to improve road surfaces and decommissioning.*

***Effectiveness*:** *Moderate to High. The Roads Analysis Process (RAP) will be employed to assist in making these management decisions.*

d. Avoiding sediment delivery to streams from the road surface.
    1. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe.

*This standard is applied directly for the proposed temporary roads.*

***Effectiveness*:** *High. Roads would be constructed with this design criterion.*

    2. Route road drainage away from potentially unstable stream channels and hillslopes.

***Effectiveness:*** *High. Improved road drainage would be part of the road package. Water would be less concentrated below existing roads than at present.*

e. Avoiding disruption of natural hydrologic flow paths.

*Roadwork associated with this project including road reconstruction and decommissioning will be completed.*

***Effectiveness:*** *High. Road reconstruction projects would restore the hydrologic flow paths.*

f. Avoid sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RHCAs in priority watersheds.

*No streams in the Twomile Project Area are listed as priority watersheds.*

***Effectiveness:*** *High. Sidecasting of snow and/or soils would be prohibited at all stream crossings*

**RF-3.** Determine the influence of each road on the Riparian Management Objectives. Meet Riparian Management Objectives and avoid adverse effects on inland native fish by:

a. Reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or that retard attainment of Riparian Management Objectives, or do not protect priority watersheds from increased sedimentation.

b. Prioritizing reconstruction based on the current and potential damage to inland native fish and their priority watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of Riparian Habitat Conservation Areas.

c. Closing and stabilizing; or obliterating and stabilizing; roads not needed for future management activities. Prioritize these actions based on the current and potential damage to inland native fish in priority watersheds, and the ecological value of the riparian resources affected.

*The proposed road reconstruction and maintenance described in Chapters II and III originate from the above standards. The action alternatives would meet this standard.*

***Effectiveness:*** *High. Existing roads are proposed for reconstruction with the Timber Sale Contract, so the likelihood that the projects would be completed is high.*

**RF-4.** Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-year flood, including associated bed load and debris, where those improvements would/do pose a substantial risk to riparian conditions. Substantial risk improvements include those that do not meet design and operation maintenance criteria, or that have been shown to be less effective than designed for controlling erosion, or that retard attainment of Riparian Management Objectives, or that do not protect priority watersheds from increased sedimentation. Base priority for upgrading on risks in priority watersheds and the ecological value of the riparian resources affected. Construct and maintain crossings to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

*The proposed road crossing improvements originate from the above standard. The action alternatives would meet this standard.*

***Effectiveness:*** *High.*

**RF-5.** Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

*These types of crossings were identified for this project to provide and maintain fish passage. These crossings were not identified in the access routes with the implementation of proposed activities under alternatives in the Twomile Resource Area. However, with the NEPA process complete the two identified locations where road crossings exist on fish bearing streams would likely be funded by other dollars, specifically RAC monies since they exist under county road jurisdiction for maintenance. Decommissioning other roads in the project area would automatically follow this standard.*

***Effectiveness*:** *Low to High.*

## Fires/Fuels Management (A-11)

**FM-1**. Design fuel treatment and fire suppression strategies, practices, and actions so as not to prevent attainment of Riparian Management Objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could perpetuate detrimental conditions, or be damaging to, long-term ecosystem function or inland native fish.

**FM-2**. Locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of Riparian Habitat Conservation Areas. If the only suitable location for such activities is within the Riparian Habitat Conservation Area, an exemption may be granted following a review and recommendation by a resource advisor. The advisor would prescribe the location, use conditions, and rehabilitation requirements, with avoidance of adverse effects to inland native fish a primary goal. Use an interdisciplinary team, including a fishery biologist, to predetermine incident base and helibase locations during presuppression planning.

**FM-3**. Avoid delivery of chemical retardant, foam, or additives to surface waters. An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor and a fishery biologist, when the action agency determines that an escape fire would cause more long-term damage to fish habitats than chemical delivery to surface waters.

**FM-4**. Design prescribed burn projects and prescriptions to contribute to the attainment of the Riparian Management Objectives.

*The proposed prescribed burn projects described in Chapters 2 and 3 originate from the above standards. The action alternatives would meet this standard.*

***Effectiveness*:** *High. Planting of long-lived tree species to provide for large woody debris recruitment would follow prescribed burning within the RHCAs.*

**FM-5**. Immediately establish an emergency team to develop a rehabilitation treatment plan to attain Riparian Management Objectives and avoid adverse effects on inland native fish whenever a wildfire or a prescribed fire burning out of prescription significantly damages Riparian Habitat Conservation Areas.

*The proposed fires/fuels management described in Chapter II and III originate from the above standards. The action alternatives would meet this standard.*

***Effectiveness*:** *Moderate to High. Prescribed fire in the project area is designed to meet these standards.*

**General Riparian Area Management (A-12)**

**RA-1**. Identify and cooperate with Federal, Tribal, State and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.

*This project does not adversely affect instream flows.*

**RA-2.** Trees may be felled in Riparian Habitat Conservation Areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.

*Slashing of the understory may occur within RHCAs in order to accomplish burning and planting of long-lived species such as cedar, larch, and white pine.*

**RA-3**. Apply herbicides, pesticides, and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on inland native fish.

*By following the BMPs and fisheries criteria as listed in the Coeur d'Alene River Ranger District Noxious Weed FEIS, all alternatives would meet this standard.*

***Effectiveness*:** *High. Standards would be met as required by the Coeur d'Alene River Ranger District Noxious Weed FEIS.*

**RA-4**. Prohibit storage of fuels and other toxicants within Riparian Habitat Conservation Areas. Prohibit refueling with Riparian Habitat Conservation Areas unless there are no other alternatives. The Forest Service must approve refueling sites within a Riparian Habitat Conservation Area or Bureau of Land Management and have an approved spill containment plan.

***Effectiveness:*** *High. This is a standard BMP that is part of the timber sale contract.*

**RA-5**. Locate water-drafting sites to avoid adverse effects to inland native fish and instream flows, and in a manner that does not retard or prevent attainment of Riparian Management Objectives.

***Effectiveness:*** *Moderate to High. This standard would be applied in the prescribed burn plans associated with the Twomile Project Area. However, wildfire suppression is beyond the scope of this project and water drafting associated with such an emergency would be addressed as a separate issue.*

**Watershed and Habitat Restoration (A-12)**

**WR-1**. Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and contributes to attainment of Riparian Management Objectives.

***Effectiveness*:** *Moderate to High. The proposed watershed restoration projects originate from the above standard. The action alternatives would meet this standard.*

**WR-2.** Cooperate with Federal, State, local, and Tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans (CRMPs) or other cooperative agreements to meet Riparian Management Objectives.

***Effectiveness:*** *Low to Moderate. Cooperation at the multiple levels as listed occurred within the framework for developing the proposed activities of this project and that future resource management will develop a CRMP for the South Fork Coeur d'Alene system.*

**Fisheries and Wildlife Restoration (A-13)**

**FW-1**. Design and implement fish and wildlife habitat restoration and enhancement actions in a manner that contributes to attainment of the Riparian Management Objectives.

***Effectiveness:*** *High. Improvements to culverts, road decommissioning, and riparian plantings are habitat enhancement actions that will be implemented in a manner that contributes to attainment of Riparian Management Objectives.*

**FW-4.** Cooperate with Federal, Tribal, and State fish management agencies to identify and eliminate adverse effects on native fish associated with habitat manipulation, fish stocking, fish harvest, and poaching.

*Cooperation at the multiple levels as listed occurred within the framework for developing the proposed activities of this project. Using the INFS Standard Widths Defining Interim RHCAs for the project activities, habitat manipulation does not apply. Fish stocking, harvest and/or poaching are all regulated by State management guidelines.*

***Effectiveness:*** *High. Existing habitat would be preserved under this project.*

# Forest Plan Fish Guidelines (USDA 1987, pp. II – 29-31)

**Fish Standards:**

1. Activities on National Forest lands will be planned and executed to maintain existing water uses. Maintain is defined as "limiting effects from National Forest activities to maintain at least 80 percent of fry emergence success in identified fishery streams." The percent is measured from pristine conditions. Current methodology will not detect an impact of less than 20 percent. During the life of the plan, new technologies may permit more precise assessments; however, the goal of this standard will remain as "to maintain 80 percent of fry emergence success.

2. Streams providing spawning and rearing habitat, which are considered critical to the maintenance of river and lake populations of special concern, will be managed at a standard higher than the 80 percent standard. Monitoring will be needed to detect this higher standard. "*High Value Streams*"

*Fry Emergence Response (Fish Standard 1 and 2):*

*The IPNF Forest Plan contains standards for fry emergence that are no longer valid since the Inland Native Fish Strategy (INFS, 1995) was developed. This section explains why.*

*The objectives for fisheries in the Forest Plan state that the forest "will be managed to maintain and improve fish habitat capacities in order to achieve cooperative goals with the State Fish and Game Department and to comply with state water quality standards. Sediment arising from land management activities will be managed so that in forest fisheries streams the objective is to maintain 80 percent fry emergence success as measured from pristine condition" (II-7). The first two standards for fish use similar language (II-29). The Fishery/Watershed Analysis to determine effects of land management activities on fry emergence is described in the Forest Plan in Appendix I (I-1, 2).*

*Appendix I (Forest Plan) requires that if, during the environmental assessment process, cumulative effects of the proposed and past activities on stream sedimentation are projected to result in greater than 20% reduction in fry emergence, then additional detailed analysis will be undertaken. The analysis is then used to determine the significance of the project on water resources. If the project is judged to have a "significantly negative effect" on water resources, it will be reviewed by the State for conformance with water quality standards prior to the final decision.*

*At the time the Forest Plan was written, models determining fry emergence (e.g., Stowell et al. 1983) were popular. These empirical models were later found to have limited application and were unreliable outside of where they were developed (Kershner 2001 personal communication). In addition, the use of fry emergence survival (regardless of the threshold) as a surrogate for viability came into question, primarily for two reasons:*

- *First, fry emergence is highly variable. This can be due to changing natural conditions (e.g., floods, temperature regimes, geology) or human-induced causes (e.g., increased sediment input, chemical spills). Both agents are at work in most cases so it is difficult to determine what proportion of egg-to-fry mortality is due to each cause. As a result the underlying relationship between sediment in redds and survival is difficult to predict (Chapman 1988).*

- *Second, and more important, egg-to-fry mortality is usually density-independent (i.e., a percentage of fry will survive regardless of the number of eggs). This means that in most cases there are enough fry to inhabit all available habitat within a stream. Therefore fry-to-smolt (sub-adult) survival, where density dependent mortality plays a significant role, is a more effective and appropriate predictor of population viability than egg-to-fry survival (for a review of these concepts see Hilborn and Walters 1992). Currently the indicator used as a surrogate of fry-to-smolt survival is stream habitat characteristics.*

*The 1989 Forest Plan Evaluation and Monitoring Report documents the change away from use of the fry emergence standard (Item G-1, pages C-1 and C-2). The findings were that it was not a good monitoring tool to report stream health. G-1 was combined with item G-3, which includes a comprehensive array of fisheries and hydrology parameters.*

*The Inland Native Fish Strategy (INFS; USDA 1995) amended the Forest Plans "…except where existing Plan direction would provide more protection" for inland native fish habitat (page 4). All INFS standards and guidelines are intended to either make progress toward Riparian Management Objectives (which describe "good" fish habitat within the context of what is capable of the watershed) or to ensure that activities will not retard the natural rate of recovery of RMOs in a watershed (USDA 1995, A6-A16). In addition, the strategy states that actions that reduce habitat quality, whether existing conditions are better or worse than objective values, are not consistent with INFS direction (USDA 1995, A-3).*

*INFS (1995) supersedes the original IPNF Forest Plan direction because it offers far more protection to inland native fish habitat for the following reasons:*

- *INFS (1995) directs the establishment of Riparian Habitat Conservation Areas (RHCAs) and only allows activities within RHCAs that maintain or improve, and do not retard, the attainment of the RMOs. The original Forest Plan direction actually permitted degradation of water resources at the discretion of the line officer, and allowed "significant" degradation after review by the State.*
- *Activities that reduce habitat quality to any extent are contrary to INFS direction, regardless of whether RMOs have been attained. The original Forest Plan direction allowed for apparent degradation of fish habitat by permitting up to a 20 percent reduction of potential fry emergence.*

*In The Lands Council v. Vaught the U. S. District Court for the Eastern District of Washington, in its reading of the plain language of the INFS documents and giving deference to the Forest Service's expertise in interpreting its Forest Plans, concluded that INFS does supersede the Forest Plan in all areas where RHCA guidelines and standards apply (i.e., where delivery of sediment to streams is the identified threat that proposed project activities pose to fish habitat). The Forest Plan standards remain in effect in all other areas.*

*In conclusion, this project complies with original Forest Plan direction because, although fry emergence was not computed, a detailed analysis of the effects to fish habitat and water resources was developed as required in Appendix I; and the project has been determined to be fully consistent with the INFS Forest Plan amendment and state water quality standards for supporting beneficial uses (see Watershed discussion).*

3. The stream and river segments (if listed) will be managed as low access fishing opportunities to maintain a diversity of fishing experiences for the public and to protect sensitive fish populations. Special road management provisions will be used to accomplish this objective. "Low Access Fishing Streams"

*Forest Plan standards 3 are not inclusive to this analysis because no streams in the analysis area are listed under "low access fishing streams." However, streams within the analysis area are recognized as to providing beneficial uses.*

4. Provide fish passage to suitable habitat areas, by designing road crossings of streams to allow fish passage or removing in-stream migration barriers.

*Within the project area, known fish barriers were identified through project review. Currently there are two human-caused fish migration barriers identified in the Twomile Project Area (see Chapter II and III; Fisheries BA/BE; above INFS standards and guidelines).*

5. 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 projects to improve habitat carrying capacities on selected streams.

*As stated in Chapter III, information was utilized from stream inventories, field reviews, historical records, aerial photographs, analysis of watershed conditions, published scientific literature, discussions with Fisheries Biologists and electrofishing/stocking data from the Idaho Department of Fish and Game (IDF&G), and the United States Fish and Wildlife Service (USFWS).*

6. Coordinate management activities with water resource concerns as described in MA 16, Appendix I, and Appendix O.

*Water resource concerns are protected in Management Area 16 through INFS standards and guidelines.*

## State of Idaho Governor's Bull Trout Plan

The following describes the mission from the Governors Bull Trout Plan. Governors Bull Trout Plan (State of Idaho 1996):

- The mission of the plan is to "…maintain and or restore complex interacting groups of bull trout populations throughout their native range in Idaho.

Bull trout in the S.F. Coeur d'Alene River drainage do not persist based on all the information available at the time of this EA development, rather they are recognized as historic in the drainage. In the Plan, under the Pandhandle Basin (Appendix F- F6) identifies "the entire Coeur d'Alene River Drainage" as a key watershed for a bull trout metapopulation.

# Appendix C – Aquatics Corporate Monitoring

**Table C1. Corporate Monitoring by aquatics issue and then description within alternatives.**

| Issue | Core Data | Unit of Measure | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|---|---|
| Water Yield | Intensity and duration of peak flow increases above existing condition. Comparison to Historic Range of Variation | Percent increase | **0%** increase above existing levels due to dead and dying trees. | **2% to 7%, Mean of 4.3%** increase above existing levels. Intensity and duration of peak flows within HRV. | **2% to 7%, Mean of 4.3%** increase above existing levels. Intensity and duration of peak flows within HRV. | **0%** increase above existing levels. Intensity and duration of peak flows within HRV. |
| Sediment Yield | Anticipated percent increase in sediment yield above existing condition. Comparison to Historic Range of Variation | Percent Increase | **0%** increase above existing levels due to ground disturbance associated with logging activities | **3% to 8%, Mean of 5.0%** increase above existing levels due to ground disturbance associated with logging activities. | **3% to 9%, Mean of 5.3%** increase above existing levels due to ground disturbance associated with logging activities. | **0%** increase above existing levels due to ground disturbance associated with vegetation activites. |
| Net Associated Risk of Sediment Delivery. | Anticipated change in sediment risk associated with high risk stream crossing. | Tons of sediment. | Current net associated risk of sediment delivery is **36 tons**. | Reduction in sediment by **30 tons.** | Reduction in sediment by **30 tons.** | Reduction in sediment by **30 tons.** |
| Hydrologic Integrity | Road Density within the short term (including temp roads) and long term (decommissioning of all roads). | Miles/Mi$^2$ | **4.78** mi/mi2 (Twomile Sub-watershed Only) | Short Term: **4.78**<br>Long Term: **3.9** | Short Term: **4.78**<br>Long Term: **3.9** | Short Term: **4.78**<br>Long Term: **3.9** |

**Issues and core data not tracked with this document are discussed below.**

| Issue/Core Data | Reason not considered in analysis |
|---|---|
| Riparian Function | Riparian road density would change at the project within the Twomile Drainage only as reflected in the 3.3miles of decommissioning in table C1 above. The construction of temporary roads and the decommissioning of existing roads are not within riparian areas |
| Mass Failures and Erosion – Road density on sensitive landtypes | Does not apply. No proposed new or temporary roads are on sensitive landtypes with high landslide potential or high sediment erosion / delivery |
| Riparian Function, temperature, and large wood recruitment | Standard Inland Native Fish Standards (INFS 1995) are included as design criteria for this project. The only work proposed in the Riparian Habitat Conservation Areas is the improvement/removal of 16 road crossings. No change in riparian hydrologic opening acreage is expected with this work. |
| Restricted Fish Use | At the junction of road #271 with the main Twomile Creek is an aquatics species barrier. Also, road #271 road/stream crossing on the East Fork Twomile Creek is an aquatic species barrier. |

# APPENDIX D
# RESPONSE TO PUBLIC COMMENTS

An overview of public involvement activities and comments received during scoping is provided in Chapter 2. After thorough consideration, their comments have been identified as either key issues, analysis issues, or issues not addressed in detail. **Key** issues were those considered as factors in the decision to be made. They have been addressed in detail in Chapter 3 either because the effects would have a bearing on the decision to be made, or because these resources are of interest or concern to the public. **Analysis** issues are not key to developing alternatives, but are important for their value in designing specific protective measures and to measure the effects of each alternative on different forest resources. Both key and analysis issues are addressed in Chapters 2 and 3.

There were three situations in which an issue was **not addressed in detail**: when the issue is beyond the scope of this project; there would be little or no effect to the issue of concern; or the issue has been effectively addressed through specific alternative features and/or mitigation measures.

A synopsis of public comments is provided in the following pages. The comment letter where the concern was identified (including the name of the individual or organization and page number) is disclosed. The Lands Council and Ecology Center submitted identical letters; therefore their comments and responses are addressed at the same time. Also provided is a brief statement of the concern (these have been paraphrased), and how the concern is addressed by this analysis.

| ***Who*** | ***Abbreviation*** |
|---:|---|
| *Billy & Mary Simpson* | *Simpson* |
| *Charley Kishbaugh* | *Kishbaugh* |
| *Idaho Parks & Recreation* | *IDPR* |
| *The Lands Council/Ecology Center* | *TLC/EC* |
| *Kootenai Environmental Alliance* | *KEA* |

# Comments Related to Forest Vegetation

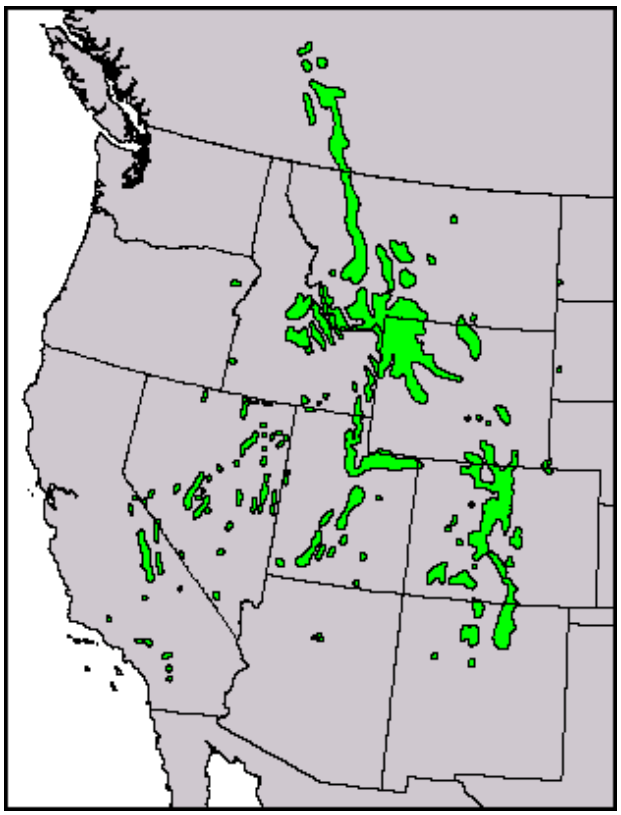
## *1.a. (Lands Council/Ecology Center, p. 6)*

**The EA must disclose what areas of the project area are ponderosa pine/Douglas-fir with white pine, limber pine and western larch that have changed in stand composition and structure due to logging and/for fire suppression.**

Changes to forest composition are discussed in Chapter 3, Forest Vegetation, for both the Coeur d'Alene River Basin and the Twomile Project Area. Maps of existing forest composition are provided in Chapter 3 (Figures 3-VEG-2 and 3-VEG-3) and in the Project Files (PF Doc. VEG-7).

There are no limber pine stands within the Twomile Resource Area. Limber pine distribution in the western United States does not include northern Idaho, as displayed in the following map.

***Figure D-1. Limber pine distribution in the western United States.***



*Source: U.S. Geological Survey, 1999, Digital representation of "Atlas of United States Trees" by Elbert L. Little, Jr. 27-Nov-2001; (http://climchange.cr.usgs.gov/data/atlas/little/).*

## *1.b. (Lands Council/Ecology Center, p. 9)*

**The FS seems to believe that timber production is required to meet Forest Plan direction for the vegetation. Clearly the timber primacy policy is still the motivation for FS activity.**

Activities proposed in the Twomile Resource Area clearly focus on the effect treatment would have on conditions in the area over the long term, not on what would be removed from the area. Purpose and need for the project was addressed in detail in Chapter 1 and in the description of the Proposed Action in Chapters 1 and 2.

## *1.c. (Lands Council/Ecology Center, p. 11)*

**The FS infers we should be managing for the natural range of variability in tree species composition, yet they focus on live, healthy trees ignores the natural range of variability for such factors as snags, old growth, edge effect, etc., and the long-term influences of culverts, miles of roads, and other human-caused structural changes in the forest ecosystem.**

Snags, old growth, edge effect, culverts, roads and other changes (both human-caused and natural) have been addressed in detail under each of the resource components throughout Chapter 3. It is also clearly stated that the natural range of variability is not necessarily a goal, but a desired trend (page 3-6): "It should be recognized that it may not be desired or feasible to return to actual historical conditions."

As stated in the description of the proposed action (Chapters 1 and 2), the focus is not on removing live, healthy trees, but on modifying forest composition and structure to reduce wildfire intensity and promote long-term forest health, while addressing structures that are having a detrimental effect on aquatic resources in the watershed (p. 2-13).

## *1.d. (Lands Council/Ecology Center, pp. 17, 19)*

**Disclose the quantity (acres/block sizes) of old growth, and evaluate the quality of blocks. Ground-truth areas chosen from photo interpretation and database examination.**

The amount of old growth available in the Twomile Resource Area and its corresponding old growth management unit is addressed in detail in Chapter 2 (Figure 2-12) and Chapter 3 (Forest Vegetation, Tables 3-VEG-5 and 3-VEG-6). Allocated old growth stands in the Twomile Resource Area were reviewed to validate whether they met old growth criteria necessary for allocation. The resource area was also screened for potential additional old growth stands. Stands meeting the old growth criteria were allocated and are listed in Table 3-VEG-1.

### *1.e. (Lands Council/Ecology Center, pp. 17,)*

**There needs to be monitoring of old growth and down woody debris.**

Although the Forest Plan does not identify old growth as a specific monitoring item (Forest Plan, pp. 67-71), it is important to forest management and there are standards regarding protection of old growth (Forest Plan pp. IV-10 through IV-12). The Forests' annual monitoring report discloses the most recent reviews and allocations of old growth across the Idaho Panhandle National Forests. Old growth is addressed in detail in Chapter 3, Forest Vegetation (pages 3-9, 3-26, and 3-29 through 3-31) and Wildlife (pages 3-153 and 3-154).

### *1.f. (Lands Council/Ecology Center, pp. 20)*

**Disclose sizes and conditions of openings from past logging in the cumulative effects analysis area, and display where proposed cutting units are in relation to those old units.**

Past harvest is discussed in Chapter 3, Forest Vegetation (pages 3-13 and 3-14) and Soils (pp. 3-113 through 3-115; Tables 3-SOIL-2 and 3-SOIL-3).

### *1.g. (Lands Council/Ecology Center, pp. 20)*

**Consider landtypes, habitat types, slopes, aspect etc. so there would be assurance of successful reforestation. Disclose (in maps, tables and other documentation) the level of reforestation success from past even-aged logging in the immediate and surrounding compartments, explaining the dates of logging, the problems encountered and duration needed before certification of restocking. Evaluate the potential that herbicide treatment or burning of competing vegetation will affect reforestation. Evaluate the potential for reforestation efforts to fail due to pocket gophers.**

Characteristics of the proposed treatment stands have been considered in detail in estimating reforestation effectiveness, as documented in Chapter 2 (p. 2-20), Chapter 3 (pages 3-14 and 3-32), and the Project Files (PF Doc.VEG-4 and VEG-44).

Although pocket gophers can cause damage in reforested areas, on the Coeur d'Alene River Ranger District they have not caused a level of damage that would cause reforestation efforts to fail. There is no reason to believe they would cause substantial damage in the Twomile Resource Area; therefore this issue was not addressed in detail.

### *1.h. (Lands Council/Ecology Center, pp. 20)*

**The IPNF has been unable to stay within the bounds of the Forest Plan's 40-acre limit on even-aged cutting units. If the FS cannot follow the Forest Plan, what implications does that have for the Forest Plan FEIS's validity and the impacts of management of other resources impacted by clearcutting?**

The 40-acre opening size is not a Forest Plan standard. It is addressed through Forest Service policy and under the Northern Regional Guide. Openings greater than 40 acres are allowed given proper public notification and approval through the Regional Forester's office, a process that is consistently followed by IPNF Districts. The public was notified that openings could exceed 40 acres in the project update distributed in November 2003 (PF Doc. PI-20). The project silviculturist is working with the Regional Office regarding those units that could exceed 40 acres (identified in Chapter 3, Forest Vegetation, Table 3-VEG-7, p. 3-28).

## Comments Related to Fire/Fuels

### *2.a. (Lands Council/Ecology Center, pp. 1, 2)*

**It is wrong to characterize wildland fire as "devastating" to public land forests since fire is a necessary part of the natural process, both in Montana and Idaho. The losses could have been avoided by private landowners taking steps to reduce hazardous fuels on their land. Logging on NF lands is not the solution; conditions must be addressed on private lands in the immediate vicinity of structures.**

The wildfires discussed were devastating to those residents in terms of lost structures; impacts to wildlife habitat, aquatic resources and recreation opportunities; and the effect to the economies of local communities. While it is important for private landowners to reduce fuels and other wildfire hazards near their structures, it is equally important that the Forest Service, as a good neighbor, take steps to reduce fuels and improve forest conditions in the wildland urban interface (National Fire Plan and Shoshone County Fire Mitigation Plan, pp. 1-2 and 1-3; Public Concerns Related to Fire/Fuels Hazards, p. 2-5; Regulatory Framework Related to Fire/Fuels, pp. 3-36 through 3-38; and Twomile Resource Area Fire History, p. 3-46).

Cohen states that treating dry-site stands to reduce potential for high intensity fire is a good ecologically-based treatment that reduces the firebrand production that tends to increase fire spread. He also sates that maintaining sustainable ecosystems is consistent with protecting homes and values associated with those homes from fire (PF Doc. PI-44).

### *2.b. (Lands Council/Ecology Center, pp. 3, 11)*

**There is a lack of evidence that thinning is effective in fuels reduction. The lack of empirical assessments of fuel treatment performance has become conspicuous. The authors (Omi & Martinson, 2002) concluded that only one other study included both statistical analysis and comparison of stand conditions in treated and untreated areas such that differential fire effects could be directly related to the intensity of fuels manipulation. Fuels reduction projects (especially logging), roads and other human disturbances can**

**increase the subsequent fire fuels, insects and diseases.**

Omi and Martinson actually stated, "The lack of empirical assessment of fuel treatment performance has become conspicuous, ***but this study continues an ongoing effort to fill the research void,"*** (emphasis added). "Generally, our results are very much in agreement with the few comparable studies that were previously published. The reduction in crown volume scorch in treated areas averaged 46% among our study sites…This is quite similar to the average (47%) and range (26-70%) of reductions measured by Pollet and Omi (2002); the 47% scorch reduction observed by Moore et al (1955), the 62% reduction reported by Cumming (1964), and roughly comparable to the 49% mortality reduction reported by Van Wagner (1968). Our range of reductions in damage ratings for treated stands (0.4 to 2.3) is also very similar to the range of 0.6 to 1.6 observed by Pollet and Omi (2002), who used comparable data," (Omi and Martinson, 2002, p. 22; PF Doc. PI-45).

Their study (which examined the effectiveness of thinning nonmerchantable timber as well as other non-commercial fuels treatments) concluded, "All measured indicators of wildfire severity (scorch height, crown volume scorch, stand damage, and depth of char) were significantly lower in treated stands at all sites" except one, where stand damage was lower but significance was marginal (Omi & Martinson, 2002, p. 19; PF Doc.45).

The authors correlate their study to that of Poleet & Omi (2002) under which, "in all cases fire severity was found to be significantly lower in treated stands." Treatments included thinning and burning 1 to 11 years prior to wildfire. In response to the concern that fuels reduction efforts actually increase fuels, Omi and Martinson stated, "While surface fire intensity is a critical factor in crown fire initiation, height to crown (the vertical continuity between fuel strata) is equally important. Further, crown fire propagation is dependent on the abundance and horizontal continuity of canopy fuels. Thus, treatments that reduce canopy fuels increase and decrease fire hazard simultaneously. With little empirical evidence and an infant crown fire theory, fuel treatment practitioners have gambled that a reduction in crown fuels outweighs any increase in surface fire hazard. Our research demonstrates that their bets have been well placed," (Omi & Martinson, 2002, p. 25; PF Doc. 45).

## *2.c. (Lands Council/Ecology Center, p. 3)*

**Excessive access opportunities in the project area only increase the number of locations where accidental or arson fire starts could occur.**

Fire ignitions from human-caused sources have the greatest probability in developed areas (Direct and Indirect Effects to Fire/Fuels Common to All Action Alternatives, p. 3-47). However, the amount of access available in the Twomile Resource Area would not be increased under any alternative. Although motorized access would increase during activities under Alternative 2 (by nearly 2 miles) and Alternative 3 (by about 1 one mile) with proposed new system road construction, both alternatives would also decommission about 3.5 miles of unclassified roads. Therefore, total road density would actually decrease under all action alternatives following project completion (Appendix H, Tables H-3 and H-4). For this reason, there would be a higher total road density available under Alternatives 1 and 4 than would be available under Alternatives 2 and 3 (Tables 2-4 and 2-5, p. 2-12).

Decreasing road density could result in a small decrease in human-caused wildland fires, but there would not be a substantial change. Additional trails in the Twomile Resource Area would also have minimal (if any) effect to Fire/Fuels (Direct and Indirect Effects to Fire/Fuels Common to All Action Alternatives, p. 3-47).

## *2.d. (Lands Council/Ecology Center, p. 6)*

**Today, current prescribed fire proposals are not simply targeting the low severity regime such as ponderosa pine and dry Douglas-fir forests. Many projects are being developed in lodgepole pine and white bark pine, high elevation forests with high severity fire regimes.**

The Twomile Resource Area is not a lodgepole pine/white bark pine dominated forest. Douglas-fir is the dominant habitat type in the area, with ponderosa pine and lesser amounts of white fir and grand-fir (Introduction, p. 1-1; Need for a Resilient Forest Ecosystem, p. 2-5; and Species Composition in the Twomile Resource Area, p. 3-7).

## *2.e. (Lands Council/Ecology Center, p. 7)*

**Development of approved fire management plans was the number one policy objective intended for immediate implementation in the Implementation Action Plan Report for the Federal Wildland Fire Management Policy and Program Review. Continued mismanagement of national forest lands and FS refusal to fully implement the Fire Policy puts wildland firefighters at risk if and when they are dispatched to wildfires.**

Alternatives 2 and 3 would be consistent with and further the goals of the Fire Plan (Direct and Indirect Effects to Fire/Fuels Under Alternative 2, pp. 3-52 through 3-56; and Direct and Indirect Effects to Fire/Fuels Under Alternative 3, pp. 3-59 and 3-60). Alternatives 1 and 4 would not be consistent with these goals, since they would allow forested areas adjacent to and within the wildland urban interface to remain in or progress into Condition Class 3 (Direct and Indirect Effects to Fire/Fuels Under Alternative 1, p. 3-49; Direct and Indirect Effects to Fire/Fuels Under Alternative 4, p. 3-61).

Fuels treatments such as those proposed in the Twomile Resource Area would decrease the risk to wildland firefighters (How Alternative 2 Addresses Fire/Fuels Hazards, p. 2-14; How Alternative 3 Addresses Fire/Fuels Hazards, p. 2-17). Omi and Martinson, cited by TLC/EC, stated it quite well: "…the greatest contributions of fuel treatments may be the

options they provide for landscape management that balances societal preferences with the unavoidable recurrence of wildland fires. Where fire threatens societal values, fuel treatments can facilitation suppression by providing safe access and egress for firefights, as well as possible counter-firing opportunities. In wildlands managed to include natural processes, fuel treatments may help restore fire to its historic regime, either by restoring fuel profiles that facilitate safe management ignitions or by buffering the border between values at risk and extensively managed areas where natural ignitions are allowed to play themselves out," (Omi and Martinson, p. 25; PF Doc. PI-45).

### *2.f. (Lands Council/Ecology Center, p. 9)*

**Assess what species and other goods and services would benefit from allowing natural processes to proceed unhindered by timber management.**

Analysis of the No-Action Alternative discloses the trade-offs (both impacts and benefits) that would occur by not accomplishing the proposed activities at this time (Alternative 1 [No Action], p. 2-13). Alternative 4 was developed in response to a suggestion the TLC/EC to re-introduce fire to forested ecosystems without commercial timber harvest (Alternative 4, p. 2-18).

### *2.g. (Lands Council/Ecology Center, p. 9)*

**On-the-ground evaluation surveys for the project area are necessary to define the first line of watershed development and maintenance, that being the organic layers on the forest floor. Provide sufficient description of the condition of the litter, duff and humus for the proposed units and for previously logged units in the cumulative effects area.**

On-the-ground reviews have been conducted to assess existing conditions in proposed activity areas (Methodology Used to Describe Existing Soil Productivity, p. 3-111). Organic matter is discussed in Chapter 3, Soils. "Soil survey data indicates that most forest sites have adequate organic matter levels to support strong ectomycorrhizae populations," (Maintenance of Large Woody Debris and Organic Matter, p. 3-113). This is addressed as a guideline and is not part of the alternative evaluations because project alternatives are designed to meet the large woody debris guidelines referred to in Graham et al, 1994 (PF Doc. SOIL-32) and specific silvicultural prescriptions (Methodology Used to Analyze Indirect Effects to Soil Productivity, p. 3-114).

### *2.h. (Lands Council/Ecology Center, p. 10)*

**Disclose the inventory or monitoring of indicators, including lichens, fungi, insects, etc. since these can and do define existing and probable future forest conditions. The rationale and analyses of this proposal must look at the forest as an ecosystem with interrelationships coequal to timber production. Use the ecosystem management approach to assess fungal and insect organisms within the project area.**

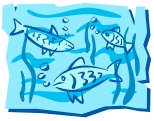
The TES plant analysis addresses effects to lichens as appropriate (Table 3-TES-2, p. 3-189), including the Sensitive species Iceland-moss lichen (Alpine/Subalpine Guild, p. 3-192). Field surveys would be completed in all previously unsurveyed areas of highly suitable habitat where activities are proposed. Approximately 800 acres in the Resource Area have already been field surveyed for this project (Plant Surveys and Documented Occurrences, p. 3-190).

### *2.i. (Lands Council/Ecology Center, p. 26)*

**NEPA documents must fully disclose the ecological problems inherent with spring burning proposals. Many species are nesting or breeding at this time of year and plants are actively adding new tissue. The heat and smoke may interrupt these functions.**

The Ecology Center has raised this concern related to other proposals. As with those proposals, the effects of prescribed fire in the Twomile Resource Area can be controlled by careful ignition in the appropriate weather conditions. Specifically, changes in aspects and shaded draws are commonly used as boundaries. These areas often have higher fuel moistures (especially in the spring) and in many cases will burn with very little intensity, if at all.

The use of prescribed fire would be based on smoke management guidelines (Features Designed to Protect Air Quality, p. 2-20); therefore, current air quality standards would not be exceeded under any alternative. Over the long term, prescribed fire may reduce total particulates by reducing the risk of large wildfires that cannot be managed for emissions.



## Comments Related to Aquatic Resources

### *3.a. (Lands Council/Ecology Center, p. 1)*

**The FS needs to design a restoration/access management plan for these watersheds to achieve recovery goals.**

Alternative 4 was developed in response to a suggestion by TLC/EC to re-introduce fire to forested ecosystems without commercial timber harvest (p. 2-18). As requested by TLC/EC, access management has been addressed through the Roads Analysis Process (Appendix H, p. H-1; PF Doc. TRAN-2).

### *3.b. (Lands Council/Ecology Center, p. 1)*

**FS needs to consider obliterating watershed-damaging roads in the project area.**

Under any action alternative, 3.4 miles of closed roads would be decommissioned. Additional roads are available for decommissioning depending on available funding (p. 2-26).

### *3.c. (Lands Council/Ecology Center, p. 1)*

**The FS' Roads Analysis Process must be utilized as the basis for informing everyone about the status of travel ways in the area, and be used for the restoration/access management assessment.**

The RAPs process was used and is documented in the Project Files (PF Doc. TRAN-2).

### *3.d. (Lands Council/Ecology Center, p. 2)*

**The FS should adopt the Restoration Principles (DellaSala, et al, in press) as a screen for proposed actions.**

The reference cited is a proposed national policy statement intended to "guide sound ecological restoration policy and projects" (PF Doc. PI-13). In the reference, restoration principles are identified to "provide a yardstick with which to evaluate proposed forest restoration policies and projects." The three core restoration principles are 1) ecological forest restoration; 2) ecologic economics; and 3) communities/work force. These principles are very similar to the objectives of activities proposed in the Twomile Resource Area, but the authors identify a different (although not dissimilar) process than is provided by the current laws and policy available to the Forest Service in guiding our analysis and managing National Forest System lands.

### *3.e. (Lands Council/Ecology Center, p. 7)*

**The real risk to watersheds is not fire, but the existing condition and effects of fighting fire. Use the Western Montana Level 1 Bull Trout Team position paper.**

The Western Montana Level 1 Bull Trout Team position paper is not applicable to the Coeur d'Alene River Basin. The State of Idaho Governor's Bull Trout Plan (1996; PF Doc. AQ-11) incorporates the entire Coeur d'Alene River drainage and its' tributaries, which includes the cumulative effects analysis area for the Twomile Resource Area (Regulatory Framework for Aquatic Resources, p. 3-68; Consistency With the State of Idaho Governor's Bull Trout Plan, p. 3-102).

### *3.f. (Lands Council/Ecology Center, p. 13)*

**Use of the Rain-on-Snow model estimates risk of occurrence, not the quantified increase in peak flow. Verification of accuracy based upon quantitative monitoring data for the ROS model has not been performed on this Forest.**

The analysis of changes to sediment and water yield in the Twomile Resource Area used methods documented in the R1/R4 Sediment Guides and WATBAL Technical User Guide (The WATBAL Model, p. 3-70). The version calibrated for the IPNF (WATSED) does not evaluate increases in sediment and peak flows specifically resulting from rain-on-snow events. Use of the WATSED model is combined with other sources of information and analyses to help determine the probable effects (Methodology Used to Estimate Effects to Rain-on-Snow, p. 3-87). The analysis of effects from rain-on-snow events is based on change in canopy openings, the size of those openings, and conclusions drawn from studies specific to the Pacific and Inland Northwest (p. 3-87). Effects to peak flow from rain-on-snow events are described in Chapter 3 (Cumulative Effects to Water Yield/Peak Flow From Rain-on-Snow Events, p. 3-96).

### *3.g. (Lands Council/Ecology Center, p. 13)*

**It is extremely important that the project NEPA document disclose the environmental baseline for watersheds. Generally this means their condition before development or resource exploitation was initiated.**

Baseline conditions are measured at the year 1980 (Direct and Indirect Effects to Water Quality [Sediment Yield] Under the Action Alternatives, pp. 3-90 and 3-91). This is based on the assumption that new vegetative growth aids in the interception and utilization of water derived from rain on snow melt. Water yield may not entirely return to pre-harvest levels, depending on slope soils, climate and aspect. Recovery may take up to 60 or 100 years, but the changes runoff and peak flow changes are too small to be detected by the WATSED model after an average of 20 years from the time of harvest (PF Doc. AQ-15).

### *3.h. (Lands Council/Ecology Center, p. 13)*

**The NEPA analysis should identify the Forest Plan inadequacies in protecting native fish populations and habitat.**

The EA does this in Chapter 3, Aquatics, "Consistency With the Forest Plan Fish Standards" (pp. 3-101 and 3-102).

## Comments Related to Soils Productivity

### *4.a. (Lands Council/Ecology Center, pp. 22, 23)*

**Explain the precise relationship between Forest Plan standards for soil productivity, FSH 2509.18, and Forest Service Handbook FMS 2500-99-1. The Forest Service's methodology for maintaining soil productivity has never been demonstrated. Neither the Forest Plan nor the FSM 2500-99-1 cite adequate scientific basis for adopting any percentage as a numerical unit. The soil quality standards do not set any rational thresholds for cumulative reductions in soil productivity outside the activity areas of the proposed timber sale.**

The primary difference is in the level of scale. The Forest Service Manual (FSM) provides *agency-wide* policy and guidance, with further detail and updated information provided in the Forest Service Handbook (FSH). The Regional Soil Quality standards apply to the *Northern Region*, which includes north Idaho. The Forest Plan provides goals, objectives, and standards specific to the *IPNF*.

As explained in Chapter 3, Soils (Methodology), the Regional Soil Quality standards were revised in

November 1999 (Regulatory Framework for Soil Productivity, p. 3-110). The revised standard specifies that 85% of an activity area (cutting unit) must have soil that is in satisfactory condition; a level based on the lowest magnitude of change detectible given current monitoring technology. To determine whether activities proposed in the Twomile Resource Area would detrimentally impact or have cumulative effects on soils, the IPNF Soil NEPA Analysis Process was used (Niehoff 2002, PF Doc. SOIL-41). This process was developed using knowledge gained through past monitoring efforts. Soils monitoring information is provided in the Project Files (PF Doc. SOIL-41, and SOIL-46 through SOIL-49).

### *4.b. (Lands Council/Ecology Center, p. 25)*

**There is no way the FS has enough soil bulk density and other compaction monitoring data collected at the adequate soil depths and in enough sites to be able to assure that the use of heavy machinery, as prescribed by the NLF Project, will not significantly or permanently impair the productivity of the soil.**

This is not the "NLF" project; however, we can apply these comments to the Twomile Resource Area. Existing data, field reviews, aerial photos, timber stand and road databases were used to determine the disturbance factor for each activity area (Chapter 3, Soils; PF Doc. SOIL-15). On the ground reviews were also conducted to assess conditions within past harvest disturbance areas (Methodology Used to Describe Existing Soil Productivity, p. 3-111). Disturbance factors used in the analysis represent an average percentage of detrimentally disturbed soils, obtained through past monitoring on existing harvest units (PF Doc. SOIL-46 through SOIL-49).

### *4.c. (Lands Council/Ecology Center, p. 25)*

**The FS often claims that helicopter yarding will cause no damage to the soil. But since several logs are lifted at once, before they clear the ground they drag. And when they drag, they cause soil compaction and displacement, disturbing and damaging other vegetation. Alexander and Poff (1985) reviewed literature and found that as much as 10 to 40% of a logged area can be disturbed by skyline logging.**

There are no claims in the Environmental Assessment that helicopter yarding causes no damage to the soil. Based on past monitoring efforts (Niehoff 2002; PF Doc. SOIL-41), helicopter and skyline/cable logging systems tend to have between 0 and 2% detrimental effects. Helicopter logging has minimal impacts since the logs are lifted into the air and transported to a landing site (Introduction to Methodology Used to Analyze Effects to Soil Productivity, p. 3-113). An estimate of 1% disturbance is used to represent impacts of helicopter/skyline yarding during spring burning, and 3% during fall burning on south/southwest aspects (Methodology Used to Analyze Direct Effects to Soil Productivity, p. 3-114).

### *4.d. (Lands Council/Ecology Center, p. 25)*

**The FS soil monitoring fails to measure soil productivity in terms of loss of soil nutrients due to logging activities, including removal of boles, branches, and from site preparation methods such as burning.**

In 2002, the IPNF initiated tree foliar analysis with the Intermountain Forest Tree Nutrition Cooperative (IFTNC) in order to gather more information on forest potassium levels. Additional sampling is planned for the winter of 2003-04. Information gained from these samplings will be used to obtain baseline data pertaining to soil nutrient levels and its effect on tree growth and health. Until the minimum thresholds are developed through research, we are using management recommendations of the IFTNC as a guideline for maintaining sufficient potassium on a site (Low Potassium Sites, p. 3-112).

## Comments Related to Wildlife

### *5.a. (Lands Council/Ecology Center, p. 10)*

**Enumeration of and monitoring of specific small, nongame birds and animal populations that are important in keeping destructive insect populations at low levels must also be disclosed.**

The Forest Plan establishes Forest-wide direction, goals objectives, standards and guidelines for the management and protection of wildlife habitat and species (Regulatory Framework for Wildlife, p. 3-124). Species for which it has been determined there would be no measurable effects have not been analyzed in detail (Wildlife Species Relevancy Screen, p. 3-127). The analysis is commensurate with the importance of the impact (CEQ 1502.15), risk associated with the project, species affected, and current knowledge (p. 3-127; USDA Forest Service, 1992; PF Doc. WL-R65).

In addition to Threatened, Endangered, Candidate and Sensitive species, this analysis considered nongame species and habitat (Table 3-WL-1, p. 3-128).

### *5.b. (Lands Council/Ecology Center, pp. 13, 14)*

**The problem with viability analyses for land encompassed by the typical project analysis areas is that such analyses look at areas of habitat much smaller than that encompassed by most wildlife species' populations. Scale of analysis must be broader than the project area – at least the Forest scale. Species populations must be proven to still be part of a viable population. Since Forest Plan monitoring efforts have failed in this regard, it must be a priority for project analyses.**

Viability analyses were completed for each Threatened, Endangered Sensitive, and Management Indicator species considered in the wildlife analyses (Chapter 3, Wildlife). For each species, the cumulative effects analysis area has been identified based on the species' or guilds' relative home range size in relation to

available habitat, topographic features that affect how species move and their home range, and boundaries that represent the furthest extent of effects (Introduction to Methodology Used to Analyze Effects to Wildlife p. 3-125). Maps depicting wildlife habitat by species are provided in the Project Files (PF Doc. WL-7, WL-8, and WL-44 through WL-50).

### *5.c. (Lands Council/Ecology Center, pp. 15-17)*

**Logging, especially clearcutting and other forms of "regeneration" cutting, causes fragmentation of forests, which is known to reduce populations of MIS and TES species. Consider fragmentation, including size distribution, connectivity of habitat patches, etc. The size of blocks of interior forest that existed historically before management was initiated must be compared to the present condition.**

Fragmentation of forest habitat was addressed in this analysis through landscape arrangement (Issue Indicators for a Resilient Forest Ecosystem, p. 2-6). In fact, changes to allocated old growth were made with the express purpose of blocking up habitat for old growth-dependent species. Alternative 2 was designed based on a landscape plan to spatially define both capable and suitable flammulated owl habitat blocks of 300 acres or larger (How Alternative 2 Addresses Flammulated Owl Habitat, p. 2-15). Under Alternative 4, burning activities would stimulate growth of brush species that are host to moths, which make up the flammulated owl's prey base (How Alternative 4 Addresses Flammulated Owl Habitat, p. 2-19). The Forest Vegetation analysis considered landscape arrangement (size and distribution of patches) under each alternative (Landscape Arrangement, pp. 3-9 and 3-10). Of primary consideration in the wildlife analysis is the current and potential capability of the composition, arrangement and patch size of the vegetation to provide the habitat components necessary to meet the life history requirements of a particular species (Suitable and Potential Wildlife Habitat, p. 3-126).

Fragmentation and road density of terrestrial wildlife habitat are described in Chapter 3, Wildlife (p. 3-131) and effects disclosed for each applicable species; for example, fisher (pp. 3-144 through 3-147), wolverine (pp. 3-147 through 3-149), and pileated woodpecker (pp. 3-152 through 3-155).

### *5.d. (Lands Council/Ecology Center, pp. 17-18)*

**The failure of the FS to complete Forest Plan required monitoring of old growth MIS means there is substantial doubt regarding the ability of existing old growth to sustain old growth dependent species. No more logging should be contemplated in old growth and near-old growth forest. In the process of identifying old growth habitat, the FS must ground-truth areas chosen from photo interpretation and database examination. This is also important for identifying recruitment old growth. Old growth character should be well documented in maps that also display past impacts to old growth.**

Forest Plan monitoring includes old growth and northern goshawk (2002 Forest Plan Monitoring Report, pp. 67-71, 77-78). Surveys for old growth management indicator species would be conducted prior to harvest to ensure protection of pileated woodpecker and goshawks (Features Design to Protect Wildlife Habitat, p. 2-24). Surveys have been conducted in the area for pileated woodpeckers (Affected Environment for Pileated Woodpeckers, pp. 3-153, 3-155).

Allocated Old growth is addressed in Chapter 3 under Forest Vegetation (pp. 3-9, 3-10, 3-25, and 3-28 through 3-30) and Wildlife (pp. 3-128, 3-129, and by old growth management indicator species – goshawk and pileated woodpecker, pp. 3-132 through 3-135 and 3-152 through 3-155 respectively). Alternatives 2 and 3 both propose fuel reduction treatment in old growth (75 and 180 acres, respectively).

No commercial harvest is proposed in allocated old growth under Alternatives 1, 2 or 4. Slashing and underburning would occur under Alternatives 2 and 4, but would not change the old growth structure or allocation of the stands. Under Alternative 3, commercial harvest in allocated old growth would change the old growth structure and allocation on approximately 155 acres (Summary of Changes to Species Composition and Structure, p. 3-25).

Allocated old growth stands in the Twomile Resource Area were reviewed to validate whether they met old growth criteria necessary for allocation (p. 3-9). The resource area was also screened for potential additional old growth stands. Stands meeting the old growth criteria were allocated and are listed in Table 3-VEG-1.

### *5.e. (Lands Council/EC, pp. 18, 20, 22)*

**Estimate the acres of potential snag loss due to firewood cutting and wind events following the logging. Scientifically sound snag retention requirements should be used within the project area. The IPNF snag guidelines are not sufficiently site-specific to the ecosystems of Northwest Montana, since they are largely based upon a research paper concerning the Blue Mountains in Oregon. Field surveys are necessary to determine the level of available snag and downed woody material in the cumulative effects analysis area. Proposals for cutting units must consider the need to offset the lack of snags in areas previously logged.**

Snags and down woody habitat are described in Chapter 3, Wildlife (p. 3-130, 3-131). Due to the frequency of various harvests and fuelwood cutting near roads, snag availability has been generally shown to be one-third less within 200 meters of a road (p. 3-130). Even though there may be motorized access on trails, those trails are rarely used for the purpose of firewood gathering. The wildlife analysis addresses effects of fuelwood gathering on snag availability and the cumulative effects to snag-dependent species such as flammulated owls and white-headed woodpeckers (p. 3-135 through 3-141), and black-backed woodpeckers (p. 3-141 through 3-144). Region 1 protocol (which are

more protective than Forest Plan snag guidelines) would be met or exceeded under the action alternatives (Features Designed to Protect Wildlife Habitat, pp. 2-24; and Consistency With Forest Policy and Legal Mandates Related to Wildlife – Other Wildlife, p. 3-164).

### *5.f. (Lands Council/Ecology Center, p. 19)*

**Goshawks, pine marten, fisher, and black-backed woodpeckers are of concern.**

Goshawks, fishers and black-backed woodpeckers have all been addressed in detail in the Chapter 3 wildlife section. Pine marten were not addressed in detail, as described in Chapter 2 (Table 2-3, p. 2-11).

### *5.g. (Lands Council/Ecology Center, p. 19)*

**FS has yet to design a consistent workable, scientifically sound conservation strategy to assure viable populations of black-backed woodpecker**

Black-backed woodpeckers are addressed in Chapter 3 (pp. 3-141 through 3-144). Although northern Idaho is below the historic range for burned habitat on the landscape, large fires in Montana in 2002 and 2003 have created habitat for black-backed woodpeckers in the Northern Rockies Region, and burned habitat is now above historic levels in Montana. Therefore, the implementation of any of the proposed 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 (Environmental Consequences for Black-backed Woodpeckers, p. 3-144).

### *5.h. (Lands Council/Ecology Center, p. 22)*

**Observe the results from McClelland and McClelland (1999), which indicate that for nesting and roosting, pileated woodpeckers favor larch and ponderosa pine far more than Douglas-fir, although the latter are often used for foraging. Because of the relative rarity of the large old larch and ponderosa pine forest wide as compared to the historical range, the IPNF should design a conservation strategy that includes retention of all trees of these species approaching 20 inches diameter.**

Pileated woodpeckers are an Old Growth Management Indicator Species addressed in detail in this analysis (pp. 3-152 through 3-155). Both larch and ponderosa pine are identified as preferred nest trees (Life History, p. 3-152).

### *5.i. (Lands Council/Ecology Center, p. 22)*

**Project analysis must acknowledge that OSHA regulations require that soft snags generally be felled for worker safety. This means vast portions of the forest will be depleted of standing soft snags. The result of the differences between Forest Plan standards and guidelines and OSHA regulations must be acknowledged and impacts disclosed.**

Snag removal for safety reasons is addressed in Chapter 2 (Features Designed to Protect Wildlife Habitat, p. 2-24). Based on past experience, the number of snags removed from a unit for safety reasons is minimal, and certainly would not deplete vast portions of the forest. Region 1 protocol (which are more protective than Forest Plan snag guidelines) would be met or exceeded under the action alternatives (pp. 2-24 and 3-164).

### *5.j. (Lands Council/Ecology Center, p. 33)*

**The USFWS is or soon will be designating critical habitat for bull trout and Canada lynx. Since habitat in the project area is likely or ought to be designated critical habitat, the FS must undergo formal consultation with the USFWS.**

Formal consultation is required when a proposed action is likely to detrimentally affect a species to the point that it would trend the species toward federal listing under the Endangered Species Act. Based on the analysis, there would be no effect to lynx (Table 2-3, p. 2-11; Table 3-WL-1, p. 3-128) or bull trout (p. 3-104). There is no habitat for any Threatened or Endangered plant species in the Twomile Resource Area. Therefore, informal consultation with representatives of the US Fish & Wildlife Service is in progress.

## Comments Related to Recreation & Access

### *6.a. (Lands Council/Ecology Center, p. 30)*

**Since the Forest Plan was written, there have been significant increases in the numbers and technology of ORV's and snowmobiles in the forest. The cumulative impacts of those factors has never been analyzed at either the Plan or project level.**

The amount of recreation use (including but not limited to ORV's and snowmobiles) in the Twomile Resource Area and Coeur d'Alene River basin has been considered in terms of potential cumulative effects (pp. 3-169 through 3-173). ORV's have also been considered by resource as appropriate. For example, effects of wildlife in general (Fragmentation and Road Density, pp. 3-131, 3-132); effects on fire/fuels (Direct and Indirect Effects to Fire/Fuels Common to All Action Alternatives, p. 3-47); effects on aquatic resources (Cumulative Effects of Restricted or Unauthorized Motor Vehicle Use on Roads, p. 3-99); effects on soils (Effect of Additional Trail for Motorized Use, pp. 3-117, 3-118; Effects of Ongoing and Reasonably Foreseeable Activities on Soil Productivity, p. 3-119), throughout the Recreation Access analysis (pp. 3-169 through 3-172); effects to wolverines (Affected Environment for Wolverines, p. 3-148) and effects to elk (Affected Environment for Rocky Mountain Elk, pp. 3-156, and 3-158 through 3-160).

### *6.b. (IDPR)*

**Trails need to be protected from the effects of this project. The project area also contains groomed snowmobile trails.**

Trail access would be increased under Alternatives 2 and 3 (pp. 2-13, 2-16, 2-24). Anticipated effects to recreation in the Twomile Resource Area would be of short duration under any action alternative – some trails could be *temporarily* closed during activities to provide for public safety (Cumulative Effects to Recreation Access Under Alternatives 2, 3 and 4; p. 3-171). Log hauling would not be allowed on groomed snowmobile routes from December 15 to April 1 each year (p. 3-171).

## Comments Related to Finances

### *7.a. (Lands Council/Ecology Center, p. 27)*

**NFMA requires a sophisticated consideration of benefits and costs, including use of both market and non-market methods of determining existing and future resource values, methods to determine opportunity costs, and use of best available quantitative and qualitative techniques. The FS must meet the substantive requirements regarding economic analyses set forth in NFMA, which means incorporating a wide range of external economic costs that will be passed on to public agencies, private landowners, business owners, and others adversely affected by the timber sale in combination with other timber sales ongoing and planned across the Forest, the Region, and the national forest system as a whole. The FS must show the timber sale would meet the test of cost practicability required by NFMA.**

Forest Service policy (FS Handbook 2409.18, Section 32) sets a minimum level of financial analysis for timber sale planning. The financial analysis is used to compare the alternatives and to show that the costs are reasonable to achieve the desired results. Non-commodity values were not included in this analysis because these resources are evaluated under each specific resource section. For the purposes of complying with NEPA, the weighing of merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis, and *should not be* when there are qualitative considerations. The sequential steps used in the analysis and how data from the spreadsheets was used to arrive at the values displayed in Chapter 3 (Section 3.9, Finances) are described in the Project Files (PF Doc. FIN-11).

### *7.b. (Lands Council/Ecology Center, p. 28)*

**The last TSPIRS report produced by the Forest Service was for fiscal year 1998. Since the TSPIRS report can no longer be used to satisfy the economic monitoring requirements, there is no fiscal monitoring occurring. Lacking up to date monitoring, explain how economics data for the NEPA document is complete and accurate.**

The factors used in the financial analysis are continually monitored and often updated. The Transaction Evidence Appraisal regression formula that looks at bids on local timber sale offerings (PF Doc. FIN-8 and FIN-9) is updated on a quarterly basis. The results of this work is combined with the latest district costs (PF Doc. FIN-7) and consumer price index or inflation factor (PF Doc. FIN-3 and FIN-4) used to model expected cash flows under each proposed alternative. This data is then set in the context of the current trends of the local and national economies via news reports (PF Doc. FIN-R4).

### *7.c. (Lands Council/Ecology Center, p. 22)*

**Numerous government studies confirm the Forest Service's financial losses and lack of accountability. According to the most recent GAO report on the timber sale program, released in 1998, the USFS lost over $1 billion selling National Forest timber between 1995 and 1997.**

The losses or gains from timber sales can cycle with the economy of the nation as a whole and within regions of the nation. Locally, timber harvesting and lumber milling has been a historic and important part of the economy, and as such the local demand for timber has been recognized in the establishment of its own transactional evidence appraisal equation (see also the response to Comment 7.b). Here the appraised minimum bid, which is determined by this appraisal method, is very often bid up through competition for the timber to the point that the resulting monies are returned to the sale area to fund resource improvement activities and/or returned to the local counties in lieu for taxes to support schools and maintenance of roads and highways. These activities have included watershed restoration, wildlife range improvement, and trail restoration work. It is the area's timber sale history that played a large part in the amount of monies that the local Resource Advisory Committee presently administers on behalf of the local counties.

In the case of the Twomile Resource Area proposal, a timber sale would be expected to have monetary costs greater than revenue (Chapter 3, Finances, Tables 3-FIN-4 through 3-FIN-6). However, the data indicates that there would be less of a deficit per treated acre if the fuel reduction work is accomplished in part through a timber sale (Tables 3-FIN-5 and 3-FIN-6). In short, the amount of congressionally allocated monies that would otherwise be needed can be reduced by using the value of the trees which need to be removed to meet fuel reduction and forest health goals. Thus the deficit scenario of the alternatives is largely due to the purpose and need of the project, which first and foremost is to both reduce the wildland fire threats and restore ecosystem health, ***and*** protect life and property.

### *7.d. (Lands Council/Ecology Center, p. 22)*

**In a report released in January 2001, the GAO found the USFS has not provided Congress and the public with a clear understanding of what is accomplished with appropriated funds. According to the report, the FS and Congress do not have accurate financial data to track the cost of programs and activities and to help make informed decisions about future funding.**

This issue is outside the scope of this project, but easily addressed. In fiscal year 2003, an independent (private) accounting firm inspected the Forest Service's financial statement and accounting books. For the second time in two years, the Forest Service was issued a Clean Audit Opinion following the inspection.

## Comments Related to TES Plants

### *8.a. (Lands Council/Ecology Center, p. 16)*

**Monitoring needs to be done for population trends of TES plants before the public review process is completed. There is a lack of survey methodology and results. There have been few conservation strategies written for TES plants, so little is known about most species. Baseline information is lacking. The impacts of silvicultural treatments on nearby TES plants populations must be monitored, reported, and considered in the NEPA analysis.**

TES plants have been addressed in detail in Chapter 3 (pp. 3-186 through 3-203). There are no documented occurrences of Threatened or Endangered plant species on the IPNF (Existing Threatened & Endangered Plant Species, p. 3-188). Analysis was conducted in part using results of past Sensitive plant surveys (Methodology Used in Assessment of the Environmental Consequences to TES Plans, p. 3-186). Field surveys have occurred on approximately 800 acres in the resource area (p. 3-190; PF Doc. TES-16).

For unsurveyed habitat that is highly suitable to support Sensitive plants, presence is assumed (p. 3-187). Under any action alternative, field surveys would be completed in all previously unsurveyed areas of highly suitable habitat where project-related activities would occur (Plant Surveys and Documented Occurrences, p. 3-190).

The need for field surveys is based on habitat suitability and the risk of effects to Sensitive plants and habitat due to project activities.

## Comments Related to Other Issues

### *9.a. (Lands Council/Ecology Center, p. 1)*

**If natural disturbance patterns are the best way to maintain or restore desired ecosystem values, then nature should be able to accomplish this task very well.**

The effects of natural disturbance patterns would not be the same today as they were historically, primarily due to the change in forest composition and structure; and the increase in the number of people recreating, working, and residing in the wildland urban interface. Alternative 1 represents the effects of taking no action – in essence, letting nature take its course. The anticipated effects (disclosed in detail by resource in Chapter 3 and summarized by resource in Chapter 2) would not be consistent with Forest Plan standards and guidelines or Forest Service policy.

### *9.b. (Lands Council/Ecology Center, p. 1)*

**Before approving a further set of activities that are known causes of ecosystem damage – activities such as logging, road construction, and motorized access – the FS must complete revision of the Forest Plan in order to elucidate a truly sustainable ecological vision of forest management.**

The Forest Plan revision effort is well underway. District specialists (including project team members), District Staff, and the District Rangers are involved in the revision effort. Activities under the Proposed Action would meet current Forest Plan standards as disclosed for each resource in Chapter 3.

### *9.c. (Lands Council/Ecology Center, p. 1)*

**Use the NEPA process to clarify any roadless area boundary issues. It is not correct to merely accept previous, often arbitrary roadless inventories – unroaded areas adjacent to inventoried areas were often left out. There is a lot of public support for adding unroaded areas as small as 1,000 acres in size to the roadless inventory.**

As stated in Chapter 2, there are no roadless areas within or adjacent to the Twomile Resource Area (Issues Not Addressed in Detail, p. 2-10). The proposed road construction would not occur in currently unroaded areas. Therefore, this issue was not addressed in detail.

### *9.d. (Lands Council/Ecology Center, p. 1)*

**The long-term costs of noxious weed treatments are never adequately disclosed or analyzed. There is no guarantee that the money needed for the present management direction will be supplied by Congress, no guarantee that this amount of money will effectively stem the growing tide of noxious weed invasions, no accurate analysis of the costs of the necessary post-treatment monitoring, and no analysis of the long-term costs beyond those incurred by site-specific weed control actions.**

While existing infestations of certain weed species may continue to increase on Federal lands and adjacent private lands, features of the action alternatives would serve to minimize (but not eliminate) the risk of weed spread (Features Designed to Reduce the Spread of Noxious Weeds, p. 2-21).

The availability of funding for noxious weed surveying, monitoring, and treatment is not known at this time, therefore these activities are identified as opportunities that could be accomplished as funding becomes available (Opportunities to Reduce the Spread of Noxious Weeds, p. 2-26). Treatment would be conducted under the guidelines of the Coeur d'Alene River Ranger District Noxious Weed Environmental Impact Statement (USDA Forest Service, 2000; PF Doc. NW-2).

Under Alternatives 2 and 3, costs of noxious weed control during activities would be covered in contract provisions requiring construction equipment washing (Appendix F, p. F-5) by the timber sale purchaser (Table 3-FIN-2, p. 3-179).

### *9.e. (Lands Council/Ecology Center, p. 1)*

**The IPNFs failure to adequately monitor impacts of implementing its Forest Plan means that site-specific project decisions would be implemented without the Responsible Official being able to accurately understand the impacts. The results of past monitoring should be incorporated into planning, include all past projects (completed or ongoing) implemented in the project area watersheds, results of all monitoring done in the project area as committed to in the NEPA documents of past projects; the results of all monitoring done in the project area as part of Forest Plan monitoring; and a description of any monitoring specific in past project NEPA documents or the Forest Plan which has yet to be gathered and/or reported.**

The Forest Plan monitoring and findings are published in an annual report that is available to the public. Results of monitoring have been used and disclosed in the project analyses as appropriate (documented by resource in Chapter 3).

### *9.f. (Lands Council/Ecology Center, p. 1)*

**Cultural resource surveys must be completed which satisfy the terms of the National Historic Preservation Act. Include the survey methodology used, a copy of any Memoranda of Agreement with the State Historic Preservation Office, and the qualifications of the people doing the survey work.**

Surveys for heritage resources have occurred in the entire Twomile Resource Area (Issues Not Addressed in Detail – Effects of Proposed Activities on Heritage Resources, p. 2-10). Specific locations are not disclosed in an effort to protect the sites from vandalism or other damage. As stated in Chapter 2, any future discovery of cultural resource sites would be inventoried and protected if found to be of cultural significance. Decisions to avoid, protect, or mitigate impacts to these sites is in accordance with the National Historic Preservation Act of 1966.

Billy E Simpson
PO Box 104
Osburn, Id 83849

Coeur d'Alene River Ranger District
2502 E Sherman Ave
Coeur d'Alene Id. 83814

Joseph P Stringer:

In response to your letter of January 28, 2003 we agree that something needs to be done to cut down the wild fire hazard.

We are properity owners in this two mile area. We realize this need on our own properity, but what concerns us is the cost of such a program to the individual owner as most of us are very limited as to paying for such a program. You gave us the name of this Project Team Leader + phone number to call in regard to this question

Thank you

Billy + Mary Simpson

February 17, 2003

Joseph P. Stringer, District Ranger
Coeur d'Alene River Ranger District
2502 East Sherman Avenue
Coeur d'Alene, ID. 83814

RE: File Code 1950

Dear Sir:

We are in receipt of your letter of January 23, 2003 and are very happy to learn that you are initiating an assessment of wildfire hazards in the Two Mile Watershed. Your letter indicated that grants may become available to reduce hazards on private property and we would like to obtain further information concerning filing of a grant application. We are very concerned about wildfire dangers around our home at 302 East Yellowstone, Silverton, Idaho.

As you know, there is a dangerous development of undergrowth on the hillsides around the residential areas of Silverton. If a wildfire were to start, or spread, in these hillside areas, many homes would be undoubtedly be lost. The presence of large trees (which are located too close to structures) seems to present a special hazard. There is a good likelihood of a wildfire originating from a structure fire, as most homes in the Silverton area are very old. Many of the homeowners in the Silverton area are retirees, such as us, who don't have the physical or financial ability to correct code deficiencies, and/or remove encroaching trees. If the Forestry Service were to become the catalyst to cause the elimination of these hazards, you would indeed be performing an invaluable community service. There doesn't appear to be any other agency up to the task! Any comprehensive plan to reduce wildfire danger in the Two Mile Watershed won't be complete until hazardous undergrowth and trees are removed from the immediate vicinity of structures.

Be assured that everyone appreciates all the good work done by the US Forest Service. Thank you for considering the foregoing in your assessment efforts.

Sincerely,

Charley R Kishbaugh

**DIRK KEMPTHORNE**
governor

**Richard J. Collignon**
director

**Rick Cummins, Administrator**
division of management services

**Dean Sangrey, Administrator**
division of operations

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February 13, 2003

Joe Stringer, District Ranger
Coeur d' Alene River Ranger District
2502 E Sherman Ave.
Coeur d' Alene, ID 83814

RE: Two-mile WUI Hazardous Fuels Reduction Project

Dear Joe:

The Idaho Department of Parks and Recreation received the Two-mile WUI Hazardous Fuels Reduction Project scoping document. The project is proposing to thin trees and use prescribed fires in the Two-mile watershed. Our department is concerned about the effects this project would have on Trails #103, #102 and #17. If thinning operations occur near any of these trails, we ask that you consider the following (listed in order of priority) to minimize the effects to the Coeur d' Alene River Ranger District's trail system.

1. Leave as many live trees surrounding the trail as possible, as long as these trees will not become potential windfalls.

2. As a part of the planning process, consider designing trail corridors to protect the integrity of the trail.

3. Relocate the trail around the thinning activity on either a temporary or permanent basis.

4. Provide recreationists with an alternate route around the sale during the thinning activity.

5. Require in the contract that the trail be re-established upon completion of the thinning operation.

The project area also contains groomed snowmobile trails associated with the Jackass Ridge National Recreational Trail. The Coeur d' Alene River Ranger District should work with the Shoshone County Snowmobile Advisory Committee on scheduling thinning work to avoid conflicts with snowmobile trail grooming.

The department appreciates the opportunity to comment on this proposal. If you have any questions about our comments, please contact Jeff Cook, Outdoor Recreation Analyst at (208) 334-4180 ext. 230.

Sincerely,

Rick Collignon, Director
Idaho Department of Parks and Recreation

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*The Lands Council*
*921 W. Sprague, Suite 205*
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*Telephone (509) 838-4912*
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February 28, 2003

Joseph Stringer, District Ranger
Coeur d'Alene River Ranger District
2502 East Sherman Avenue
Coeur d'Alene, Idaho 83814

Mr. Stringer;

Thank you for the opportunity to comment on the Twomile Project proposal. These comments are submitted on behalf of The Lands Council.

We note that the Forest Service (FS) recognizes the area as having a high priority for watershed and aquatic restoration. Our goals for the area include fully functioning stream ecosystems that include healthy, resilient populations of native trout. We agree that the highest priority management actions in the project area are those that remove impediments to natural recovery. We request the FS design a restoration/access management plan for these watersheds that will achieve recovery goals. The task of management should be the reversal of artificial legacies to allow restoration of natural, self-sustaining ecosystem processes. If natural disturbance patterns are the best way to maintain or restore desired ecosystem values, then nature should be able to accomplish this task very well without human intervention (Frissell and Bayles, 1996).

We request the FS strongly consider obliterating the watershed-damaging roads in the project area. The FS's Roads Analysis Process (RAP) must be utilized as the basis for informing everyone about the status of travelways in the area, and be used for the restoration/access management assessment. This will help us understand why the FS might want to keep a road or travelway on the landscape, and allow us to further comment. The RAP can be utilized as the basis for an Environmental Assessment that proposes such restoration alone.

This restoration/access management proposal must take a hard look at the valley bottom streamside roads, disclose the impacts of their continuing existence inside Riparian Habitat Conservation Areas, and consider the option of their obliteration.

Your January 2003 letter alleges a need to reduce the possibility of wildfire burning from national forest land threatening homes as a part of the project's purpose and need. In fact, the letter raises the specter of "frantic families leaving their homes... as fire devastated the forests of Montana and other parts of the western United States." We believe it is wrong to characterize wildland fire as "devastating" to public land forests since fire is a necessary part of the natural process, both in Montana and Idaho. Certainly there were property losses involved with the 2000 fires, however in many cases the losses could have been avoided by taking the steps your letter discusses toward the end, where it mentions "opportunities for private landowners to reduce hazardous fuels on their land." To the extent that you first mention

"frantic families..." followed by pages of discussion of the Twomile proposal reveals what looks like an attempt to evoke fear into the public and offer logging on national forest land as the solution. Your January 28, 2003 letter also misses the opportunity to educate the public about the unavoidable nature of some level of risk of living in a fire-born ecosystem—that to some degree people must accept the likelihood that fire will eventually affect practically every acre of land.

Your January 28, 2003 letter's mention of "opportunities for private landowners to reduce hazardous fuels on their land" at the very end seems to lessen the importance of actions that can be taken on private land to reduce risk of fire damage to structures on this private land. In fact, those are the most important actions; if the conditions on private land in the immediate vicinity of structures are not addressed appropriately, nothing done outside this zone on national forest land will much matter. In effect, your January 28, 2003 letter puts the cart before the horse and thus is a source of public misinformation.

By far the most significant factor determining whether homes and other buildings might burn are the structures' ignitability, not the fuel situation on adjacent national forest land (USDA Forest Service 1999a). There is no reason to focus on fuel levels at distances far removed from the structures to be protected, when money would much better be spent on educating landowners and taking simple steps to reduce fuels adjacent to structures on public land.

The January 28 letter, as well as its enclosed map, reveals that vegetation conditions on private land must be disclosed and fully analyzed if the subject is truly fire risk.

The FS is very familiar with the concept of "defensible space" as it relates to protecting structures in forest and other wildland ecosystems, the education programs (many created by the FS) have proliferated in recent years. Implemented properly, those programs will adequately deal with the risk of fire damaging or destroying these structures—this seems to have been put into your January 28 letter practically as an afterthought instead of it being disclosed as the primary means of dealing with fire risk to private land and structures. As far as treating the vegetation in areas away from the immediate vicinity of such structures, it appears the FS is proposing a prescription with unknown, but likely high, costs and risks both ecologically and economically.

Before approving a further set of activities that are known causes of ecosystem damage—activities such as logging, road construction, and motorized access—the FS must complete the revision of the Forest Plan in order to elucidate a truly sustainable ecological vision of forest management. The FS proposes to continue to implement a Forest Plan that has expired, both legally and ecologically. Project-level decisions based upon an out-of-date Forest Plan and in an absence of adequate monitoring are inadequately informed, are likely illegal, and will result in more of the same kind of damage that has occurred continuously under the first Forest Plan.

If the FS were to bring the problems of the Forest Plan to the light of public scrutiny, it would, among other things, revisit its old growth, management indicator species, monitoring, soil productivity, fire suppression, watershed restoration, and Sensitive species policies.

We present the FS with the rest of these comments knowing the agency will almost certainly ignore what's written above, and will plunge into another expensive, controversial timber sale NEPA process, heedless of what it should have learned long ago.

We request the FS adopt the Restoration Principles (DellaSala, et al., *in press*) as a screen for proposed actions such as those proposed for the Twomile project area. We incorporate them by reference, into this scoping response letter.

We suggest the FS reduce the excessive road network on national forest land. More often than not, wildland fires are started by human activities, and the FS's own information on fire starts shows this is usually immediately adjacent to travelways. Excessive access opportunities in the project area only increases the number of locations where accidental (or arson) fire starts could occur.

There is a gaping lack of empirical studies of the effectiveness of thinning for fuels reduction as applied in the field. "The most debated response to alleviating future fires—mechanically thinning trees—has had limited study." (Christensen, et al., 2002.) Researchers for the federal government's Joint Fire Science Program pointed out last year that "The lack of empirical assessment of fuel treatment performance has become conspicuous." (Omi & Martinson, 2002.) The authors, after canvassing the existing scientific literature, concluded that, other than theirs, only one study "included both statistical analysis and comparison of stand conditions in treated and untreated areas such that differential fire effects could be directly related to the intensity of fuels manipulation." (Id.)

Numerous other reviews and reports, many of them generated by the federal government, confirm the scientific uncertainty surrounding how thinning actually affects subsequent fire intensity. For example, a Department of Interior publication states, "Scant information exists, however, on the efficacy of fuel treatments for mitigating wildfire severity." (USDI, 2002.) An Environmental Assessment published by Grand Canyon National Park reports that "methodologies appropriate for returning 'natural' forest function and process are the subject of considerable debate." (National Park Service, 2002.) A FS publication notes, "although restoration techniques have been tested at the stand level, we do not really have landscape-level knowledge yet." (Rapp, 2002.) Another states: "Some uncertainty ... surrounds management treatments. ...At landscape scales, the effectiveness of treatments in improving watershed conditions has not been well documented." (USDA Forest Service, 2002.) And the FS's most recent intensive retrospective examination of the relationship between fuel reduction activities and subsequent fire intensity found no systematic benefit: "(E)ach of the different types of fuel modification encountered by the Hayman Fire had instances of success as well as failure in terms of altering fire spread or severity." (Finney, et al. 2002.)

Reliable information with which to justify thinning for fuels reduction, including site-specific information on historical conditions and changes is central to any management proposal purpose and need. The general frequency of past fires and the "natural" density of trees in various types of landscapes remain controversial. (Sierra Nevada Ecosystem Project, 1996, pp. 62-63.) The perception that lethal fire has greatly increased in frequency does not necessarily hold true for vast areas of the Western US. A FS assessment of changes in the Interior Columbia River Basin from pre-settlement to modern times, concludes, "Lethal fire regimes, that kill the upper layer of vegetation, increased 17 percent in the Basin." (Quigley et al, 1997, p. 856.) As a general matter, it is problematic to extrapolate just how dense or sparse forests actually were in pre-settlement times. (Stephenson, N.L. 1999; Landres, et al., 1999.) And current FS-DOI estimations of "Condition Class" to show where conditions have changed most significantly from pre-settlement fire regimes, are completely inadequate for site-specific location of remedial efforts. The agencies themselves note that: "While the coarse-scale assessment of Fire Condition Classes provides a useful first-approximation of national level risk, its analysis scale and resolution of data are not sufficient to estimate local and regional levels of risk." (USDI & USDA 2002; Schmidt et al. 2002.) This government agency conclusion stands in stark contrast to what seems to be the policy of the Idaho Panhandle National Forests, which is to take high fuel conditions and high fire risk conditions on virtually all areas of the Forest for granted, without looking closely at site-specific conditions.

The FS should admit that fuels reduction projects can increase, rather than decrease, subsequent fire effects. Christensen, et al., 2002 summarize the situation: "Although a few empirically based studies have shown a systematic reduction in fire intensity subsequent to some actual thinning,

others have documented increases in fire intensity and severity." A FS science publication reports: "Depending on the type, intensity, and extent of thinning, or other treatment applied, fire behavior can be improved (less severe and intense) or exacerbated." (Graham, et. al, 1999a, p. 15.) A report of the Secretaries of Agriculture and Interior to the President warned: "(T)he National Research Council found that logging and clearcutting can cause rapid regeneration of shrubs and trees that can create highly flammable fuel conditions within a few years of cutting. Without adequate treatment of small woody material, logging may exacerbate fire risk rather than lower it." (Babbitt and Glickman 2000, p. 12.) Another explanation for increase in fire intensity post-thinning is the increased drying effect of sun and wind in stands that have been opened up. (Christensen et al., 2002; Rapp 2002, p. 8.) And a series of studies from the scientific literature shows post-thinning increases in fire intensity and/or spread.[1]

Recently, Huff, et al., 1995 stated:

> (I)ntensive forest management annually produces high fuel loadings associated with logging residues. As a by-product of clearcutting, thinning, and other tree-removal activities, activity fuels create both short- and long-term fire hazards to ecosystems. The potential rate of spread and intensity of fires associated with recently cut logging residues is high (see for example, Anderson 1982, Maxwell and Ward 1976), especially the first year or two as the material decays. High fire-behavior hazards associated with the residues can extend, however, for many years depending on the tree species (Olson and Fahnestock 1955). Even though these hazards diminish, their influence on fire behavior can linger for up to 30 years in the dry forest ecosystems of eastern Washington and Oregon. Disposal of logging residue using prescribed fires, the most common approach, also has an associated high risk of an escaped wildfire (Deeming

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[1] Many of these studies were reviewed by the Forest Service in connection with the Final Environmental Impact Statement for the Roadless Areas Conservation Rule (FEIS). The fire specialist review of scientific literature for the FEIS summarizes their findings. See FEIS, Fuel Management and Fire Suppression Specialist's Report [available online at: http://www.roadless.fs.fed.us/documents/feis/specrep/xfire_spec_rpt.pdf] at 22 ("The Congressional Research Service ... noted: 'timber harvesting does remove fuel, but it is unclear whether this fuel removal is significant;'" "Covington (1996) ... notes that, 'scientific data to support such management actions [either a hand's off approach or the use of timber harvesting] are inadequate'" (brackets in the source)); id. at 22-23 ("Kolb and others (1994) ... conclude that ... management activities to improve forest health [such as fuel management] are difficult to apply in the field" (brackets in the source)); id. at 21 ("Fahnstock's (1968) study of precommercial thinning found that timber stands thinned to a 12 feet by 12 feet spacing commonly produced fuels that 'rate high in rate of spread and resistance to control for at least 5 years after cutting, so that it would burn with relatively high intensity;'" "When precommercial thinning was used in lodgepole pine stands, Alexander and Yancik (1977) reported that a fire's rate of spread increased 3.5 times and that the fire's intensity increased 3 times"); id. at 23 ("Countryman (1955) found that 'opening up' a forest through logging changed the 'fire climate so that fires start more easily, spread faster, and burn hotter"). See also Huff, M.H., R.D. Ottmar, E. Alvarado, R.E. Vihnanek, J.F. Lehmkuhl, P.F. Hessburg, and R.L. Everett. 1995. "Historical and current landscapes in eastern Oregon and Washington. Part II: linking vegetation characteristics to potential fire behavior and related smoke production." U.S. Forest Service Pacific Northwest Forest and Range Experiment Station, GTR PNW-355. See also "Initial review of silvicultural treatments and fire effects on Tyee fire." Appendix A, Environmental Assessment for the Bear-Potato Analysis Area of the Tyee Fire, Chelan and Entiat Ranger Districts, Wenatchee National Forest, Wenatchee, WA.

1990). The link between slash fires and escaped wildfires has a history of large conflagrations for Washington and Oregon (Agee 1989, Deeming 1990).

Regeneration and seral development patterns can have a profound effect on potential fire behavior within landscapes by enhancing or diminishing its spread (Agee and Huff 1987, Saveland 1987). Spatially continuous fuels associated with thick regeneration in plantations can create high surface-fire potential during early successional stages. This was evident in most of the roughly 275 hectares of 1- to 25-year-old plantations burned in the 3500-hectare 1991 Warner Creek Fire in the Willamette National Forest (USDA 1993). The fire moved swiftly through the openings created by past harvests, killing nearly all the regeneration but usually missing adjacent stands >80 years old.

Logged areas generally showed a strong association with increased rate of spread and flame length, thereby suggesting that tree harvesting could affect the potential fire behavior within landscapes.

In general, rate of spread and flame length were positively correlated with the proportion of area logged in the sample watersheds.

Increased rate of spread means that the perimeter of the fire will grow much faster. Generally, a faster perimeter growth makes a wildfire harder to contain.

Other scientists have doubts about the efficacy of intensive fuels reductionsas fire-proofing methods. DellaSala, et al. (1995) state:

> Scientific evidence does not support the hypothesis that intensive salvage, thinning, and other logging activities reduce the risk of catastrophic fires if applied at landscape scales ... At very local scales, the removal of fuels through salvage and thinning may hinder some fires. However, applying such measures at landscape scales removes natural fire breaks such as moist pockets of late-seral and riparian forests that dampen the spread and intensity of fire and has little effect on controlling fire spread, particularly during regional droughts. ... Bessie and Johnson (1995) found that surface fire intensity and crown fire initiation were strongly related to weather conditions and only weakly related to fuel loads in subalpine forest in the southern Canadian Rockies. . . . Observations of large forest fires during regional droughts such as the Yellowstone fires in 1988 (Turner, et al. 1994) and the inland northwest fires of 1994 . . . raise serious doubts about the effectiveness of intensive fuel reductions as "fire-proofing" measures.

A federal government scientific assessment states:

> More than any other human activity, logging has increased the risk and severity of fires by removing the cooling shade of trees and leaving flammable debris." And, "Timber harvest, through its effects on forest structure, local microclimate, and fuel accumulation, has increased fire severity more than any other recent human activity. ... Although silvicultural treatments can mimic the effects of fire on structural patterns of woody vegetation, virtually no data exist on the ability to mimic ecological functions of natural fire."

(Sierra Nevada Ecosystem Project 1996, p. 62)

Agee et al., 1999 state:

The effectiveness of fuelbreaks remains a subject of debate within and outside the fire management community. There are many reasons for this broad range of opinion, among them that objectives can vary widely, fuelbreak prescriptions (width, amount of fuel reduction, maintenance standards) may also vary, they can be placed in many different fuel conditions, and may be approached by wildland fires under a variety of normal to extreme weather conditions. Furthermore, fuelbreaks are never designed to stop fires but to allow suppression forces a higher probability of successfully attacking a wildland fire. The amount of technology directed at the fire, and the requirement for firefighter safety, both affect the efficacy of fuelbreaks in the suppression effort

Sustained alteration of fire behavior requires effective and frequent maintenance, so that the effectiveness of any fuel treatment, including fuelbreaks, will be not only a function of the initial prescription for creation, but also standards for maintenance that are applied.The efficacy of many past fuelbreaks has been largely lost because of inadequate or no maintenance. If a fuelbreak is to remain effective, permanent cover type must occur.

Low elevation, dry forests in the Northern Rockies are commonly dominated by ponderosa pine and/or Douglas-fir with scattering of western white pine, limber pine and western larch. They usually have low severity underburns. However, ponderosa pine forests are variable, some have been found to have stand-replacing fires even in pre-settlement times. (Arno et al. 1995). These are the forests types where fires were most frequent and it is in these forests that logging and fire suppression have changed stand composition and structure the most from pre-settlement conditions. The NEPA document must clearly disclose what areas in the project area match this description, and disclose the management history of these areas—the actions taken and the resultant vegetation conditions.

At mid-elevations the forests are most often comprised of various configurations of Douglas-fir, lodgepole pine, grand fir and western larch with scattering of spruce and subalpine fir in the moister sites. This is where the moderate fire severity regime is most common. At higher elevations, forests dependent on stand-replacing fires are composed primarily of lodgepole pine or near treeline by whitebark pine, which, given enough time, are often replaced by subalpine fir and spruce. These forests occupy environments where most trees in a stand are killed by infrequent fires This is where stand-replacing fires are the norm.

Thus, in the Northern Rockies, fire management and policy must reflect the elevational gradient, with the very different high elevation forests and their severe fire regimes differentiated from the lowelevation forests and their low intensity fire regimes. It may be desirable for the low elevations to be managed such that fire becomes more frequent than was experienced in these ecosystems in the 20th Century. On the other hand, the high elevation forests are not in need of as much attention or management activities.

For most prescribed fire and fuels management activities in the Northern Rocky Mountains, land management agency personnel use as their model the ponderosa pine ecosystem. This might be caled the ponderosa pine "poster child." It is the fire regime professionals utilize as a justification for increasing budgets for prescribed burning and as an example of how fire suppression has resulted in forests that are markedly different from pre-settlement times. Yet, this is one of the least extensive forest types in the region. Hutto (1995) states, "the origin of most Rocky Mountain forest stands can be traced to stand replacement fires as opposed to mild understory burns" (internal citations omitted).

Today, current prescribed fire proposals are not simply targeting the low severity regime such as ponderosa pine and dry Douglas-fir forests. Many projects are being developed in lodgepole pine and whitebark pine, high elevation forests with high severity fire regimes. These are forested areas least affected by fire suppression activities in the last 50 years and are the most remote. There is very good

evidence that these moderate (Barrett, et al., 1991) and severe fire regimes (Weir et al. 1995) have not been affected by fire suppression. Therefore, prescribed burning and fuels management in these areas is often not necessary. Wildfires in these mid- to high-elevation forests affect human safety and important or expensive structures the least. If the public is to be supportive of increased prescribed burning, taxpayers money should be spent targeting areas primarily in low-elevation, low-severity fire regimes or areas adjacent to important structures.

Your January 28, 2003 scoping letter suggest that wildland fires pose a threat to soil and makes a huge deal about the impacts of wildland fire on stream functioning. However, you badly misplace the threat onto vegetative conditions instead of correctly identifying the true threats to watershed health. The Western Montana Level I Bull Trout Team (2001) state:

> (T)he real risk to fisheries is not the direct effects of fire itself, but rather the existing condition of our watersheds, fish communities, and stream networks, and the impacts we impart as a result of fighting fires. Therefore, attempting to reduce fire risk as a way to reduce risks to native fish populations is really subverting the issue. If we are sincere about wanting to reduce risks to fisheries associated with future fires, we ought to be removing barriers, reducing road densities, reducing exotic fish populations, and re-assessing how we fight fires. At the same time, we should recognize the vital role that fires play in stream systems, and attempt to get to a point where we can let fire play amore natural role in these ecosystems.

We ask that the Coeur d'Alene River Ranger District explicitly consider the Western Montana Level I Bull Trout Team position paper in the subsequent Twomile NEPA document.

The development of approved fire management plans in compliance with the Federal Wildland Fire Policy was the number one policy objective intended for immediate implementation in the Implementation Action Plan Report for the Federal Wildland Fire Management Policy and Program Review. In general, the Forest Service lags far behind other federal land management agencies that have already invested considerable amounts of time, money, and resources to implement the Fire Policy. Continued mismanagement of national forest lands and FS refusal to fully implement the Fire Policy puts wildland firefighters at risk if and when they are dispatched to wildfires.

Hutto, et al. 1995 state:

> Fire (and its aftermath) should be seen for what it is: a natural process that creates and maintains much of the variety and biological diversity of the Northern Rockies.

This statement, carefully considered, calls into question the whole FS rationale for "managing" wildfire as they have historically "managed" it. Rather than to trust nature to right the wrongs perpetrated by past misguided FS policies, the FS now insists upon managing itself out of the supposed "unnatural" conditions created by its own mismanagement, a kind of administrative hubris specifically addressed by Hutto et al, 1995:

> Fire is such an important creator of the ecological variety in Rocky Mountain landscapes that ***the conservation of biological diversity*** [required by NFMA] ***is likely to be accomplished only through the conservation of fire as a process***...Efforts to meet legal mandates to maintain biodiversity should, therefore, be directed toward maintaining processes like fire, which create the variety of vegetative cover types upon which the great variety of wildlife species depend.
>
> Unfortunately, we are not currently managing the land to maintain thekind of early successional seral stages that follow stand-replacement fires and, hence, many fire-

dependent plant and animal species. Why not? First *prescribed fires in conifer forests are most often low-intensity, understory burns that are justified by the argument that, with past fire prevention, forest composition is now 'unnatural' and that we need to reintroduce a native fire regime of frequent, mild, understory burns to restore forests and to prevent catastrophic crown fires, which are 'destructive' and 'unnatural.'* This justification holds only for a very limited number of habitat types, however (for example, low-elevation ponderosa pine forests). Most of the forested landscape in the northern Rockies evolved under a regime of high-intensity, large fires every 50-100 years, not under a regime of low-intensity, frequent understory burns.

(emphasis added; citations to other scientific papers omitted)

The argument referenced by Hutto et al, 1995, of course, is exactly the kind of justification nowin vogue for so many FS projects. However, the point to be derived from the Hutto et al, 1995 critique is not so much that prescribed burning and favoring a regime of frequent, mild understory fire is never justified, but rather that it is in no way a panacea; and, more significantly, that the catastrophic, stand-replacing crown fires that have swept the west in recent years are part of the fire regime that create the biodiversity which the FS is required by law to insure. Put bluntly, there is a kind of ignorance, bordering on mass hysteria, that needs to be addressed in today's political climate, which sees all wildfire as bad and all burned forests as wasted resources, a view which is every bit as dangerous (and actually quite consistent with) the now acknowledged FS ignorance that favored suppression of wildfires at all costs for many decades.

Also please see Ament (1997) as comments on this proposal, in terms of fire policy and Forest Planning.

Hessburg and Lehmkuhl (1999) question a common assumption that fuel levels are too high for prescribed burning to take place before thinning. Their review also stresses the importance of larger level spatial and temporal issues, generally not well disclosed or understood in limited "treatment" proposals.

Thinning "can also significantly alter nutrient storage and turnover in the modified stands." (Graham, et al., 1999.) Especially on dry sites this can cause nutrient shortage and damage site productivity. (Id.) This and many other adverse consequences to soil, ecological processes, wildlife, and other elements of the natural environment are associated with logging, including thinning. (Ercelawn, 1999; Ercelawn, 2000.) For example: "Salvage or thinning operations that remove dead or decayed trees or coarse woody debris on the ground will reduce the availability of forest structures used by fishers and lynx." (Bull et al., 2001.) Conversion of closed canopy stands to more open conditions may reduce habitat quality for fishers, and loss of understory structural diversity would be detrimental to lynx prey, while the increased human presence and other disturbance factors associated with fuels reduction are "likely to have an adverse effect on rare forest carnivores." (Id.)

Please utilize the NEPA process to clarify any roadless boundary issues. It is not correct to merely accept previous, often arbitrary roadless inventories—unroaded areas adjacent to inventoried areas were often left out. Additionally, there is a lot of public support for adding unroaded areas as smallas 1,000 acres in size to the roadless inventory.

The FS, under the guise of ecosystem management (EM), has been using "forest health" as an argument for the necessity of logging. EM is an alleged departure from past management philosophy when timber had primacy, and the other multiple uses were simply constraints on the dominant use. It appears that EM, as practiced on the Coeur d'Alene River Ranger District, is a concept that is having difficulty being implemented.

The Forest Plan was developed under the old philosophy. Therefore it is difficult to implement the new EM concepts if Management Areas are primary timber production zones. The FS seems to believe that timber production is required to meet Forest Plan direction for the vegetation. There may belimitations on logging under EM but only if the "limiting factors" of "multiple use" can be demonstrated to be harmed by logging. The FS may strive to implement EM but when NEPA documents are prepared, such as those for Iron Honey and the Douglas-fir Beetle project, clearly the timber primacy philosophy is still the motivation for FS activity.

Your January 28, 2003 letter identifies potential insect infestations as a part of the rationale to propose logging. The portrayal of certain insects as essentially a negative part of the forest ecosystem imparts a huge timber production bias. These organisms have always played a part of a healthy forest within the project area. This "saving" of the forest trees from infestation has been demonstrated to have deleterious effects on species dependent upon forest insects and diseases. For example, the IPNF admits that of the habitat structures that provide denning opportunities for the Canada lynx, "Salvage logging that has removed dead and dying trees has contributed to the shortage of down logs in some areas" (USDA Forest Service, 2000a p. 62).

Please assess what species and other goods and services would benefit from allowing natural processes to proceed unhindered by timber management. Please don't just assume theseprocesses are deleterious to timber production, and that logging is the only method that management has to improve "forest health."

It is incongruous that, while professing EM, the FS myopically focuses on trees, largely disregarding many vital forest parts, particularly components that ensure forest dynamics and permit tree growth.

In previous NEPA documents for timber sales on the Coeur d'Alene River RD, conditions of the forest floor have been treated superficially and without on-ground data from the project area. On-ground evaluation surveys for the project area are necessary to define the first line of watershed development and maintenance, that being the organic layers on the forest floor. It is here, in the litter, duff and humus, that moisture and considerable energy is gently captured, filtered and gradually released to underlying soil strata. If these indicators are depleted, further biomass removal activities will exacerbate the situation and can lead to long-term impairment of the forest ecosystem. Without it, rainfall soon compacts and often concretes the surface leading to the first stages of runoff and erosion. Please provide sufficient description of the condition of the litter, duff and humus for the proposed units and for previously logged units in the cumulative effects area (watersheds). Without on-the-ground surveys, indirect, direct and cumulative effects on soils cannot be ascertained.

This same set of layers is the principal abode of mycorrhizal fungi, which are essential both forsuccessful establishment of tree seedlings and later tree growth. When the duff and humus layers have been reduced or eliminated by past extensive and repeated logging and post-logging slash burns, studies have shown very poor survival among planted seedlings. In much of the previously logged area ground-based log removal methods were used that not only destroyed the organic layers but also permanently changed the mineral soil structure beneath. Regeneration logging methods such as clearcutting also havean adverse effect on mycorrhizal production. The amount of duff and humus loss relative to mycorrhizal content also has not been measured on the ground and the cumulative effects are thus not disclosed.

It is also this set of organic layers that supportsa host of microorganisms including those acting as antagonists to pathogenic fungi such as root-rotting fungi. Attention to these factors is a must in project planning and cannot be omitted if true EM is being practiced.

This same set of organic layers also contains mites, ants, nematodes and other roundworms, small rodents and too many other small organisms to enumerate here. These constitute a serious part of the lower food chains that sustain animals higher in the food chain, including animals and birds, many of which actively keep insect pests under natural control. Without these layers the lives and activities of all animal life in the forest are restricted or eliminated. Diverse animal activity is rare for years in heavily cutover areas for these reasons.

The organic floor of forest also hold the majority of soil-building invertebrates and microorganisms which act slowly to develop structure in the inorganic layers below and return nutrients to those layers.

Harvey et al., 1994 state:

> The ...descriptions of microbial structures and processes suggest that they are likely to provide highly critical conduits for the input and movement of materials within soil and between the soil and the plant. Nitrogen and carbon have been mentioned and are probably the most important. Although the movement and cycling of many others are mediated by microbes, sulfur phosphorus, and iron compounds are important examples.
>
> The relation between forest soil microbes and N is striking. Virtually all N in eastside forest ecosystems is biologically fixed by microbes... Most forests, particularly in the inland West, are likely to be limited at some time during their development by supplies of plant-available N. Thus, to manage forest growth, we must manage the microbes thatadd most of the N and that make N available for subsequent plant uptake.
> (Internal citations omitted.)

Please disclose your inventory or monitoring of indicators, including lichens, fungi, insects, etc. since these can and do define existing and probable future forest conditions. Lichens in particular, while capturing atmospheric nitrogen for later release to higher plants and trees, are sensitive indicators of atmospheric and ground conditions and cannot be ignored in attempts at EM. Fungi and insectsindicate and largely drive forest condition. Those that act as antagonists or parasites to destructive forms like root disease fungi or bark beetles should be recognized, as should tree pathogens and pests.

Enumeration of and monitoring of specific small, non-game birds and animal populations that are important in keeping destructive insect populations at low levels must also be disclosed.

The rationale and analysis of this proposal must look at the forest as an ecosystem with interrelationships coequal to timber production. Pleas use the EM approach to assess fungal and insect organisms as capable of operating in a self-regulatory manner and exist as beneficial organisms within the project area. Some species of trees, native insects, and disease organisms are often described by the FS as "invasive" or somehow bad for the ecosystem. Such contentions that conditions are somehow "unnatural" runs counter to more enlightened thinking on such matters. For example, Harvey et al., 1994 state:

> Although usually viewed as pests at the tree and stand scale, insects and disease organisms perform functions on a broader scale.
>
> ...Pests are a part of even the healthiest eastside ecosystems. Pest roles—such as the removal of poorly adapted individuals, accelerated decomposition, and reduced stand density—may be critical to rapid ecosystem adjustment
>
> ...In some areas of the eastside and Blue Mountain forests, at least, the ecosystem has been altered, setting the stage for high pest activity (Gast and others, 1991). This increased activity does not mean that the ecosystem is broken or dying; rather, it is demonstrating functionality, as programmed during its developmental (evolutionary) history.

In making your case for "forest health" you are inferring we should be managing for the natural range of variability in tree species composition. Yet your focus on live, healthy trees ignores the natural range of variability for such factors as snags, old growth, edge effect, etc. and the long-term influences of culverts, miles of roads, and other human-caused structural changes in the forest ecosystem. The concept of range of natural variability suffers from its failure to provide defensible criteria about which factors' ranges should be measured (Frissell and Bayles, 1996). Your proposed "cures" pose far greater threats to biodiversity than do fires and other natural events that might (or might not) be associated with the "undesired" changes in forest structure (Id.; Henjum, et al., 1994; Rhodes, et al., 1994). The sole task of management should be the reversal of artificial legacies to allow restoration of natural, self-sustaining ecosystem processes. If natural disturbance patterns are the best way to maintain or restore desired ecosystem values, then nature should be able to accomplish this task very well without human intervention (Frissell and Bayles, 1996).

Your January 28, 2003 letter makes a case for logging as a way to reduce insect and disease damage to timber stands. As far as we are aware, the FS has no empirical evidence to indicate its "treatments" for "forest health" decrease, rather than increase, the incidence of insects and diseases in the forest. Since the FS doesn't cite research that proves otherwise in its NEPA analyses, we can only conclude that "forest health" discussions are unscientific and biased toward logging as a "solution." Please consider the large body of research that indicates logging, roads, and other human caused disturbance<u>promote</u> the spread of tree diseases and insect infestation.

For example, multiple studies have shown that annosus root disease (Heterobasidion annosum, formerly named Fomes annosus), a fungal root pathogen that is often fatal or damaging for pine, fir, and hemlock in western forests, has increased in western forests as a result of logging (Smith 1989). And researchers have noted that the incidence of annosus root disease in true fir and ponderosa pine stands increased with the number of logging entries (Goheen and Goheen 1989). Large stumps served as infection foci for the stands, although significant mortality was not obvious until 10 to 15 years after logging (Id.).

The proportion of western hemlock trees infected by annosus root disease increased after precommercial thinning, due to infection of stumps and logging equipment wounds (Edmonds et al. 1989, Chavez, et al. 1980).

Armillaria, a primary, aggressive root pathogen of pines, true firs, and Douglasfir in western interior forests, spreads into healthy stands from the stumps and roots of cut trees (Wargo and Shaw 1985). The fungus colonizes stumps and roots of cut trees, then spreads to adjacent healthy trees. Roots of large trees in particular can support the fungus for many years because they are moist and large enough for the fungus to survive, and disease centers can expand to several hectares in size, with greater than 25% of the trees affected in a stand (id.). Roth et al. (1980) also noted that Armillaria was present in stumps of old growth ponderosa pine logged up to 35 years earlier, with the oldest stumps having the highest rate of infection.

Filip (1979) observed that mortality of saplings was significantly correlated to the number of Douglasfir stumps infected with Armillaria mellea and laminated root rot (Phellinus weirii). McDonald, et al. (1987) concluded the pathogenic fungus Armillaria had a threefold higher occurrence on disturbed plots compared to pristine plots at high productivity sites in the Northern Rockies. Those authors also reviewed past studies on Armillaria, noting a clear link between management and the severity of Armillaria-caused disease.

Morrison and Mallett (1996) observed that infection and mortality from the root disease Armillaria ostoyae was several times higher in forest stands with logging disturbance than in undisturbed stands, and that adjacent residual trees as well as new regeneration became infected when their roots came into contact with roots from infected stumps.

Precommercial thinning and soil disturbance led to an increased risk of infection and mortality by black stain root disease (Leptographium wageneri) in Douglas-fir, with the majority of infection centers being close to roads and skid trails (Hansen et al. 1988). Also another Black-stain root disease (Verticicladiella wagenerii) occurred at a greater frequency in Douglas-fir trees close to roads than in trees located 25 m or more from roads (Hansen 1978). Witcosky et al. (1986) also noted that precommercially thinned stands attracted a greater number of black-stain root disease insect vectors.

Complex interactions involve mechanical damage from logging, infestation by root diseases, and attacks by insects. Aho et al. (1987) saw that mechanical wounding of grand fir and white fir by logging equipment activated dormant decay fungi, including the Indian paint fungus (Echinodontium tinctorium).

Trees stressed by logging, and therefore more susceptible to root diseases are, in turn, more susceptible to attack by insects. Goheen and Hansen (1993) reviewed the association between pathogenic fungi and bark beetles in coniferous forests, noting that root disease fungi predispose some conifer species to bark beetle attack and/or help maintain endemic populations of bark beetles.

Goheen and Hansen (1993) observed that live trees infected with Laminated root rot (Phellinus weirii) have a greater likelihood of attack by Douglas-fir beetles (Dendroctonus pseudotsugae). Also, Douglas-fir trees weakened by Black-stain root disease (Leptographium wageneri var. pseudotsugae) are attacked and killed by a variety of bark beetle species, including the Douglas-fir bark beetle (D. pseudotsugae) and the Douglas-fir engraver (Scolytus unispinosis) (id.).

The root disease Leptographium wageneri var. ponderosum predisposes ponderosa pine to several bark beetle species, including the mountain pine beetle (D. ponderosae) and the western pine beetle (D. brevicomis) (Goheen and Hansen 1993).

A variety of root diseases, including black-stain, Armillaria, and brown cubical butt rot (Phaeolus schweinitzii), predispose lodgepole pine to attack by mountain pine beetles in the interior west. The diseases are also believed to provide stressed host trees that help maintain endemic populations of mountain pine beetle or trigger population increases at the start of an outbreak (Goheen and Hansen 1993).

Grand and white fir trees in interior mixed-conifer forests have been found to have a high likelihood of attack by the fir engraver (Scolytus ventralis) when they are infected by root diseases, such as laminated root rot, Armillaria, and annosus (Goheen and Hansen 1993).

More western pine beetles (Dendroctonus breviformis) and mountain pine beetles (D. ponderosae) were captured on trees infected by black-stain root disease (Ceratocystis wageneri) than on uninfected trees (Goheen et al. 1985). The two species of beetle were more frequently attracted to wounds on trees that were also diseased than to uninfected trees. They also noted that the red turpentine beetle (Dendroctonus valens) attacked trees at wounds, with attack rates seven-to-eight times higher on trees infected with black-stain root disease than uninfected trees. Spondylis upiformis attacked only wounded trees, not unwounded trees (Id.).

Within the proposed project area, rain-on-snow (ROS) during the winter and spring months has been found to be the dominant mechanism causing peak flows (MacDonald and Hoffman, 1995). Please keep

in mind that the use of the ROS model estimates the risk of occurrence of a ROS event, not the quantified increase in peak flows expected. Verification of accuracy based upon quantitative monitoring data for the ROS model has not been performed on this Forest.

Jones and Grant (1996) describe the relationship of roads and clearcutting:

> The addition of roads to clear-cutting in small basins produced a quite different hydrologic response than clear-cutting alone, leading to significant increases in all sizes of peak discharges in all seasons, and especially prolonged increases in peak discharges of winter events. These results support the hypothesis that roads interact positively with clear-cutting to modify water flow paths and speed the delivery of water to channels during storm events, producing much greater changes in peak discharges than either clear-cutting or roads alone. Roads alone appear to advance the time of peak discharges and increase them slightly. Road surfaces, cutbanks, and ditches, and culverts all can convert subsurface flow paths to surface flow paths (Harret al., 1975; King and Tennyson, 1984; Wemple, 1994; Wright et al., 1990). Reid (1991) and Reid and Dunne (1984) estimated discharges from culvert outfalls in western Washington and associated them with runoff from road surfaces.

It is extremely important the project NEPA document disclose the environmentalbaseline for watersheds. Generally, this means their condition before development or resource exploitation was initiated. For example, the baseline condition of a stream means the habitat conditions for fish and other aquatic species prior to the impacts of road building, logging, livestock grazing, etc. Therefore, proper disclosure of baseline conditions would mean estimates of stream stability, pool frequency conditions, water temperature range—essentially the values of Riparian Management Objectives along with such parameters as sediment levels. When such information is provided, comparison with the current conditions (after impacts of development) will aid in the assessment of cumulative effects of all alternatives.

Several concerns have arisen since Forest Plans had been amended by the INFISH DN (USDA Forest Service, 2000a, p. 77). The NEPA analysis should disclose these problems and identify the obvious implications of Forest Plan inadequacies in protecting habitat and populations of native fish species.

Ruggiero, et al. 1994 provide guidance for reconciling the disparity between the geographic size of project analyses vs. the needs of species: "The disparity between the scale of a local management action (e.g., a timber sale) and the scale of the ecological response (e.g., speciesviability) is a fundamental problem in assessing population viability." Basically, they point out that the problem with viability analyses for land encompassed by the typical project analysis areas is that such analyses look at areas of habitat much smaller than that encompassed by most wildlife species' populations. Thus it is easy to erroneously conclude, as do FS project-specific analyses in most cases, that small reductions in the amount of habitat are not significant for maintaining population viabilty.

The FS has acknowledged that viability is not merely a project area consideration, that the scale of analysis must be broader:

> Population viability analysis is not plausible or logical at the project level such as the scale of the Dry Fork Vegetation and Recreation Restoration EA. Distributions of common wildlife species as well as species at risk encompass much larger areas than typical project areas and in most cases larger than National Forest boundaries. No wildlife species that presently occupy the project area are at such low numbers that potential effects to individuals would jeopardize species viability. No actions proposed under the preferred alternative would conceivably lead to loss of population viability. (Lewis and Clark NF, Dry Fork EA Appendix D at p. 9.)

The FS should firmly establish that the species that exist, or historically are believed to have been present in the analysis area are still part of viable populations. Since Forest Plan monitoring efforts have failed in this regard, it must be a priority for project analyses. Identification of viable populations is something that must be done at a specific geographic scale. The analysis must cover a large enough area to include a cumulative effects analysis area that would include truly viable populations. Analysis must identify viable populations of indicator, TES, at-risk, focal, and demand species of which the individuals in the analysis area are members in order to sustain viable populations.

The fact that the FS has not monitored the population trends of its old growth management indicator species (MIS) as required by the Forest Plan bears important mention here. Considering potential difficulties of using population viability analysis at the project analysis area level (Ruggiero, et. al., 1994), the cumulative effects of carrying out multiple projects simultaneously across the Forest makes it imperative that population viability be assessed at least at the forestwide scale (Marcot and Murphy, 1992). Also, temporal considerations of the impacts on wildlife population viability from implementing something with such long duration as a Forest Plan must be considered (id.) but this has never been done by the IPNF. It is also of paramount importance to monitor population trends(as mandated by the Forest Plan) during the implementation of the Forest Plan in order to validate assumptions used about longterm species persistence i.e., population viability (Marcot and Murphy, 1992; Lacy and Clark, 1993).

In making determinations about maintaining population viability of management indicator, focal, demand, Sensitive, Threatened, Proposed, and Endangered Species, the Forest Service usually goes no farther than a) relying on US Fish and Wildlife Recovery Plans for threatened and endangered species and, b) using database-derived calculations of amounts of habitat thought to maintain a home ranges of individuals or nesting pairs of species. The problem with this approach to maintaining population viability is that it is not a true population viability analysis. Mills (1994), criticizes a wildlife analysis performed by the Forest Service for a timber sale in the Kootenai National Forest. Mills points out that the FS's use of the term "viable" refers to habitat characteristics, not population dynamics. Mills goes on to explain the range of parameters which must be used to make a scientifically sound assessment of the viability of wildlife species. Population dynamics refers to persistence of a population over time—which is key to making predictions about population viability. Population dynamics include assessing population size, population growth rate, and linkages to other populations and must be included in a scientifically sound population viability analysis. Ruggiero, et al. (1994) also point out that a sound population viability analysis must utilize measures of population dynamics. Finally, the 1999 draft NFMA planning regulations also recognize the importance of consideration of population dynamics for sustaining species.

Both Ruggiero, et al. (1994) and Lindenmayer, et al. (1993) provide discussion on why population viability analysis is the best available tool assessing population viability, the latter providing examples of population viability analysis being used for several species of wildlife and one plant species. Lacy and Clark (1993) provide an example of population viability analysis used to design a computer simulation of risk of extinction of the pine marten.

One of the problems with relying on database-derived habitat suitability models is that such data is not reliable enough for scientific biology. The information is gathered by stand examiners who may or may not have biological training, and is often quite dated. Very recently, the IPNF has admitted that the useof database habitat information is suspect:

> Habitat modeling based on the timber stand database has its limitations: the data are, on average, 15 years old; canopy closure estimates are inaccurate; and data do not exist for the abundance or distribution of snags or down woody material... (USDA Forest Service, 2000a)

In a scientific document prepared as a part of ICBEMP, Witmer, Martin, & Sayler (1998) make recommendations which reinforce the points we make above about population dynamics, population viability analysis, and monitoring. From the Abstract:

> Forest carnivores in the Pacific Northwest include 11 medium- to large-sized mammalian species of canids, felids, mustelids, and ursids. These carnivores have widely differing status in the region, with some harvested in regulated furbearer seasons, some taken for depredations, and some protected because of rarity. Most large carnivores have declined in numbers or range from human encroachment, loss or modification of forest habitat, accidental deaths (e.g.,mortality from vehicles), illegal kills, and our inability to adequately monitor and protect populations. Efforts to reverse these trends include new approaches to reduce conflicts with humans, research to better define habitat needs, formation of expert carnivore working groups, and use of Geographic Information System models to predict specific impacts of habitat modifications. Long-term preservation of large carnivores in the region is problematic unless we reduce forest fragmentation and conflicts with humans and improve our ability to quantitatively integrate population dynamics with landscape level habitat requirements. (Emphasis added.)

Logging, especially clearcutting and other forms of "regeneration" cutting, causes fragmentation of forests which is known to reduce populations of MIS and TES species. Researchers note reduced habitat use from fragmentation and/or recommend minimizing fragmentation or emphasizing connectivity to avoid further impacts to: lynx (Butts, 1992; Tanimoto and Garton, 1993);wolverines (Copeland, 1996; USDA Forest Service, 1993); goshawks (Crocker-Bedford, 1990; Erdman, et al., 1998; Graham, et. al., 1999; Iverson, et al. 1996; Reynolds, et al. 1992; Ruggiero, et al., 1991); and various wildlife species including the above (Witmer, Martin, & Sayler, 1998).

The scientific literature on biological diversity makes it clear that project assessments should consider, among other things, size distribution and connectivity for various types of habitat patches, amount and distribution of important types of such patches (such as roadless areas) which have been reduced by prior human activity, disturbed and historic vegetative mosaic patterns across the forest, cumulative effects of past activity from a watershed or regional ecosystem level, and edge effects of further forest fragmentation (Noss, 1990).

Along with the fragmentation in the IPNF is the loss of structural diversity unique to mature and old growth forests that logging has reduced. Structural diversity is lacking in clearcutand other "regeneration"-logged areas, and it is obvious that salvage and other partial cutting methods on the Forest which have targeted dead, dying, and windthrown trees has further reduced the structural diversity important for wildlife species. Biologists recommend retaining such structure and/or learned that live trees and the vertical and horizontal diversity provided by snags and large down woody debris are important habitat characteristics for: lynx (Butts, 1992; ; Koehler and Brittel, 1990; Tanimoto and Garton, 1993); wolverine (Lofroth,1997) goshawk (Daw, DeStefano, & Steidl, 1998; Hayward & Escano, 1989; Iverson, et al. 1996); and various wildlife species including the above (Ruggiero, Jones, & Aubry, 1991*in* Ruggiero, et al., 1991).

The issue of providing for the larger landscape needs of far-ranging forest carnivores (including the grizzly bear, gray wolf, wolverine, fisher, pine marten, lynx, goshawk, etc.) reveals the need to utilize the principles of Conservation Biology on a landscape level. Core areas of relatively undisturbed habitats need to be maintained. Linkages with other core areas need to be established, providing sufficient habitat components so the linkages, or corridors, are functional for genetic interchange purposes. Both core areas and linkages should be the focus of the watershed rehabilitation and recovery discussed above (such as

road removal). Buffer zones around core areas should also be recognized in their contribution to habitat needs for these wildlife species.

State-of-the-art conservation biology and the principles that underlie the agency's policy of "ecosystem management" dictate an increasing focus on the landscape-scale concept and design of large biological reserves accompanied by buffer zones and habitat connectors as the most effective (and perhaps only) way to preserve wildlife diversity and viability (Noss, 1993).

The continued fragmentation of the Forest also is a major issue. It is documented that edge effects occur 10-30 meters into a forest tract (Wilcove et al., 1986). The size of blocks of interior forest that existed historically before management (including fire suppression) was initiated must be compared to the present condition. Again, this should be a landscape ecology analysis which looks atthe larger picture of the fragmentation of habitat in surrounding concentric circles.

The NEPA analysis must disclose the results of monitoring population trends of TES plantsbefore the public review process is completed.

NEPA analyses typically suffer from lack of disclosure of the details of plant surveys in areas that would be disturbed by proposed projects. Generally, survey methodology and results are not disclosed, and mitigation measures are not offered for public review. The variance in plant species' flowering seasons makes it difficult if not impossible for the surveyors to locate all species potentially present. And the lack of familiarity with the dozens of species on the part of surveyors also makes survey results suspect.

Additionally, there have been few conservation strategies written for TES plants as so little is known about most species. Baseline population information is lacking. Most of the discussion in this letter on population viability for wildlife species applies equally toTES plants.

The impacts of various silvicultural "treatments" on nearby TES plants populations must be monitored, reported, and considered in NEPA analysis.

The *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (hereafter, *Scientific Assessment)* recognizes the importance of maintaining large, old trees and the loss of big trees in Columbia Basin from logging. From the*Scientific Assessment:*

> There has been a 27 percent decline in multi-layer and 60 percent decline in single-layer old-forest structures, predominantly in forest types used commercially. (P. 181.)
>
> Emerging Science Issues: We had not anticipated the data indicating the extensive loss of large trees in the landscapes over much of the Basin. The harvest legacy has been more extensive than we thought. (P. 180.)
>
> Management outside the reserve boundaries includes an emphasis on conserving remaining old forest stands and roadless areas larger than 1000 acres. (P. 140.)
>
> Throughout most forested Ecological Reporting Areas (ERUs), native herblands, shrublands, and old multi-layered and single-layered forests have declined substantially in area and connectivity since the Basin was first settled by European-Americans. (P. 60.)

> (S)alvage emphasizes the extraction of specified volumes of dead and green trees at risk of dying. As such, harvest will emphasize larger trees, both green and recent dead, of desirable species ... Our findings suggest that this type of harvesting is not compatible with contemporary ecosystem-based management. (P. 178.)

The failure of the FS to complete Forest Plan-required monitoring of old growth MIS means there is substantial doubt regarding the ability of existing old growth to sustainold growth dependent species. Therefore, no more logging should be even contemplated in old growth and near-old growth forest if we are to sustain old growth and the species that depend upon it. Thomas, et al. (1988) stated that "the best probability of success is to preserve all remaining old growth ..."

Methodology exists for determining the presence of indicator and Sensitive wildlife species presence in forest areas and/or for monitoring population levels (Bachman et. al. 1990, Becker 1991, Bull et a. 1990; Copeland 1993, Foresman et. al. 1998, Jones & Raphael 1991, Raphael 1994, USGS 1997, Watson et. al. 1999, Weaver, et al., 1997; Zielinski et. al. 1996, Zielinski et. al. 1995). Some of these techniques, such as snow track surveys, are useful for multiple species in single transects.

Promoting logging in old growth in order to "restore" it is not supported by science. Emphasizing individual tree health subverts the goal of ecosystem integrity and long-term sustainability of forests and their myriad biotic components (McClelland and McClelland 1999). Management that attempts to restore "forest health" through routine cutting of dead, dying, and diseased trees and fire suppression can eliminate essential characteristics of old growth (Id.).

Old growth includes downed woody material that serves as shelter for old growth dependent species—it is not "excessive fire fuel" that needs removal. It also provides irreplaceable nutrients to the forest soil, and dead trees (snags) providing nesting habitat for many birds and cavity dwelling animals. Old growth forest also has important hydrological functions for the forest ecosystem. These things—features of the old growth forest itself—maintain the health of the forest ecosystem. In that context, old growth forests should be thought of as essential parts of whole, self-sustaining forest ecosystems. Targeting mortality for logging within old growth, or logging to encourage growth of larger trees is a part of a failed management paradigm that fails to realize that natural, intact ecosystems are self-sustaining. Removing trees by logging has <u>nothing</u> to contribute to old growth forests or old growth dependent species.

The FS resists designation of reserve blocks of sufficient size and spatial arrangementto support old-growth associated species of wildlife, including boreal owl, pine marten, black-backed woodpecker, lynx, pileated woodpecker, fisher, and several species of migratory birds. Habitat quality is a key component of the analysis of old growth MIS reserve blocks, as is indicated in the Region One direction in Warren, 1990 and the science behind Forest Plan old growth standards. The obvious implication is that simply designating old growth is not enough to maintain viable populations of old growth dependent species. Disclose the quantity (total number of acres and block sizes) of old growth in the project area, and evaluate the <u>quality</u> of the blocks by considering the edge effect from natural and manmade openings caused by roads and logging.

The FS has stated: "Well distributed habitat is the amount and location of required habitat which assure that individuals from demes,[2] distributed throughout the population's existing range, can interact. Habitat should be located so that genetic exchange among all demes is possible." (Mealey 1983.)

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[2]Subpopulations.

In the process of identifying of old growth habitat, the FS must ground truth areas chosen from photo interpretation and database examination. This is also important for identifying recruitment old growth, and to meet future old growth habitat needs. Old growth character should be well documented in maps that also display past impacts to old growth. For each project there should be an estimate of how many acres of potential snag loss has or will occur due to firewood cutting and wind events following logging.

Research reveals that the Forest Plan's target level of old growth to be scientifically unjustified. A recent study by Lesica (1996), suggests that old growth occupied 20-50% of many presettlement forest ecosystems in the Northern Rockies. The Forest Plan for the Kootenai National Forest also admits this:

> A review of applicable literature on wildlife species and their habitat needs indicated that a minimum of 8-10 percent of available wildlife habitat should provide old growth conditions (McClelland, 1978; Juday, 1978) at any given time. (A 17-9, emphasis in the original.)

Research suggests that it is essential to viability of goshawks that 20-50% of old growth within their nesting areas be maintained (Suring et al. 1993, Reynolds et al. 1992). USDA Forest Service (2000b) recommends that forest opening greater than 50-60 acres be avoided in the vicinity of goshawks. At least five years of monitoring is necessary to allow for effective estimates of habitat quality (Id.). Research suggests that a localized distribution of 50% old growth should be maintained to allow for viability of goshawks (Suring et al. 1993).

Goshawks are associated with habitat with large-diameter overstory trees, large standing dead or defective trees, downed logs, a deep duff layer, and formation of several canopy layers (Warren, 1990). Goshawks are often associated with a thick overstory cover and areas with a large number of large trees. For example, Hayward and Escano recommend an overstory canopy between 75 - 80% (Hayward and Escano, 1989). This study found that 89% of the trees surveyed in nest stands were larger trees (between 35-50" dbh) east of the Continental Divide in Montana.

According to the BE/BA for the Keystone Quartz FEIS in Region One,

> Goshawks prefer vegetation structure that permits them to approach prey unseen and to use their flight maneuverability to advantage (Widen, 1989, Beier and Drennan 1997). ... In northern Arizona ponderosa pine and mixed conifer forests, Beier and Drennan (1997) found that goshawks did not select foraging sites based on prey abundance; abundance of some prey were lower on used than contrast plots. Goshawks selected foraging sites that had higher canopy closure, greater tree density, and greater density of trees >16" DBH than on contrast plots.

(Keystone Quartz FEIS B1-22.)

Edge-adapted species may compete with the goshawk and displace the goshawk if adequate amounts of forest interior habitat is not provided. Crocker-Bedford (1990) recommends that a foraging area of >5000 acres of dense forest, in which no logging is permitted, be designated for goshawks, with additional areas of 2500-5000 acres of more marginal habitat designated beyond this 5,000 acre foraging area.

In the western United Stares, pine marten are most abundant in mature to old-growth true-fir or spruce-fir forests and generally avoid open, drier coniferous forest. They prefer forest stands greater than 40% tree canopy closure, which protects them from predators and enhances the moist conditions favorable for prey species. (USDA Forest Service 1999 at III-257.)

Marten are closely associated with mature to old-growth timber stands, preferring moist habitat types where small mammals are more abundant. Pine marten prefer stands with greater than 40 percent canopy closure, and tend to avoid those stands with less than 30 percent closure. In addition to a closed canopy, marten require an abundance of large downed logs and snags. This provided secure resting locations, denning habitat and winter access to small mammals living beneath the snow. (Id. at III580, 581.)

Buskirk and Ruggiero (1994) state, regarding the pine marten:

> Logging is commonly regarded as the primary cause of observed distributional losses in historic times in the western contiguous United States. Fire, insects, and disease are other important causes of tree death in the western conterminous United States, but the effects of these disturbances on martens have been studied little. Because logging is unique among these disturbances in removing boles from forests, and because of the importance of boles in contributing physical structure to habitats, logging is likely more deleterious to habitat quality for martens than other disturbances.

Fishers occur most commonly in landscapes dominated by mature to old-forest cover. (USDA Forest Service 1999 at III-254.) "Fishers prefer habitats with high canopy closure (greater than 80 percent) and avoid areas with low canopy closure (less than 50 percent). ...The habitat requirements of fishers are thought to be associated with the physical structure of the forest and associated prey. This structure includes the vertical and horizontal complexity created by a diversity of trees sizes and shapes, light gaps, dead and downed wood and layers of overhead cover. Large-diameter spruce and grand-fir snags and large downed material are used for denning and foraging. Fishers tend to avoid non-forested areas." (Id. at 254.)

The black-backed woodpecker is on the Sensitive species list for the IPNF. Cherry (1997) states:

> The black-backed woodpecker appears to fill a niche that describes everything that foresters and fire fighters have attempted to eradicate. For about the last 50 years, disease and fire have been considered enemies of the "healthy" forest and have been combated relatively successfully. We have recently (within the last 0 to 15 years) realized that disease and fire have their place on the landscape, but the landscape is badly out of balance with the fire suppression and insect and disease reduction activities (i.e. salvage logging) of the last 50 years. Therefore, the black-backed woodpecker is likely not to be abundant as it once was, and continued fire suppression and insect eradication is likely to cause further decline.

Dolan (1998a) states, "Retention of all or most of the large snags will help compensate for past losses." But the FS generally **targets** large dead trees in logging projects. Dolan (1998b) states in regards to impacts on the black-backed woodpecker due to fire suppression and post-fire logging states:

> It seems that we have a huge cumulative effects problem here, and that each salvage sale removes habitat that is already very limited. We are having trouble avoiding a "trend to federal listing" call for the BBWO in salvaging burns, unless comparable acres of fire-killed dead are being created through prescribed burns.

The comments by other biologists attached to Dolan, 1998b reveal that the FS has yet to design a consistent, workable, scientifically sound conservation strategy to assure viable populations of black-backed woodpeckers.

In the process of identifying of old growth habitat, the FS should ground truth areas chosen from photo interpretation and database examination. This is also important foridentifying recruitment old growth,

and to meet future old growth habitat needs. Old growth character should be well documented in maps that also display past impacts to old growth. For each project there should be an estimate of how many acres of potential snag loss will occur due to firewood cutting and wind events following the logging.

Please disclose the sizes and condition of openings from past logging in the cumulative effects analysis area, and display where proposed cutting units are in relation to those old units. Deviations from Regional Guide and Forest Plan standards for dispersal must be disclosed.

Please do studies that consider landtypes, habitat types, slopes, aspect, etc. for this project, so that there would be assurance of successful reforestation. Please disclose (by providing maps, tables, and other documentation) the level of reforestation success from past even-aged logging in the immediate and surrounding compartments, explaining the dates of logging, the problems encounteredand duration needed before certification of restocking.

Evaluate the potential for reforestation efforts in some cutting units to fail due to pocket gophers. If it is possible that pocket gophers will be a problem leading to the "need" to "control" gophers, then the area's suitability for even-aged timber management is in doubt.

Likewise, any potential that herbicide treatment or burning of competing vegetation will be needed to achieve reforestation raises a whole new set of cumulative impacts timbersale environmental analysis should be dealing with up front.

The IPNF has been unable to stay within the bounds of the Forest Plan's 40-acre limit on even-aged cutting units. If the FS cannot follow the Forest Plan, what implications does that have for the Forest Plan FEIS's validity, and the impacts of management of other resources impacted by clearcutting, such as wildlife, fish, recreation, and water quality?

Snags and downed woody debris have long been recognized as important components of functioning ecosystems. These forest features provide habitat for a wide variety of wildlife species and are important for nutrient cycling. Forest Service research shows that in forests of western Oregon and Washington, "snags are used by nearly 100 species of wildlife of which at least 53 species (39 birds and 14 mammals) are cavity-dependent. . . . (F)or some species the presence of dead trees can spell the difference between local extinction and the perpetuation of existing populations." (U.S. Forest Service 1985.) Mannan, 1977 recommended that forest managers "retain as much unmanaged forest land over 100 years as possible" and "retain all snags in riparian buffer strips."

We urge that scientifically sound snag retention requirements be employed within the project area. The IPNF snag guidelines—since they are largely based upon a research paper (Thomas, 1979) concerning the Blue Mountains in Oregon—are not sufficiently site-specific to the ecosystems of Northwest Montana. Indeed, the Wallowa-Whitman National Forest, where the Blue Mountains upon which Thomas' and IPNF snag guidelines are based are located, has even updated Thomas' snag recommendations based upon their finding that inadequate snag replacements would be supplied over the entire rotation. We refer to the "Wallowa-Whitman National Forest Green Tree Snag Replacement Guidelines, Revised Final 4/93." Therein, Tables 1 - 3 show that a mixed conifer stand must contain anywhere from 17.6 to 29.7 green tree replacement snags, depending on the size ofthe available green tree replacements and the logging method proposed. Those numbers of snags are only for meeting the minimum viability 40% habitat level—not shown to be sufficient in such a large area as the IPNF. That document also mentions the need for assuring funding is available: "Induced mortality will require detailed tracking and a solid commitment from management to continually fund induced mortality throughout the rotation." (p. 5.)

The IPNF started to recognize the inadequacy of its present guidelines in the 1996 Mosquito Fly DEIS, wherein it stated:

> On the basis of the most recent U.S. Forest Service management recommendations for snag retention for snag dependent species, such as black-backed woodpecker and other primary cavity excavator species, the design criteria require that at least three suitable snags and 10 green tree replacements per acre for lodgepole pine and subalpine fir forests and six suitable snags and 20 green tree replacements per acre for all other forest types be left in harvested areas. (Page 2-21.)

USDA Forest Service (2000a) also calls for updated guidelines: "Apply snag and down woody material guidelines from the Upper Columbia River Basin Assessment to improve marten habitat" (p. 39). Although that Report doesn't state what those guidelines should be, we welcome the IPNF's acknowledgment of scientific evidence that refutes its inadequate guidelines. We urge prompt action to face this issue on a forestwide and site-specific basis.

In regards to the Thomas model, still used by the IPNF, Bull et al., 1997 state:

> This document presents new information on the retention and selection of trees and logs most valuable to wildlife.
>
> ...Current direction for providing wildlife habitat on public forest lands does not reflect this new information. Since the publication of Thomas and others (1979), new research suggests that to fully meet the needs of wildlife, additional snags and habitat are required for foraging, denning, nesting, and roosting. Although we do not suggest specific numbers or snags to retain by forest type, two recent studies indicate that viable woodpecker populations occurred in areas with about four snags per acre.
>
> We suggest that the next step in snag management should involve creating a model that incorporates the new information on woodpecker foraging substrates (live trees, snags, and logs), home range sizes, number and characteristics of roost trees, multiple occupancy of snags, and needs for other habitat structures. Once this information is incorporated,the model may suggest changes to guidelines that specify numbers of snags and other habitat features by forest type and geographic area. Additional information on fall rates of snags, foraging needs of black-backed and three-toed woodpeckers, relation of the density of woodpeckers to that of secondary cavity nesters, and relation of snag density to woodpecker density would greatly improve the model.
>
> The guide most widely used in the past, Thomas and others (1979), prescribed the number of nest and roost trees to leave for specified woodpecker populations, but the number was based on a hypothetical, untested model and did not include any snags for foraging. Three studies (Baste 1995, Bull and Holthausen 1993, Dixon 1995) conducted in eastern Oregon have shown that retaining foraging structure is essential, in addition to nest an roost trees in managed landscapes. The Thomas model provided only two roost trees per pair per year, yet research has shown that individual pairs of pileated woodpeckers and white-headed woodpeckers use considerably more than two per year (Bull and others, 1992, Doxon 1995). Radio-telemetry studies have shown that home range sizes of pileated woodpeckers (Bull and Holthausen 1993), white-headed woodpeckers (Dixon 1995), and three-toed and black-backed woodpeckers (Goggans and others 1988) are considerably larger than those used in the Thomas model.
>
> Raphael and White (1984) found that the relation between numbers of snags and cavity nesters in not linear, which was assumed in the Thomas model. The substitution factor used

in the Thomas model is variable and largely a function of snag density. Neitro and others (1985) thought allowing substitution of snags that reduced the number retained was not appropriate. The Thomas model did not take into account the habitat needs of some of the secondary cavity nesters, like bats and brown creepers, that use such snag features as loose bark. In addition, Bull and Holthausen (1993) found lower densities of pileated woodpeckers in nine study areas than predicted by Thomas and others (1979) based on the number of snags present. The above studies present new data suggesting that some of the assumptions and data used in the Thomas model are not valid, and that the prescribed snag densities need to be revised upward. (P. 28.)

Ideally, data would be available on the exact number of snags required to support specific populations of primary and secondary cavity nesters. Unfortunately, this kind of information is not available. We do know, whoever, that the snag numbers presented by Thomas and others (1979) are not adequate to support the populations intended because of a lack of foraging strata and invalid assumptions used in the model. If management agencies have an objective to manage for viable populations of woodpeckers, providing numbers of snags that have been shown to support viable populations in the recent studies would be prudent. (P. 29.)

Results of monitoring cavity habitat condition and amount has generally shown that prescriptions have not been met following logging. Field surveys are necessary to determine the level of available snag and downed woody material in the cumulative effects analysis area, since it may be the case that proposals for cutting units must consider the need to offset the lack of snags in areas previously logged.

USDA Forest Service, 2000a (p. 39) states, "Pileated woodpeckers are indicators of old growth or late successional ponderosa pine and Douglas-fir forests." We urge biologists observe the results from McClelland and McClelland (1999) which indicate that for nesting and roosting, pileated woodpeckers favor larch and ponderosa pine far more than Douglas-fir, although the latter are often used for foraging. Because of the relative rarity of the large, old larch and ponderosa pine forestwide as compared to the historical range, the IPNF should design a conservation strategy that includes retention of<u>all</u> trees of these species approaching 20" dbh.

Project analysis must acknowledge that OSHA regulations require that soft snags generally be felled for worker safety. This means vast portions of the forest will be depleted of standing soft snags. The results of the differences between Forest Plan standards and guidelines and OSHA regulations must be acknowledged and the impacts disclosed.

One of the biggest problems with the FS's failure to deal forthrightly with the noxious weed problem on a forestwide basis is that the long-term costs are never adequately disclosed or analyzed. The public is expected to continuously foot the bill for noxious weed treatments—the need for which increases yearly as the IPNF continues the large-scale propagation of weeds, and fails to monitor the effectiveness of all its noxious weed treatment plans to date. There is no guarantee that the money needed for the present management direction will be supplied by Congress, no guarantee that this amount of money will effectively stem the growing tide of noxious weed invasions, no accurate analysis of the costs of the necessary post-treatment monitoring, and certainly no genuine analysis of the long-term costs beyond those incurred by site specific weed control actions.

Please explain, in clear, understandable language, the precise relationship between Forest Plan standards for soil productivity, FSH2509.18, and Forest Service Handbook FSM 2500-99-1.

The FS is dodging the important issue of maintaining soil productivity as NFMA mandates. As indicated in the Forest Plan, FSM 2500-99-1 and FSH 2509.18, the FS assumes that maintaining soil productivity is achieved simply by limiting detrimental disturbance to no more than 15% or 20% of an Activity Area. The scientific adequacy of the FS's methodology for maintaining soil productivity on has never been demonstrated. The FS's determination that it may permanently damage the soil on 15% or 20% of an activity area and still meet NMFA and planning regulations is arbitrary. Neither the Forest Plan nor the FSM 2500-99-1 cite adequate scientific basis for adopting any percentage as a numerical limit.

The FS has essentially admitted that it is in the dark as far as doing scientific research on soil productivity changes following management activities. In response to comments on the Black Ant Salvage DEIS, Lewis & Clark NF, USDA Forest Service, 2002 states:

> Soil Quality Standards "provide benchmark values that indicate when changes in soil properties and soil conditions would result in significant change or impairment of soil quality based on available research and Regional experience" (Forest Service Manual 2500, Region 1 Supplement 2500-99-1, Chapter 2550 – Soil Management, Section 2554.1).
>
> A formal research study, the "Long Term Soil Productivity Study," is currently being conducted by the Research Branch of U.S. Department of Agriculture, Forest Service to validate these soil quality standards.

Even assuming that FSM 2500-99-1 contains nondiscretionary standards, a problem with these soil quality standards (and the FEIS's interpretation of them) is that they do not set any rational thresholds for cumulative reductions in soil productivity <u>outside the activity areas</u> of the proposed timber sale. It is thus the FS's position that significant losses of soil productivity in areas that have experienced livestock grazing, roads, landings, firelines created to fight wildland fires, and the loss of soil productivity from wildland fires themselves can simply be unlimited in any project area regardless of what further impacts are proposed.

The Forest Management Handbook at FSH 2509.18 directs the FS to do validation monitoring to "Determine if coefficients, S&Gs, and requirements meet regulations, goals and policy" (2.1– Exhibit 01). It asks what we are asking: "Are the threshold levels for soil compaction adequate for maintaining soil productivity? Is allowing 15% of an area to be impaired appropriate to meet planning goals?" The Ecology Center recently asked the Northern Region if they have ever performed this validation monitoring of its 15% Standard, in their February 26, 2002 Freedom of Information Act request to the Regional Forester, requesting:

> The Forest Management Handbook at FSH 2509.18 provides the Forest Service with examples of validation monitoring to "Determine if coefficients, S&Gs, and requirements meet regulations, goals and policy." It asks "Are the threshold levels for soil compaction adequate for maintaining soil productivity? Is allowing 15% of an area to be impaired appropriate to meet planning goals?" We request all documentation of validation monitoring by the Forest Service in the Northern Region that answers those two questions.

The Regional Office's reply letter stated that there is no documentation that responds to this request.

FSM 2500-99-1 superceded similar directives issued in 1994 (FSH 2509.18). Both versions of these Regional directives have required implementation and effectiveness monitoring. But as the Regional Office's reply to the Ecology Center FOIA indicates, the FEIS is unable to cite the results of any

monitoring, required by the Standards, to provide a basis for assuming the Regional Soil Standards actually protect **soil productivity.**

It is reasonable to expect that in order for the FS to insure that soil productivity is not or has not been significantly impaired, to assure that the forest is producing a sustained yield of timber, for one example, tree growth must not be significantly reduced by soil-disturbing management activities. Grier et al. (1989), in a Forest Service General Technical Report, adopted as a measure of soil productivity: "the total amount of plant material produced by a forest per unit area per year." (P. 1.) And they cite a study finding "a 43-percent reduction in seedling height growth in the Pacific Northwest on primary skid trails relative to uncompacted areas" for example. And in another Forest Service report, Adams and Froehlich (1981) state:

> Measurements of reduced tree and seedling growth on compacted soils show that significant impacts can and do occur. Seedling height growth has been most often studied, with reported growth reductions on compacted soils from throughout the U.S. ranging from about 5 to 50 per cent.

Adams and Froehlich (1981) also provide reasons why impacts beyond the directly compacted 15% or 20% of an area must be considered in any reasonable definition of soil productivity:

> Since tree roots extend not only in depth but also in area, the potential for growth impact also becomes greater as compaction affects more of the rooting area. In a thinned stand, for example, you can expect the greatest growth impacts in residual trees that closely border major skid trails or that have been subject to traffic on more than one side of the stem."

In other words, when an activity area reaches 15% or 20% detrimentally impacted soils via compaction, tree growth **outside the skid trail,** or beyond the compacted area, is affected.

FSM 2500-99-1 recognizes that soil productivity is defined not merely in terms of the absence of meeting the 15% standard. "Soil Function" is defined thus:

> Primary soil functions are: (1) the sustenance of biological activity, diversity, and productivity, (2) soil hydrologic function, (3) filtering, buffering, immobilizing, and detoxifying organic and inorganic materials, and (4) storing and cycling nutrients and other materials.

And "Soil Quality" is defined as: "The capacity of a specific soil to function within its surroundings, support plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation."

Neither soil function nor soil quality, as FSM 2500-99-1 defines it, have ever been monitored on the IPNF following management activities. Unfortunately, the FS seems to have only interpreted monitoring requirements in terms of maintaining no more than 15% or 20% of activity areas in a detrimentally disturbed condition.

Page-Dumroese et al. 2000 (an earlier version of which is cited in FSM 2500-99-1) emphasize the importance of validating soil quality standards using the results of monitoring:

> Research information from short- or long-term research studies supporting the applicability of disturbance criteria is often lacking, or is available from a limited number of sites which have relative narrow climatic and soil ranges. ...Application of selected

> USDA Forest Service standards indicate that blanket threshold variables applied over disparate soils do not adequately account for nutrient distribution within the profile or forest floor depth. These types of guidelines should be continually refined to reflect pre disturbance conditions and site-specific information. (Abstract.)

The FS's methodology might approach adequacy if the FS were to have actually validated it by performing objective, scientifically adequate measures of compaction such as measures of bulk density. Adams and Froehlich (1981) state: "While general field observationscan be useful in recognizing severe compaction problems, measurement of actual changes in soil density permits the detection of less obvious levels of compaction."

For a study done on the Kootenai NF and the Flathead NF in Montana, soil scientists measured soil bulk densities, macropore porosities, and infiltration rates using paired observations of disturbed vs. undisturbed soils. They discovered that although "the most significant increase in compaction occurred at a depth of 4 inches... some sites showed that maximum compaction occurred at a depth of 8 inches... (and) "Furthermore, ... subsurface compaction occurred in glacial deposits to a depth of at least 16 inches." (Kuennen, Edson, and Tolle, 1979.) There is simply no way that the FS has enough soil bulk density and other compaction monitoring data collected at the adequate soil depths and in enough sites to be able to assure that the use of heavy machinery, as prescribed by the NLF Project, will not significantly or permanently impair the productivityof the soil.

Following a study by Cullen et al. (1991) which was carried out on the Kootenai NF and the Flathead NF, the authors concluded: "This result lends support to the general observation that most compaction occurs during the first and second passage of equipment." And Page-Dumroese (1993), in a Forest Service research report investigating logging impacts on volcanic ash-influenced soils, states, "Moderate compaction was achieved by driving a Grappler log carrier over the plots twice." She also cited other studies that indicated: "Large increases in bulk density have been reported to a depth of about 5 cm with the first vehicle pass over the soil." Williamson and Neilsen (2000) assessed change in soil bulk density with number of passes and found 62% of the compaction to the surface 10cm to come with the first pass of a logging machine. In fine textured soils Brais and Camire (1997) demonstrated that the first pass creates 80 percent of the total disturbance to the site.

Adams and Froehlich (1981) state, "Unfortunately, little research has yet been done to compare the compaction and related impacts caused by low-pressure and by conventional logging vehicles."

The FS often claims that helicopter yarding will cause no damage to the soil. But since several logs are lifted at once, before they clear the ground they drag. And when they drag, they cause soil compaction and displacement, and disturb and damage other vegetation.

Alexander and Poff (1985) reviewed literature and found that as much as 10% to 40% of a logged area can be disturbed by skyline logging. They state:

> There are many more data on ground disturbance in logging, but these are enough to indicate the wide diversity of results obtained with different equipment operators, and logging techniques in timber stands of different composition in different types of terrain with different soils. Added to all these variables are different methods of investigating and reporting disturbance.

Another problem with the FS's soil monitoring is that it failsto measure soil productivity in terms of loss of soil nutrients due to logging activities, including removal of boles, branches, and from site preparation methods such as burning. DeLuca (2001) states:

> Organic matter is clearly lost from forest floor and often from the mineral soil following wildfire or prescribed fire. Organic matter is also lost from sites when net mineralization is stimulated by higher temperatures caused by opening of the canopy and removal of understory. (Internal citations omitted.)

From Grier and others (1989):

> The potential productivity of a site can be raised or lowered by management activities causing a permanent or long-term increase or decrease in the availability of nutrients essential for plant growth. (P. 27.)
>
> ...Any time organic matter is removed from a site, a net loss of nutrients from that site also occurs. In timber harvesting or thinning, nutrient losses tend to be proportional to the volume removed. (P. 27.)
>
> ...Slash burning is a common site preparation method that can affect soil chemical properties tremendously. A great deal of controversy is often associated with using fire because of the wide variety of effects, some of which are definitely detrimental to site quality and some of which are beneficial. (P. 30.)

Logging projects that remove all or most of the tree canopy often create warm soil conditions that quickly decompose the litter layer and associated slow-release nutrients. In addition, severe cuts leave nothing for future soil organic matter contributions. Creating a silvicultural prescription that conserves or enhances appropriate organic matter reserves after timber harvest is essential for maintaining forest health and soil productivity (Jurgensen, et al., 1997). "Regeneration harvesting" would certainly decrease protective shade cover, thereby, increasing the temperature of the soils, thus lowing the soil's ability to absorb nutrients.

Regarding maintaining productivity of forest soils during logging, Graham, et al., 1994 (cited in FSM 2500-99-1) state that sufficient amounts of coarse woody debris must be retained. FSM 2500-99-1 states:

> The loss of surface organic matter can cause nutrient and carbon cycle deficits and negatively affect physical and biological soil conditions. Objectives for fine organic matter layer thickness and distribution should be determined locally based on similar soils or ecological types. The direct benefits of coarse woody material to soils can vary widely, depending on ecological type. Research guidelines such as those contained in Graham et al.,1994 should be used if more specific local guidelines are not available. Since the management of coarse woody material is important to wildlife, fire, and other resources, integration based on local objectives needs to occur.

Many forest managers prefer to carry out prescribed burning in the spring, whereas wildlife have adapted to late summer and fall fires. Springtime burning is not mimicking natural processes, and wildlife have not evolved to withstand this impact. Agency biologists inthe North Umpqua Ranger District have said that: "Many species are nesting and/or breeding during this time of year [spring] and plants are actively adding new tissue. The heat and smoke from prescribed fires may interrupt these functions." And, "Neotropical migratory birds are beginning to arrive and establish territories and breed. Small animals and young are more susceptible to mortality from ground fires because they are less mobile and in the case of some birds, unable to fly. During spring, amphibians are widely dispersed and near the ground surface... During the hotter summer months and by late fall, most amphibians are concentrated near wet, riparian habitats or deeper in the ground substrates." NEPA documents must fully disclose the ecological problems inherent with spring burning proposals.

NFMA and the Forest and Rangeland Renewable Resources Planning Act (RPA) require management of national forest system lands in a manner that "maximizes long term net public benefits" [36 CFR 219.1(a)]. The FS's planning regulations have defined the term "net public benefits" as the "overall value of positive effects (benefits) less all associated inputs and negative effects (costs)." NFMA requires a sophisticated consideration of benefits and costs, includinguse of both market and non-market methods of determining existing and future resource values, methods to determine opportunity costs, and use of best available quantitative and qualitative techniques [(36 CFR 219.12(e); 219.12(f)2; 219.1(b)12]. Costs and benefits must be assessed not only from the perspective of the FS, but from the perspective of "all other private and public" interests (36 CFR 219.12(g)3i).

The FS must meet the substantive requirements regarding economic analyses set forth in NFMA. This means incorporating a wide range of external economic costs that will be passed on to public agencies, private landowners, business owners, and others adversely affected by the timber sale in combination with other timber sales ongoing and planned across the Forest, the Region, and the national forest system, as a whole. These include:

- decreased private property values in the proposed project area attributable to lost scenic, aesthetic, and recreational values on the lands affected by the proposed timber sale and other timber sales in this area;
- lost business and revenue incurred by those engaged in the manufacturing, distribution, and sale of alternative fiber products in the region who face competition from subsidized public timber sales;
- lost business and revenue incurred by those engaged in ecologically sensitive timber harvest on private lands who face unfair competition from subsidized public timber sales implemented under less costly, less ecologically sensitive practices such as those usually proposed by the Forest;
- costs incurred by county and state governments related to repair and maintenance of roads damaged by log trucks;
- costs incurred by county and state governments as well as private individuals related to loss of life or personal injury from collisions with or accidents caused by logging trucks transporting logs from national forest system lands;
- lost revenue and jobs incurred by those engaged in businesses related to recreation, fisheries, tourism, and other non-timber forest uses that will be precluded by proposed timber sales. Even if the site-specific effects of the proposed timber sale on these uses are small, the cumulative effects of one sale in combination with all others in the affected watersheds may significantly alter theaesthetic attraction of these entire watersheds to the point where business related to non-timber uses are no longer viable;
- increased filtration costs incurred by private water users downstream attributable to the increased sediment load created by the proposed timber sale and all others in the affected watersheds.
-
- The FS must show the timber sale would meet the test of "cost practicability" required by NFMA regulations at 36 CFR 219.27(b)7. The FS must complete the necessary qualitative and quantitative assessments to incorporate the costs identified above as well as all other external economic costs. If costs cannot reasonably be assessed on an individual timber sale basis, then the FS must first complete the analysis on a national, regional, or watershed scale and then assign a proportion of these costs to individual sales using established quantitative methods.
-
- In addition, in order to comply with NFMA economic analysis requirements NEPA documents must adequately discuss or assign value to a wide range of ecosystem services performed by intact forests in proposed project areas. To meet the letter and intent of NFMA, the FS must analyze the market and non-market benefits of unlogged forests in analysis areas, including:
- their role in regulating the flow of water in the affected watersheds, specifically, their role in mitigating flash floods and other catastrophic precipitation events;

- their role in purifying water for downstream users;
- their role in maintaining long term forest productivity.
- Unmanaged forests in proposed project areas provide a source of native organisms and ecological processes vital to regeneration and forest development in surrounding areas. In addition, the older and larger trees are a genetic reservoir of immense value to reforestation efforts on similar sites throughout the region;
- the economic value of non-timber uses of the proposed sale area including gathering of forest products, recreation, hunting, fishing, and wildlife observation, and;
- their role in mitigating pests. The structurally diverse habitats in the proposed sale area support bird and bat species that prey upon insects and rodents harmful to forest and cropland health.

The FS must utilize state of the art methods for calculating the market value of these and other ecosystem services provided by forests in proposed project areas. For example, an international team of scientists recently completed an economic assessment of the ecosystem services provided by 12 distinct ecosystems, estimating the annual market value of these ecosystems to be 33 trillion dollars [Nature's Services: Societal Dependence on Natural Ecosystems (Island Press, Washington, D.C.)]. Many other natural resource economists have devised quantitative and qualitative methods for assessing the value of ecosystem services.

The FS must make use of these methods and incorporate ecosystem service value as a standard component of the agency's environmental assessment process. Failure to do so will artificially inflate the value of forests as timber relative to their role in regulating climate, purifying water, and supporting aesthetic or recreational uses. Unless project NEPA analyses incorporate ecosystem service values, they cannot meet NFMA's mandate to properly assess the value of all forest resources and functions that have a market value [36 CFR 219.12(e)(1)ii, iii].

Each of the effects noted above requires analysis by the Forest Service because they fall squarely within the definition of direct, indirect, and cumulative effects as well as connected actions described by NEPA (40 CFR 1508.7, 1508.8,1508.25) and are significant on a regional scale.

The abstract of General Accounting Office (GAO) report # GAO-01-1101R dated September 21, 2001 states:

> GAO reviewed the Forest Services total costs associated with its timber sales program for fiscal years 1998 and 1999. Serious accounting and financial reporting deficiencies at the Forest Service during fiscal years 1998 and 1999 precluded GAO from making an accurate determination of the total federal costs for the timber sales program. These deficiencies made the Forest Service's cost information totally unreliable.

The last TSPIRS report produced by the Forest Service was for fiscal year 1998. Since the TSPIRS report can no longer be used to satisfy the economic monitoring requirements, there is no fiscal monitoring occurring. Lacking up-to-date monitoring, please explain how economics data for the NEPA document is complete and accurate.

Numerous government studies confirm the Forest Service's financial losses and lack of accountability. According to the most recent GAO report on the timber sale program, released in 1998, the USFS lost over $1 billion selling National Forest timber between 1995 and 1997.

In a report released in January 2001, the GAO found the USFS has not provided Congress and the public with a clear understanding of what is accomplished with appropriated funds. According to the report, "the

Forest Service and Congress do not have accurate financial data to track the cost of programs and activities and to help make informed decisions about future funding."

The GAO states:

> For fiscal years 1995, 1996, 1997, and previous years, the Office of the Inspector General reported that because of significant internal control weaknesses invarious accounting subsystems, the Forest Service's accounting data were not reliable. Despite these weaknesses, we used the data because they were the only data available and are the data that the agency uses to manage its programs.

In January 1999, the GAO named the financial management system of the USFS to its "High Risk List" of government programs susceptible to waste, fraud and abuse. The GAO reported the problems were worsened by a new accounting system that had not been able to produce necessaryreports on assets, liabilities and revenues. In January 2001, the GAO reported, "the Forest Service does not appear to be fully committed to making performance accountability one of its top priorities, and major hurdles to achieving performance accountability remain."

Since fiscal year 1996, the Department of Agriculture Inspector General has been unable to form an opinion on the financial health of the USFS, due to a lack of supporting documents to verify accounts for land, buildings and equipment, as well as errors in financial statements.

On March 26, 1998, Barry Hill, Associate Director of Energy, Resources and Science Issues at the GAO, testified before the House Committees on Resources, Budget, and Appropriations and the Subcommittee on Interior and Related Agencies. Mr. Hill concluded:

> Forgone revenue, inefficiency, and waste throughout the Forest Service's operations and organization have cost taxpayers hundreds of millions of dollars. The agency's financial statements are unreliable, and expenditures of significant amounts cannot be accounted for. Inefficiency within the Forest Service's business processes is accompanied by numerous shortcomings in the agency's accounting and financial and information systems that preclude the Forest Service from presenting accurate and complete financial information. For example, in reporting its fiscal year 1995 financial results, the Forest Service could not identify how it spent $215 million of its $3.4 billion in operating and program funds.

In sworn testimony in 1992, former Forest Service Chief of Law Enforcement John McCormick warned Congress, "The agency has become comfortable with lying to the public, ignoring long-festering problems and serving the timber industry as government agents of environmental destruction." We don't see that much has changed within the agency since McCormick made that statement.

Fifteen years into Forest Plan implementation, the FS has failed to complete adequate and meaningful monitoring for many of the items required by the Forest Plan. As a result, the impacts of logging, mining, road building, grazing, and other management practices are poorly understood.

For every project proposal, it is important that the results of past monitoring be incorporated into planning. All Interdisciplinary Team Members should be familiar with the results of all past monitoring pertinent to the project area, and any deficiencies of monitoring that have been previously committed to. For that reason, we expect that the following be included in theNEPA documents or project files:

- A list of all past projects (completed or ongoing) implemented in the proposed project area watersheds.
- The results of all monitoring done in the project area as committed to in the NEPA documents of those past projects.

The results of all monitoring done in the proposed project area as a part of the Forest Plan monitoring and evaluation effort.

A description of any monitoring, specified in those past project NEPA documents or the Forest Plan for proposed project area, which has yet to be gathered and/or reported.

The 1998 Forest Plan Monitoring and Evaluation Report states, "Necessary monitoring continues to be limited by available funding. The recommendations that follow will likely not occur without increased funding levels."

At the Washington Office level, the Forest Service has declared that funding was not to be an excuse to fail to meet forest plan implementation monitoring commitments. National Forest System Associate Deputy Chief David Unger gave a speech entitled Expectations for Monitoring of Forest Plan Implementation, wherein he had this to say:

> There will be no additional "special" dollars to do monitoring. The funds that you already receive must be used. Recall that monitoring is an integral part ofthe total management process. That means that a year's activities under the Forest Plan are not completed until the monitoring of the effects of those activities, as specified in the Forest Plan, is completed.

Similar sentiments are echoed elsewhere in the report—that sufficient monitoring could not be carried out because of budget limitations. It appears that the officials responsible for seeing that sufficient monitoring take place have decided that more resource extraction should hold priority over understanding the impacts of past resource extraction, despite the concerns of resource specialists. The IPNF's past and ongoing failure to adequately monitor the impacts of implementing its Forest Plan means that sitespecific project decisions would be implemented without the Responsible Official being able to accurately understand the impacts. This letter now discusses some of the IPNF's deficiencies in monitoring specific items.

MONITORING ITEM D-1

Forest Plan monitoring item D-1 is to measure the effects of Off-Road Vehicles (ORVs) on resources, uses, and public safety (Forest Plan at IV-11). The data source specified is very ambiguous. There is no description of how the data source will be used to measure conflicts or effects. ORV impacts are to be reported on an annual basis however reporting has not been consistent. No monitoring results were included in 1997 and 1994 reports. The 1995 noted illegal use on the St. Joe Lake Trail #49 and #48. Again in the 1993 report this same illegal use was reported as well as illegal use in 8 other areas causing erosion trail degradation and user conflicts. Plans to inform users of travel restriction to offroad vehicles were suggested as action to mitigate this damage. No action to deal with illegal trail usage or to inform users of trail restrictions has been reported on. Severe damage by ORVs was reported on the Chilco Mountain trail and rehabilitation was slated to begin following the 1993 monitoring report. There is no indication that restoration was ever done. The IPNF is not adequately monitoring effects of off-road vehicles.

Since the Forest Plan was written, there have been significant increases in the numbers of ORVs and snowmobiles in the forest. Also, the technology has evolved such that machinescan move easier, faster, and over areas not previously accessible. The cumulative impacts of those factors has never been analyzed at either the Plan or project level.

Without consistent and meaningful monitoring of this item, it is impossible for the IS to be able to understand the cumulative effects of ORV impacts to resources such as wildlife populations, soil productivity, and water quality.

The Coeur d'Alene Ranger District's 1998 Access Management Environmental Assessment (AMEA) states that "Traditional recreation activities such as hiking, horse packing, hunting and other remotearea activities are being displaced by an increasingly mobile and motorized recreator." This sounds something like reporting for Forest Plan monitoring item D-1, but does not distinguish between ORV and other motorized travel. The relationship between the AMEA and item D-1 is unclear at best. The significance of the described conflict on recreationalists and the amount attributable to ORVs is unclear. Moreover, the AMEA's preferred Alternative would add an additional 143 miles of motorized trail. Future "reasonably foreseeable actions" include new trail construction for motorcycles and additional ATV trail systems.

The implications of increasing ORV use on the Forest include increasing the spread of noxious weeds along roads and trails. This is but another cumulative impact never analyzed at the Forest Plan nor site specific project level.

The AMEA explicitly states that its Preferred Alternative is likely to bring wide-ranging furbearers "closer to listing under the Endangered Species Act," and that animals "unable to move great distances would either become acclimatized to the disturbance or their population numbers would be reduced."

In essence, the astounding cumulative effects of ORVs—already poorly understood because of yearly increase in ORV use and because monitoring for Forest Plan item D-1 has not been adequate—will be exacerbated by any project which increases access or disturbance to wildlife, water quality, and nonmotorized recreation experiences.

MONITORING ITEM F-2: (Grizzly bear recovery)
the data source is very ambiguous. It is not clear how information is to be gained from Idaho Fish and Game. Also there is not enough stated specificity in the data sources. Until the 1998 report, the monitoring reports did not estimate population trends, therefore how recovery is proceeding is unclear. Forest Service recovery efforts seem to be failing since the U.S. Fish & Wildlife Service has determined uplisting from "Threatened" to "Endangered" is warranted. Also USDA Forest Service (2000a) admits that "populations are at or below half of the carrying capacity of the habitat...". Reports discuss acres of secure habitat for the grizzly but do not indicate what this has to do with recovery. Further, a number of reports state "the primary threat to recovery of grizzly bear populations is direct mortality from hunting" however no actions have been discussed (such as more road obliteration, etc.) as to how to remedy this situation (1996 report pg. 32).

MONITORING ITEM F-3 (Woodland caribou recovery)
This item is to be monitored and reported annually and the "threshold to initiate further action" is "not working towards recovery." The data source is very unclear. Monitoring reports do not include population levels, therefore how recovery is to be monitored is vague. Multiple reports state that caribou habitat is averaging less then 50 percent of the targeted conditions. Further, the 1996 report discusses the increase in mortality of caribou as a result of management activities adjacent to caribou habitat (pg. 33). In a number of reports it is discussed that data on the current populations are inconclusive to determining if recovery is occurring. The IPNF is failing to take actions to minimize the impacts of management activities on caribou habitat and continues to degrade the habitat without seeing how Forest Plan implementation is affecting recovery.

The failure to positively demonstrate recovery revealsthat the IPNF, has been unable to comply with NFMA's viability requirements and is failing to meet its Forest Plan recovery goals.

MONITORING ITEM G-1 (Water/fish): Greater than 80% of potential emergence success

The IPNF declared that this was not a meaningful monitoring measure, and dropped this item without undergoing proper NEPA and NFMA forest plan amendment process.

MONITORING ITEM G-2 (Water/fish): Validate R-1/R-4 model

The IPNF now uses an updated version of the R-1/R-4 model—WATSED, which is itself an update of the WATBAL model. The only recalibration of WATSED was the addition of landtypes to the model. Barry Rosenberg had a brief conversation with Jerry Niehoff on July 13, 1999 in the Supervisor's Office in the presence of Steve Johnson, Rick Patton and Mike Mihelich. Rosenberg asked Patton when the last time the model was recalibrated, he said he wasn't sure and referred the question to Niehoff. Niehoff said the last time the model was changed was when landtypes were added to it several years ago.

There is no reference in IPNF monitoring reports that the data accumulated has actually been used to validate and/or recalibrate WATSED. Until the model's confidence levels are established through monitoring data the portion of any project analysis which relies on WATSED is questionable.

MONITORING ITEM G-3 (Water/fish): Validate fish habitat trends identified in the Forest Plan

The 1994 report states that habitat attributes are sub-standard in many watersheds; several fish populations continue on a downward trend (pg. 11), yet it appears no actions have been taken outside those forced by the public on behalf of bull trout. The 1998 Report reveals that habitat monitoring has been poorly designed and carried out, is unreliable, and is unable to show habitat trends in response to road building, logging, ORV use, and other actions that impact water quality.

MONITORING ITEM G-4: Fish population trends - cutthroat trout and bull trout

Information to be gained and how it is to be gathered is vague. The 1996 report states westslope cutthroat trout have a stable population but populations in the Upper Priest Lake system will likely result in a long term decline of bull trout and westslope cutthroat populations due to competition (pg. 42). No actions are discussed to deal with this problem. Also no population numbers are stated. There was no reporting in 1994 despite the 2 year reporting requirement. The 1993 report suggests physical fish habitat and loss of residual pool depth and volume have resulted in a downward trend in fish populations (pg. 45). No actions are discussed to remedy this problem. The IPNF is not collecting the data, as required. The 1998 Report only has population trends reported once—for the portion of the Little North Fork Coeur d'Alene River from Laverne Creek to Deception Creek. These results, following over a dozen years of Forest Plan implementation, are not sufficient monitoring.

MONITORING ITEM K-1: Prescriptions and Effects on Land Productivity

USDA, 2000a provides monitoring data on impacts to soils. The problem is, the number of cutting units adequately monitored is too few to be able to make accurate prediction of the next proposed site-specific project. Too many variables (slope, aspect, soil type, yarding method, etc.) exist for the monitoring done to date to account for. Furthermore, USDA, 2000a reveals that monitoring of impacts of livestock grazing fails to apply the definitions of "detrimentally disturbed soils" and "activity area", meaning that cumulative effects with other past and proposed activities cannot be reliably estimated.

We request that complete cultural resources surveys be completed which satisfy the terms of the National Historic Preservation Act and its implementing regulations. These surveys must be done for all areas that are proposed for ground disturbing activities, including road construction, helicopter landing pad construction, ground-based log skidding units, and all other areas where the surface will be disturbed. Please include in your NEPA documentation, the survey methodology used, a copy of any Memoranda of Agreement with the State Historic Preservation Office, and the qualifications of the people doing the survey work.

The USFWS is, or soon will be designating critical habitat for bull trout and Canada lynx. Since habitat in the project area is likely, or ought to be, designated critical habitat, the FS must undergo formal consultation with the USFWS as part of this project proposal.

Many of the documents cited in this letter were provided to the IPNF as attachments to appeals of the Douglas-fir Beetle Project or Iron Honey project. Please obtain copies of the documents in the list of references from these FS sources. If there are any in the list of references at the endof this letter that you cannot get from FS sources, please let us know so that we can be sure they will be placed in the project files during the comment period.

We expect that project interdisciplinary team will be aware of these issues as they developthe Twomile project proposal, and inquire if they are uncertain about how these comments relate to project planning. Thank you for your consideration of these important issues. Please keep our organization on the list to receive all future mailings regarding this project proposal.

Very truly yours,

Karen Lindholdt

Karen Lindholdt
Forest Watch Coordinator/Staff Attorney
The Lands Council

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February 24, 2003

*Via email—notification of receipt requested*

Joseph Stringer, District Ranger
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Mr. Stringer;

These are comments on the Twomile Project proposal (your January 28, 2003 letter) on behalf of the Ecology Center and the Alliance for the Wild Rockies.

We note that the Forest Service (FS) recognizes the area as having a high priority for watershed and aquatic restoration. Our goals for the area include fully functioning stream ecosystems that include healthy, resilient populations of native trout. We agree that the highest priority management actions in the project area are those that remove impediments to natural recovery. We request the FS design a restoration/access management plan for these watersheds that will achieve recovery goals. The task of management should be the reversal of artificial legacies to allow restoration of natural, self-sustaining ecosystem processes. If natural disturbance patterns are the best way to maintain or restore desired ecosystem values, then nature should be able to accomplish this task very well without human intervention (Frissell and Bayles, 1996).

We request the FS strongly consider obliterating the watershed-damaging roads in the project area. The FS's Roads Analysis Process (RAP) must be utilized as the basis for informing everyone about the status of travelways in the area, and be used for the restoration/access management assessment. This will help us understand why the FS might want to keep a road or travelway on the landscape, and allow us to further comment. The RAP can be utilized as the basis for an Environmental Assessment that proposes such restoration alone.

This restoration/access management proposal must take a hard look at the valley bottom streamside roads, disclose the impacts of their continuing existence inside Riparian Habitat Conservation Areas, and consider the option of their obliteration.

Your January 2003 letter alleges a need to reduce the possibility of wildfire burning from national forest land threatening homes as a part of the project's purpose and need. In fact, the letter raises the specter of "frantic families leaving their homes… as fire devastated the forests of Montana and other parts of the western United States." We believe it is wrong to characterize wildland fire as "devastating" to public land forests since fire is a necessary part of the natural process, both in Montana and

Idaho. Certainly there were property losses involved with the 2000 fires, however in many cases the losses could have been avoided by taking the steps your letter discusses toward the end, where it mentions "opportunities for private landowners to reduce hazardous fuels on their land." To the extent that you first mention "frantic families…" followed by pages of discussion of the Twomile proposal reveals what looks like an attempt to evoke fear into the public and offer logging on national forest land as the solution. Your January 28, 2003 letter also misses the opportunity to educate the public about the unavoidable nature of some level of risk of living in a fire-born ecosystem—that to some degree people must accept the likelihood that fire will eventually affect practically every acre of land.

Your January 28, 2003 letter's mention of "opportunities for private landowners to reduce hazardous fuels on their land" at the very end seems to lessen the importance of actions that can be taken <u>on private land</u> to reduce risk of fire damage to structures on this private land. In fact, those are the most important actions; if the conditions on private land in the immediate vicinity of structures are not addressed appropriately, nothing done outside this zone on national forest land will much matter. In effect, your January 28, 2003 letter puts the cart before the horse and thus is a source of public misinformation.

By far the most significant factor determining whether homes and other buildings might burn are the structures' <u>ignitability</u>, not the fuel situation on adjacent national forest land (USDA Forest Service 1999a). There is no reason to focus on fuel levels at distances far removed from the structures to be protected, when money would much better be spent on educating landowners and taking simple steps to reduce fuels adjacent to structures on public land.

The January 28 letter, as well as its enclosed map, reveals that vegetation conditions on private land <u>must</u> be disclosed and fully analyzed if the subject is truly fire risk.

The FS is very familiar with the concept of "defensible space" as it relates to protecting structures in forest and other wildland ecosystems, the education programs (many created by the FS) have proliferated in recent years. Implemented properly, those programs will adequately deal with the risk of fire damaging or destroying these structures—this seems to have been put into your January 28 letter practically as an afterthought instead of it being disclosed as the primary means of dealing with fire risk to private land and structures. As far as treating the vegetation in areas away from the immediate vicinity of such structures, it appears the FS is proposing a prescription with unknown, but likely high, costs and risks both ecologically and economically.

Before approving a further set of activities that are known causes of ecosystem damage—activities such as logging, road construction, and motorized access—the FS must complete the revision of the Forest Plan in order to elucidate a truly sustainable ecological vision of forest management. The FS proposes to continue to implement a Forest Plan that has expired, both legally and ecologically. Project-level decisions based upon an out-of-date Forest Plan and in an absence of adequate monitoring are inadequately informed, are likely illegal, and will result in more of the same kind of damage that has occurred continuously under the first Forest Plan.

If the FS were to bring the problems of the Forest Plan to the light of public scrutiny, it would, among other things, revisit its old growth, management indicator species, monitoring, soil productivity, fire suppression, watershed restoration, and Sensitive species policies.

We present the FS with the rest of these comments knowing the agency will almost certainly ignore what's written above, and will plunge into another expensive, controversial timber sale NEPA process, heedless of what it should have learned long ago.

We request the FS adopt the Restoration Principles (DellaSala, et al., *in press*) as a screen for proposed actions such as those proposed for the Twomile project area. We incorporate them by reference, into this scoping response letter.

We suggest the FS reduce the excessive road network on national forest land. More often than not, wildland fires are started by human activities, and the FS's own information on fire starts shows this is usually immediately adjacent to travelways. Excessive access opportunities in the project area only increases the number of locations where accidental (or arson) fire starts could occur.

There is a gaping lack of empirical studies of the effectiveness of thinning for fuels reduction as applied in the field. "The most debated response to alleviating future fires—mechanically thinning trees—has had limited study." (Christensen, et al., 2002.) Researchers for the federal government's Joint Fire Science Program pointed out last year that "The lack of empirical assessment of fuel treatment performance has become conspicuous." (Omi & Martinson, 2002.) The authors, after canvassing the existing scientific literature, concluded that, other than theirs, only one study "included both statistical analysis and comparison of stand conditions in treated and untreated areas such that differential fire effects could be directly related to the intensity of fuels manipulation." (Id.)

Numerous other reviews and reports, many of them generated by the federal government, confirm the scientific uncertainty surrounding how thinning actually affects subsequent fire intensity. For example, a Department of Interior publication states, "Scant information exists, however, on the efficacy of fuel treatments for mitigating wildfire severity." (USDI, 2002.) An Environmental Assessment published by Grand Canyon National Park reports that "methodologies appropriate for returning 'natural' forest function and process are the subject of considerable debate." (National Park Service, 2002.) A FS publication notes, "although restoration techniques have been tested at the stand level, we do not really have landscape-level knowledge yet." (Rapp, 2002.) Another states: "Some uncertainty … surrounds management treatments. …At landscape scales, the effectiveness of treatments in improving watershed conditions has not been well documented." (USDA Forest Service, 2002.) And the FS's most recent intensive retrospective examination of the relationship between fuel reduction activities and subsequent fire intensity found no systematic benefit: "(E)ach of the different types of fuel modification encountered by the Hayman Fire had instances of success as well as failure in terms of altering fire spread or severity." (Finney, et al. 2002.)

Reliable information with which to justify thinning for fuels reduction, including site-specific information on historical conditions and changes is central to any management proposal purpose and need. The general frequency of past fires and the "natural" density of trees in various types of landscapes remain controversial. (Sierra Nevada Ecosystem Project, 1996, pp. 62-63.) The perception that lethal fire has greatly increased in frequency does not necessarily hold true for vast areas of the Western US. A FS assessment of changes in the Interior Columbia River Basin from pre-settlement to modern times, concludes, "Lethal fire regimes, that kill the upper layer of vegetation, increased 17 percent in the Basin." (Quigley et al, 1997, p. 856.) As a general matter, it is problematic to extrapolate just how dense or sparse forests actually were in pre-settlement times. (Stephenson, N.L. 1999; Landres, et al., 1999.) And current FS-DOI estimations of "Condition Class" to show where conditions have changed most significantly from pre-settlement fire regimes, are completely inadequate for site-specific location of remedial efforts. The agencies themselves note that: "While the coarse-scale assessment of Fire Condition Classes provides a useful first-approximation of national level risk, its analysis scale and resolution of data are not sufficient to estimate local and regional-levels of risk." (USDI & USDA 2002; Schmidt et al. 2002.) This government agency conclusion stands in stark contrast to what seems to be the policy of the Idaho Panhandle National Forests, which is to take high fuel conditions and high fire risk conditions on virtually all areas of the Forest for granted, without looking closely at site-specific conditions.

The FS should admit that fuels reduction projects can increase, rather than decrease, subsequent fire effects. Christensen, et al., 2002 summarize the situation: "Although a few empirically based studies have shown a systematic reduction in fire intensity subsequent to some actual thinning, others have documented increases in fire intensity and severity." A FS science publication reports: "Depending on the type, intensity, and extent of thinning, or other treatment applied, fire behavior can be improved (less severe and intense) or exacerbated." (Graham, et. al, 1999a, p. 15.) A report of the Secretaries of Agriculture and Interior to the President warned: "(T)he National Research Council found that logging and clearcutting can cause rapid regeneration of shrubs and trees that can create highly flammable fuel conditions within a few years of cutting. Without adequate treatment of small woody material, logging may exacerbate fire risk rather than lower it." (Babbitt and Glickman 2000, p. 12.) Another explanation for increase in fire intensity post-thinning is the increased drying effect of sun and wind in stands that have been opened up. (Christensen et al., 2002; Rapp 2002, p. 8.) And a series of studies from the scientific literature shows post-thinning increases in fire intensity and/or spread.[1]

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[1] Many of these studies were reviewed by the Forest Service in connection with the Final Environmental Impact Statement for the Roadless Areas Conservation Rule (FEIS). The fire specialist review of scientific literature for the FEIS summarizes their findings. See FEIS, Fuel Management and Fire Suppression Specialist's Report [available online at: http://www.roadless.fs.fed.us/documents/feis/specrep/xfire_spec_rpt.pdf] at 22 ("The Congressional Research Service … noted: 'timber harvesting does remove fuel, but it is unclear whether this fuel removal is significant;'" "Covington (1996) … notes that, 'scientific data to support such management actions [either a hand's off approach or the use of timber harvesting] are inadequate'" (brackets in the source)); id. at 22-23 ("Kolb and others (1994) … conclude that … management activities to improve forest health [such as fuel management] are difficult to apply in the field" (brackets in the source)); id. at 21 ("Fahnstock's (1968) study of

Recently, Huff, et al., 1995 stated:

> (I)ntensive forest management annually produces high fuel loadings associated with logging residues. As a by-product of clearcutting, thinning, and other tree-removal activities, activity fuels create both short- and long-term fire hazards to ecosystems. The potential rate of spread and intensity of fires associated with recently cut logging residues is high (see for example, Anderson 1982, Maxwell and Ward 1976), especially the first year or two as the material decays. High fire-behavior hazards associated with the residues can extend, however, for many years depending on the tree species (Olson and Fahnestock 1955). Even though these hazards diminish, their influence on fire behavior can linger for up to 30 years in the dry forest ecosystems of eastern Washington and Oregon. Disposal of logging residue using prescribed fires, the most common approach, also has an associated high risk of an escaped wildfire (Deeming 1990). The link between slash fires and escaped wildfires has a history of large conflagrations for Washington and Oregon (Agee 1989, Deeming 1990).
>
> Regeneration and seral development patterns can have a profound effect on potential fire behavior within landscapes by enhancing or diminishing its spread (Agee and Huff 1987, Saveland 1987). Spatially continuous fuels associated with thick regeneration in plantations can create high surface-fire potential during early successional stages. This was evident in most of the roughly 275 hectares of 1- to 25-year-old plantations burned in the 3500-hectare 1991 Warner Creek Fire in the Willamette National Forest (USDA 1993). The fire moved swiftly through the openings created by past harvests, killing nearly all the regeneration but usually missing adjacent stands >80 years old.
>
> Logged areas generally showed a strong association with increased rate of spread and flame length, thereby suggesting that tree harvesting could affect the potential fire behavior within landscapes.

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precommercial thinning found that timber stands thinned to a 12 feet by 12 feet spacing commonly produced fuels that 'rate high in rate of spread and resistance to control for at least 5 years after cutting, so that it would burn with relatively high intensity;'" "When precommercial thinning was used in lodgepole pine stands, Alexander and Yancik (1977) reported that a fire's rate of spread increased 3.5 times and that the fire's intensity increased 3 times"); id. at 23 ("Countryman (1955) found that 'opening up' a forest through logging changed the 'fire climate so that fires start more easily, spread faster, and burn hotter"). See also Huff, M.H., R.D. Ottmar, E. Alvarado, R.E. Vihnanek, J.F. Lehmkuhl, P.F. Hessburg, and R.L. Everett. 1995. "Historical and current landscapes in eastern Oregon and Washington. Part II: linking vegetation characteristics to potential fire behavior and related smoke production." U.S. Forest Service Pacific Northwest Forest and Range Experiment Station, GTR PNW-355. See also "Initial review of silvicultural treatments and fire effects on Tyee fire." Appendix A, Environmental Assessment for the Bear-Potato Analysis Area of the Tyee Fire, Chelan and Entiat Ranger Districts, Wenatchee National Forest, Wenatchee, WA.

> In general, rate of spread and flame length were positively correlated with the proportion of area logged in the sample watersheds.
>
> Increased rate of spread means that the perimeter of the fire will grow much faster. Generally, a faster perimeter growth makes a wildfire harder to contain.

Other scientists have doubts about the efficacy of intensive fuels reductions as fire-proofing methods. DellaSala, et al. (1995) state:

> Scientific evidence does not support the hypothesis that intensive salvage, thinning, and other logging activities reduce the risk of catastrophic fires if applied at landscape scales ... At very local scales, the removal of fuels through salvage and thinning may hinder some fires. However, applying such measures at landscape scales removes natural fire breaks such as moist pockets of late-seral and riparian forests that dampen the spread and intensity of fire and has little effect on controlling fire spread, particularly during regional droughts. ... Bessie and Johnson (1995) found that surface fire intensity and crown fire initiation were strongly related to weather conditions and only weakly related to fuel loads in subalpine forest in the southern Canadian Rockies. . . . Observations of large forest fires during regional droughts such as the Yellowstone fires in 1988 (Turner, et al. 1994) and the inland northwest fires of 1994 . . . raise serious doubts about the effectiveness of intensive fuel reductions as "fire-proofing" measures.

A federal government scientific assessment states:

> More than any other human activity, logging has increased the risk and severity of fires by removing the cooling shade of trees and leaving flammable debris." And, "Timber harvest, through its effects on forest structure, local microclimate, and fuel accumulation, has increased fire severity more than any other recent human activity. ... Although silvicultural treatments can mimic the effects of fire on structural patterns of woody vegetation, virtually no data exist on the ability to mimic ecological functions of natural fire."

(Sierra Nevada Ecosystem Project 1996, p. 62)

Agee et al., 1999 state:

> The effectiveness of fuelbreaks remains a subject of debate within and outside the fire management community. There are many reasons for this broad range of opinion, among them that objectives can vary widely, fuelbreak prescriptions (width, amount of fuel reduction, maintenance standards) may also vary, they can be placed in many different fuel conditions, and may be approached by wildland fires under a variety of normal to extreme weather conditions. Furthermore, fuelbreaks are never designed to stop fires but to allow suppression forces a higher probability of successfully attacking a wildland fire. The amount of technology directed at the fire, and the requirement for firefighter safety, both affect the efficacy of fuelbreaks in the suppression effort

> Sustained alteration of fire behavior requires effective and frequent maintenance, so that the effectiveness of any fuel treatment, including fuelbreaks, will be not only a function of the initial prescription for creation, but also standards for maintenance that are applied. The efficacy of many past fuelbreaks has been largely lost because of inadequate or no maintenance. If a fuelbreak is to remain effective, permanent cover type must occur.

Low elevation, dry forests in the Northern Rockies are commonly dominated by ponderosa pine and/or Douglas-fir with scattering of western white pine, limber pine and western larch. They usually have low severity underburns. However, ponderosa pine forests are variable, some have been found to have stand-replacing fires even in pre-settlement times. (Arno et al. 1995). These are the forests types where fires were most frequent and it is in these forests that logging and fire suppression have changed stand composition and structure the most from pre-settlement conditions. The NEPA document must clearly disclose what areas in the project area match this description, and disclose the management history of these areas—the actions taken and the resultant vegetation conditions.

At mid-elevations the forests are most often comprised of various configurations of Douglas-fir, lodgepole pine, grand fir and western larch with scattering of spruce and subalpine fir in the moister sites. This is where the moderate fire severity regime is most common. At higher elevations, forests dependent on stand-replacing fires are composed primarily of lodgepole pine or near treeline by whitebark pine, which, given enough time, are often replaced by subalpine fir and spruce. These forests occupy environments where most trees in a stand are killed by infrequent fires. This is where stand-replacing fires are the norm.

Thus, in the Northern Rockies, fire management and policy must reflect the elevational gradient, with the very different high elevation forests and their severe fire regimes differentiated from the low elevation forests and their low intensity fire regimes. It may be desirable for the low elevations to be managed such that fire becomes more frequent than was experienced in these ecosystems in the 20th Century. On the other hand, the high elevation forests are not in need of as much attention or management activities.

For most prescribed fire and fuels management activities in the Northern Rocky Mountains, land management agency personnel use as their model the ponderosa pine ecosystem. This might be called the ponderosa pine "poster child." It is the fire regime professionals utilize as a justification for increasing budgets for prescribed burning and as an example of how fire suppression has resulted in forests that are markedly different from pre-settlement times. Yet, this is one of the least extensive forest types in the region. Hutto (1995) states, "the origin of most Rocky Mountain forest stands can be traced to stand-replacement fires as opposed to mild understory burns" (internal citations omitted).

Today, current prescribed fire proposals are not simply targeting the low severity regime such as ponderosa pine and dry Douglas-fir forests. Many projects are being

developed in lodgepole pine and whitebark pine, high elevation forests with high severity fire regimes. These are forested areas least affected by fire suppression activities in the last 50 years and are the most remote. There is very good evidence that these moderate (Barrett, et al., 1991) and severe fire regimes (Weir et al. 1995) have not been affected by fire suppression. Therefore, prescribed burning and fuels management in these areas is often not necessary. Wildfires in these mid- to high-elevation forests affect human safety and important or expensive structures the least. If the public is to be supportive of increased prescribed burning, taxpayers money should be spent targeting areas primarily in low-elevation, low-severity fire regimes or areas adjacent to important structures.

Your January 28, 2003 scoping letter suggest that wildland fires pose a threat to soil and makes a huge deal about the impacts of wildland fire on stream functioning. However, you badly misplace the threat onto vegetative conditions instead of correctly identifying the true threats to watershed health. The Western Montana Level I Bull Trout Team (2001) state:

> (T)he real risk to fisheries is not the direct effects of fire itself, but rather the existing condition of our watersheds, fish communities, and stream networks, and the impacts we impart as a result of fighting fires. Therefore, attempting to reduce fire risk as a way to reduce risks to native fish populations is really subverting the issue. If we are sincere about wanting to reduce risks to fisheries associated with future fires, we ought to be removing barriers, reducing road densities, reducing exotic fish populations, and re-assessing how we fight fires. At the same time, we should recognize the vital role that fires play in stream systems, and attempt to get to a point where we can let fire play a more natural role in these ecosystems.

We ask that the Coeur d'Alene River Ranger District explicitly consider the Western Montana Level I Bull Trout Team position paper in the subsequent Twomile NEPA document.

The development of approved fire management plans in compliance with the Federal Wildland Fire Policy was the number one policy objective intended for immediate implementation in the Implementation Action Plan Report for the Federal Wildland Fire Management Policy and Program Review. In general, the Forest Service lags far behind other federal land management agencies that have already invested considerable amounts of time, money, and resources to implement the Fire Policy. Continued mismanagement of national forest lands and FS refusal to fully implement the Fire Policy puts wildland firefighters at risk if and when they are dispatched to wildfires.

Hutto, et al. 1995 state:

> Fire (and its aftermath) should be seen for what it is: a natural process that creates and maintains much of the variety and biological diversity of the Northern Rockies.

This statement, carefully considered, calls into question the whole FS rationale for "managing" wildfire as they have historically "managed" it. Rather than to trust

nature to right the wrongs perpetrated by past misguided FS policies, the FS now insists upon managing itself out of the supposed "unnatural" conditions created by its own mismanagement, a kind of administrative hubris specifically addressed by Hutto et al, 1995:

> Fire is such an important creator of the ecological variety in Rocky Mountain landscapes that ***the conservation of biological diversity*** [required by NFMA] ***is likely to be accomplished only through the conservation of fire as a process***…Efforts to meet legal mandates to maintain biodiversity should, therefore, be directed toward maintaining processes like fire, which create the variety of vegetative cover types upon which the great variety of wildlife species depend.
>
> Unfortunately, we are not currently managing the land to maintain the kind of early successional seral stages that follow stand-replacement fires and, hence, many fire-dependent plant and animal species. Why not? First*, prescribed fires in conifer forests are most often low-intensity, understory burns that are justified by the argument that, with past fire prevention, forest composition is now 'unnatural' and that we need to reintroduce a native fire regime of frequent, mild, understory burns to restore forests and to prevent catastrophic crown fires, which are 'destructive' and 'unnatural.'* This justification holds only for a very limited number of habitat types, however (for example, low-elevation ponderosa pine forests). Most of the forested landscape in the northern Rockies evolved under a regime of high-intensity, large fires every 50-100 years, not under a regime of low-intensity, frequent understory burns.

(emphasis added; citations to other scientific papers omitted)

The argument referenced by Hutto et al, 1995, of course, is exactly the kind of justification now in vogue for so many FS projects. However, the point to be derived from the Hutto et al, 1995 critique is not so much that prescribed burning and favoring a regime of frequent, mild understory fire is never justified, but rather that it is in no way a panacea; and, more significantly, that the catastrophic, stand-replacing crown fires that have swept the west in recent years are part of the fire regime that create the biodiversity which the FS is required by law to insure. Put bluntly, there is a kind of ignorance, bordering on mass hysteria, that needs to be addressed in today's political climate, which sees all wildfire as bad and all burned forests as wasted resources, a view which is every bit as dangerous (and actually quite consistent with) the now acknowledged FS ignorance that favored suppression of wildfires at all costs for many decades.

Also please see Ament (1997) as comments on this proposal, in terms of fire policy and Forest Planning.

Hessburg and Lehmkuhl (1999) question a common assumption that fuel levels are too high for prescribed burning to take place before thinning. Their review also stresses the importance of larger level spatial and temporal issues, generally not well disclosed or understood in limited "treatment" proposals.

Thinning "can also significantly alter nutrient storage and turnover in the modified stands." (Graham, et al., 1999.) Especially on dry sites this can cause nutrient shortage and damage site productivity. (Id.) This and many other adverse consequences to soil, ecological processes, wildlife, and other elements of the natural environment are associated with logging, including thinning. (Ercelawn, 1999; Ercelawn, 2000.) For example: "Salvage or thinning operations that remove dead or decayed trees or coarse woody debris on the ground will reduce the availability of forest structures used by fishers and lynx." (Bull et al., 2001.) Conversion of closed canopy stands to more open conditions may reduce habitat quality for fishers, and loss of understory structural diversity would be detrimental to lynx prey, while the increased human presence and other disturbance factors associated with fuels reduction are "likely to have an adverse effect on rare forest carnivores." (Id.)

Please utilize the NEPA process to clarify any roadless boundary issues. It is not correct to merely accept previous, often arbitrary roadless inventories—unroaded areas adjacent to inventoried areas were often left out. Additionally, there is a lot of public support for adding unroaded areas as small as 1,000 acres in size to the roadless inventory.

The FS, under the guise of ecosystem management (EM), has been using "forest health" as an argument for the necessity of logging. EM is an alleged departure from past management philosophy when timber had primacy, and the other multiple uses were simply constraints on the dominant use. It appears that EM, as practiced on the Coeur d'Alene River Ranger District, is a concept that is having difficulty being implemented.

The Forest Plan was developed under the old philosophy. Therefore it is difficult to implement the new EM concepts if Management Areas are primary timber production zones. The FS seems to believe that timber production is required to meet Forest Plan direction for the vegetation. There may be limitations on logging under EM but only if the "limiting factors" of "multiple use" can be demonstrated to be harmed by logging. The FS may strive to implement EM but when NEPA documents are prepared, such as those for Iron Honey and the Douglas-fir Beetle project, clearly the timber primacy philosophy is still the motivation for FS activity.

Your January 28, 2003 letter identifies potential insect infestations as a part of the rationale to propose logging. The portrayal of certain insects as essentially a negative part of the forest ecosystem imparts a huge timber production bias. These organisms have always played a part of a healthy forest within the project area. This "saving" of the forest trees from infestation has been demonstrated to have deleterious effects on species dependent upon forest insects and diseases. For example, the IPNF admits that of the habitat structures that provide denning opportunities for the Canada lynx, "Salvage logging that has removed dead and dying trees has contributed to the shortage of down logs in some areas" (USDA Forest Service, 2000a p. 62).

Please assess what species and other goods and services would benefit from allowing natural processes to proceed unhindered by timber management. Please don't just assume these processes are deleterious to timber production, and that logging is the only method that management has to improve "forest health."

It is incongruous that, while professing EM, the FS myopically focuses on trees, largely disregarding many vital forest parts, particularly components that ensure forest dynamics and permit tree growth.

In previous NEPA documents for timber sales on the Coeur d'Alene River RD, conditions of the forest floor have been treated superficially and without on-ground data from the project area. On-ground evaluation surveys for the project area are necessary to define the first line of watershed development and maintenance, that being the organic layers on the forest floor. It is here, in the litter, duff and humus, that moisture and considerable energy is gently captured, filtered and gradually released to underlying soil strata. If these indicators are depleted, further biomass removal activities will exacerbate the situation and can lead to long-term impairment of the forest ecosystem. Without it, rainfall soon compacts and often concretes the surface leading to the first stages of runoff and erosion. Please provide sufficient description of the condition of the litter, duff and humus for the proposed units and for previously logged units in the cumulative effects area (watersheds). Without on-the-ground surveys, indirect, direct and cumulative effects on soils cannot be ascertained.

This same set of layers is the principal abode of mycorrhizal fungi, which are essential both for successful establishment of tree seedlings and later tree growth. When the duff and humus layers have been reduced or eliminated by past extensive and repeated logging and post-logging slash burns, studies have shown very poor survival among planted seedlings. In much of the previously logged area ground-based log removal methods were used that not only destroyed the organic layers but also permanently changed the mineral soil structure beneath. Regeneration logging methods such as clearcutting also have an adverse effect on mycorrhizal production. The amount of duff and humus loss relative to mycorrhizal content also has not been measured on the ground and the cumulative effects are thus not disclosed.

It is also this set of organic layers that supports a host of microorganisms including those acting as antagonists to pathogenic fungi such as root-rotting fungi. Attention to these factors is a must in project planning and cannot be omitted if true EM is being practiced.

This same set of organic layers also contains mites, ants, nematodes and other roundworms, small rodents and too many other small organisms to enumerate here. These constitute a serious part of the lower food chains that sustain animals higher in the food chain, including animals and birds, many of which actively keep insect pests under natural control. Without these layers the lives and activities of all animal life in the forest are restricted or eliminated. Diverse animal activity is rare for years in heavily cutover areas for these reasons.

The organic floor of forest also hold the majority of soil-building invertebrates and microorganisms which act slowly to develop structure in the inorganic layers below and return nutrients to those layers.

Harvey et al., 1994 state:

> The ...descriptions of microbial structures and processes suggest that they are likely to provide highly critical conduits for the input and movement of materials within soil and between the soil and the plant. Nitrogen and carbon have been mentioned and are probably the most important. Although the movement and cycling of many others are mediated by microbes, sulfur phosphorus, and iron compounds are important examples.
>
> The relation between forest soil microbes and N is striking. Virtually all N in eastside forest ecosystems is biologically fixed by microbes... Most forests, particularly in the inland West, are likely to be limited at some time during their development by supplies of plant-available N. Thus, to manage forest growth, we must manage the microbes that add most of the N and that make N available for subsequent plant uptake.

(Internal citations omitted.)

Please disclose your inventory or monitoring of indicators, including lichens, fungi, insects, etc. since these can and do define existing and probable future forest conditions. Lichens in particular, while capturing atmospheric nitrogen for later release to higher plants and trees, are sensitive indicators of atmospheric and ground conditions and cannot be ignored in attempts at EM. Fungi and insects indicate and largely drive forest condition. Those that act as antagonists or parasites to destructive forms like root disease fungi or bark beetles should be recognized, as should tree pathogens and pests.

Enumeration of and monitoring of specific small, non-game birds and animal populations that are important in keeping destructive insect populations at low levels must also be disclosed.

The rationale and analysis of this proposal must look at the forest as an ecosystem with interrelationships coequal to timber production. Pleas use the EM approach to assess fungal and insect organisms as capable of operating in a self-regulatory manner and exist as beneficial organisms within the project area. Some species of trees, native insects, and disease organisms are often described by the FS as “invasive” or somehow bad for the ecosystem. Such contentions that conditions are somehow “unnatural” runs counter to more enlightened thinking on such matters. For example, Harvey et al., 1994 state:

> Although usually viewed as pests at the tree and stand scale, insects and disease organisms perform functions on a broader scale.
>
> ...Pests are a part of even the healthiest eastside ecosystems. Pest roles—such as the removal of poorly adapted individuals, accelerated decomposition, and reduced stand density—may be critical to rapid ecosystem adjustment
>
> ...In some areas of the eastside and Blue Mountain forests, at least, the ecosystem has been altered, setting the stage for high pest activity (Gast and others, 1991). This increased activity does not mean that the

ecosystem is broken or dying; rather, it is demonstrating functionality, as programmed during its developmental (evolutionary) history.

In making your case for "forest health" you are inferring we should be managing for the natural range of variability in tree species composition. Yet your focus on live, healthy trees ignores the natural range of variability for such factors as snags, old growth, edge effect, etc. and the long-term influences of culverts, miles of roads, and other human-caused structural changes in the forest ecosystem. The concept of range of natural variability suffers from its failure to provide defensible criteria about which factors' ranges should be measured (Frissell and Bayles, 1996). Your proposed "cures" pose far greater threats to biodiversity than do fires and other natural events that might (or might not) be associated with the "undesired" changes in forest structure (Id.; Henjum, et al., 1994; Rhodes, et al., 1994). The sole task of management should be the reversal of artificial legacies to allow restoration of natural, self-sustaining ecosystem processes. If natural disturbance patterns are the best way to maintain or restore desired ecosystem values, then nature should be able to accomplish this task very well without human intervention (Frissell and Bayles, 1996).

Your January 28, 2003 letter makes a case for logging as a way to reduce insect and disease damage to timber stands. As far as we are aware, the FS has no empirical evidence to indicate its "treatments" for "forest health" decrease, rather than increase, the incidence of insects and diseases in the forest. Since the FS doesn't cite research that proves otherwise in its NEPA analyses, we can only conclude that "forest health" discussions are unscientific and biased toward logging as a "solution." Please consider the large body of research that indicates logging, roads, and other human caused disturbance <u>promote</u> the spread of tree diseases and insect infestation.

For example, multiple studies have shown that annosus root disease (Heterobasidion annosum, formerly named Fomes annosus), a fungal root pathogen that is often fatal or damaging for pine, fir, and hemlock in western forests, has increased in western forests as a result of logging (Smith 1989). And researchers have noted that the incidence of annosus root disease in true fir and ponderosa pine stands increased with the number of logging entries (Goheen and Goheen 1989). Large stumps served as infection foci for the stands, although significant mortality was not obvious until 10 to 15 years after logging (Id.).

The proportion of western hemlock trees infected by annosus root disease increased after precommercial thinning, due to infection of stumps and logging equipment wounds (Edmonds et al. 1989, Chavez, et al. 1980).

Armillaria, a primary, aggressive root pathogen of pines, true firs, and Douglas-fir in western interior forests, spreads into healthy stands from the stumps and roots of cut trees (Wargo and Shaw 1985). The fungus colonizes stumps and roots of cut trees, then spreads to adjacent healthy trees. Roots of large trees in particular can support the fungus for many years because they are moist and large enough for the fungus to survive, and disease centers can expand to several hectares in size, with greater than 25% of the trees affected in a stand (id.). Roth et al. (1980) also noted that Armillaria was present in stumps of old-growth ponderosa pine logged up to 35 years earlier, with the oldest stumps having the highest rate of infection.

Filip (1979) observed that mortality of saplings was significantly correlated to the number of Douglas-fir stumps infected with Armillaria mellea and laminated root rot (Phellinus weirii). McDonald, et al. (1987) concluded the pathogenic fungus Armillaria had a threefold higher occurrence on disturbed plots compared to pristine plots at high productivity sites in the Northern Rockies. Those authors also reviewed past studies on Armillaria, noting a clear link between management and the severity of Armillaria-caused disease.

Morrison and Mallett (1996) observed that infection and mortality from the root disease Armillaria ostoyae was several times higher in forest stands with logging disturbance than in undisturbed stands, and that adjacent residual trees as well as new regeneration became infected when their roots came into contact with roots from infected stumps.

Precommercial thinning and soil disturbance led to an increased risk of infection and mortality by black-stain root disease (Leptographium wageneri) in Douglas-fir, with the majority of infection centers being close to roads and skid trails (Hansen et al. 1988). Also another Black-stain root disease (Verticicladiella wagenerii) occurred at a greater frequency in Douglas-fir trees close to roads than in trees located 25 m or more from roads (Hansen 1978). Witcosky et al. (1986) also noted that precommercially thinned stands attracted a greater number of black-stain root disease insect vectors.

Complex interactions involve mechanical damage from logging, infestation by root diseases, and attacks by insects. Aho et al. (1987) saw that mechanical wounding of grand fir and white fir by logging equipment activated dormant decay fungi, including the Indian paint fungus (Echinodontium tinctorium).

Trees stressed by logging, and therefore more susceptible to root diseases are, in turn, more susceptible to attack by insects. Goheen and Hansen (1993) reviewed the association between pathogenic fungi and bark beetles in coniferous forests, noting that root disease fungi predispose some conifer species to bark beetle attack and/or help maintain endemic populations of bark beetles.

Goheen and Hansen (1993) observed that live trees infected with Laminated root rot (Phellinus weirii) have a greater likelihood of attack by Douglas-fir beetles (Dendroctonus pseudotsugae). Also, Douglas-fir trees weakened by Black-stain root disease (Leptographium wageneri var. pseudotsugae) are attacked and killed by a variety of bark beetle species, including the Douglas-fir bark beetle (D. pseudotsugae) and the Douglas-fir engraver (Scolytus unispinosis) (id.).

The root disease Leptographium wageneri var. ponderosum predisposes ponderosa pine to several bark beetle species, including the mountain pine beetle (D. ponderosae) and the western pine beetle (D. brevicomis) (Goheen and Hansen 1993).

A variety of root diseases, including black-stain, Armillaria, and brown cubical butt rot (Phaeolus schweinitzii), predispose lodgepole pine to attack by mountain pine beetles in the interior west. The diseases are also believed to provide stressed host trees that

help maintain endemic populations of mountain pine beetle or trigger population increases at the start of an outbreak (Goheen and Hansen 1993).

Grand and white fir trees in interior mixed-conifer forests have been found to have a high likelihood of attack by the fir engraver (Scolytus ventralis) when they are infected by root diseases, such as laminated root rot, Armillaria, and annosus (Goheen and Hansen 1993).

More western pine beetles (Dendroctonus breviformis) and mountain pine beetles (D. ponderosae) were captured on trees infected by black-stain root disease (Ceratocystis wageneri) than on uninfected trees (Goheen et al. 1985). The two species of beetle were more frequently attracted to wounds on trees that were also diseased than to uninfected trees. They also noted that the red turpentine beetle (Dendroctonus valens) attacked trees at wounds, with attack rates seven-to-eight times higher on trees infected with black-stain root disease than uninfected trees. Spondylis upiformis attacked only wounded trees, not unwounded trees (Id.).

Within the proposed project area, rain-on-snow (ROS) during the winter and spring months has been found to be the dominant mechanism causing peak flows (MacDonald and Hoffman, 1995). Please keep in mind that the use of the ROS model estimates the risk of occurrence of a ROS event, not the quantified increase in peak flows expected. Verification of accuracy based upon quantitative monitoring data for the ROS model has not been performed on this Forest.

Jones and Grant (1996) describe the relationship of roads and clearcutting:

> The addition of roads to clear-cutting in small basins produced a quite different hydrologic response than clear-cutting alone, leading to significant increases in all sizes of peak discharges in all seasons, and especially prolonged increases in peak discharges of winter events. These results support the hypothesis that roads interact positively with clear-cutting to modify water flow paths and speed the delivery of water to channels during storm events, producing much greater changes in peak discharges than either clear-cutting or roads alone. Roads alone appear to advance the time of peak discharges and increase them slightly. Road surfaces, cutbanks, and ditches, and culverts all can convert subsurface flow paths to surface flow paths (Harret al., 1975; King and Tennyson, 1984; Wemple, 1994; Wright et al., 1990). Reid (1991) and Reid and Dunne (1984) estimated discharges from culvert outfalls in western Washington and associated them with runoff from road surfaces.

It is extremely important the project NEPA document disclose the environmental <u>baseline</u> for watersheds. Generally, this means their condition <u>before</u> development or resource exploitation was initiated. For example, the baseline condition of a stream means the habitat conditions for fish and other aquatic species prior to the impacts of road building, logging, livestock grazing, etc. Therefore, proper disclosure of baseline conditions would mean estimates of stream stability, pool frequency conditions, water temperature range—essentially the values of Riparian Management Objectives along with such parameters as sediment levels. When such information is provided,

comparison with the current conditions (after impacts of development) will aid in the assessment of cumulative effects of all alternatives.

Several concerns have arisen since Forest Plans had been amended by the INFISH DN (USDA Forest Service, 2000a, p. 77). The NEPA analysis should disclose these problems and identify the obvious implications of Forest Plan inadequacies in protecting habitat and populations of native fish species.

Ruggiero, et al. 1994 provide guidance for reconciling the disparity between the geographic size of project analyses vs. the needs of species: "The disparity between the scale of a local management action (e.g., a timber sale) and the scale of the ecological response (e.g., species viability) is a fundamental problem in assessing population viability." Basically, they point out that the problem with viability analyses for land encompassed by the typical project analysis areas is that such analyses look at areas of habitat much smaller than that encompassed by most wildlife species' populations. Thus it is easy to erroneously conclude, as do FS project-specific analyses in most cases, that small reductions in the amount of habitat are not significant for maintaining population viability.

The FS has acknowledged that viability is not merely a project area consideration, that the scale of analysis must be broader:

> Population viability analysis is not plausible or logical at the project level such as the scale of the Dry Fork Vegetation and Recreation Restoration EA. Distributions of common wildlife species as well as species at risk encompass much larger areas than typical project areas and in most cases larger than National Forest boundaries. No wildlife species that presently occupy the project area are at such low numbers that potential effects to individuals would jeopardize species viability. No actions proposed under the preferred alternative would conceivably lead to loss of population viability. (Lewis and Clark NF, Dry Fork EA Appendix D at p. 9.)

The FS should firmly establish that the species that exist, or historically are believed to have been present in the analysis area are still part of viable populations. Since Forest Plan monitoring efforts have failed in this regard, it must be a priority for project analyses. Identification of viable populations is something that must be done at a specific geographic scale. The analysis must cover a large enough area to include a cumulative effects analysis area that would include truly viable populations. Analysis must identify viable populations of indicator, TES, at-risk, focal, and demand species of which the individuals in the analysis area are members in order to sustain viable populations.

The fact that the FS has not monitored the population trends of its old growth management indicator species (MIS) as required by the Forest Plan bears important mention here. Considering potential difficulties of using population viability analysis at the project analysis area level (Ruggiero, et. al., 1994), the cumulative effects of carrying out multiple projects simultaneously across the Forest makes it imperative that population viability be assessed at least at the forestwide scale (Marcot and Murphy, 1992). Also, <u>temporal</u> considerations of the impacts on wildlife population viability from implementing something with such long duration as a Forest Plan must

be considered (id.) but this has never been done by the IPNF. It is also of paramount importance to monitor population trends (as mandated by the Forest Plan) during the implementation of the Forest Plan in order to validate assumptions used about long-term species persistence i.e., population viability (Marcot and Murphy, 1992; Lacy and Clark, 1993).

In making determinations about maintaining population viability of management indicator, focal, demand, Sensitive, Threatened, Proposed, and Endangered Species, the Forest Service usually goes no farther than a) relying on US Fish and Wildlife Recovery Plans for threatened and endangered species and, b) using database-derived calculations of amounts of habitat thought to maintain a home ranges of individuals or nesting pairs of species. The problem with this approach to maintaining population viability is that it is not a true population viability analysis. Mills (1994), criticizes a wildlife analysis performed by the Forest Service for a timber sale in the Kootenai National Forest. Mills points out that the FS's use of the term "viable" refers to habitat characteristics, not population dynamics. Mills goes on to explain the range of parameters which must be used to make a scientifically sound assessment of the viability of wildlife species. Population dynamics refers to persistence of a population over time—which is key to making predictions about population viability. Population dynamics include assessing population size, population growth rate, and linkages to other populations and must be included in a scientifically sound population viability analysis. Ruggiero, et al. (1994) also point out that a sound population viability analysis must utilize measures of population dynamics. Finally, the 1999 draft NFMA planning regulations also recognize the importance of consideration of population dynamics for sustaining species.

Both Ruggiero, et al. (1994) and Lindenmayer, et al. (1993) provide discussion on why population viability analysis is the best available tool assessing population viability, the latter providing examples of population viability analysis being used for several species of wildlife and one plant species. Lacy and Clark (1993) provide an example of population viability analysis used to design a computer simulation of risk of extinction of the pine marten.

One of the problems with relying on database-derived habitat suitability models is that such data is not reliable enough for scientific biology. The information is gathered by stand examiners who may or may not have biological training, and is often quite dated. Very recently, the IPNF has admitted that the use of database habitat information is suspect:

> Habitat modeling based on the timber stand database has its limitations: the data are, on average, 15 years old; canopy closure estimates are inaccurate; and data do not exist for the abundance or distribution of snags or down woody material… (USDA Forest Service, 2000a)

In a scientific document prepared as a part of ICBEMP, Witmer, Martin, & Sayler (1998) make recommendations which reinforce the points we make above about population dynamics, population viability analysis, and monitoring. From the Abstract:

> Forest carnivores in the Pacific Northwest include 11 medium- to large-sized mammalian species of canids, felids, mustelids, and ursids. These

> carnivores have widely differing status in the region, with some harvested in regulated furbearer seasons, some taken for depredations, and some protected because of rarity. Most large carnivores have declined in numbers or range from human encroachment, loss or modification of forest habitat, accidental deaths (e.g., mortality from vehicles), illegal kills, and our inability to adequately monitor and protect populations. Efforts to reverse these trends include new approaches to reduce conflicts with humans, research to better define habitat needs, formation of expert carnivore working groups, and use of Geographic Information System models to predict specific impacts of habitat modifications. Long-term preservation of large carnivores in the region is problematic unless we reduce forest fragmentation and conflicts with humans and improve our ability to quantitatively integrate population dynamics with landscape level habitat requirements. (Emphasis added.)

Logging, especially clearcutting and other forms of "regeneration" cutting, causes fragmentation of forests which is known to reduce populations of MIS and TES species. Researchers note reduced habitat use from fragmentation and/or recommend minimizing fragmentation or emphasizing connectivity to avoid further impacts to: lynx (Butts, 1992; Tanimoto and Garton, 1993); wolverines (Copeland, 1996; USDA Forest Service, 1993); goshawks (Crocker-Bedford, 1990; Erdman, et al., 1998; Graham, et. al., 1999; Iverson, et al. 1996; Reynolds, et al. 1992; Ruggiero, et al., 1991); and various wildlife species including the above (Witmer, Martin, & Sayler, 1998).

The scientific literature on biological diversity makes it clear that project assessments should consider, among other things, size distribution and connectivity for various types of habitat patches, amount and distribution of important types of such patches (such as roadless areas) which have been reduced by prior human activity, disturbed and historic vegetative mosaic patterns across the forest, cumulative effects of past activity from a watershed or regional ecosystem level, and edge effects of further forest fragmentation (Noss, 1990).

Along with the fragmentation in the IPNF is the loss of structural diversity unique to mature and old growth forests that logging has reduced. Structural diversity is lacking in clearcut and other "regeneration"-logged areas, and it is obvious that salvage and other partial cutting methods on the Forest which have targeted dead, dying, and windthrown trees has further reduced the structural diversity important for wildlife species. Biologists recommend retaining such structure and/or learned that live trees and the vertical and horizontal diversity provided by snags and large down woody debris are important habitat characteristics for: lynx (Butts, 1992; ; Koehler and Brittel, 1990; Tanimoto and Garton, 1993); wolverine (Lofroth,1997) goshawk (Daw, DeStefano, & Steidl, 1998; Hayward & Escano, 1989; Iverson, et al. 1996); and various wildlife species including the above (Ruggiero, Jones, & Aubry, 1991 *in* Ruggiero, et al., 1991).

The issue of providing for the larger landscape needs of far-ranging forest carnivores (including the grizzly bear, gray wolf, wolverine, fisher, pine marten, lynx, goshawk,

etc.) reveals the need to utilize the principles of Conservation Biology on a landscape level. Core areas of relatively undisturbed habitats need to be maintained. Linkages with other core areas need to be established, providing sufficient habitat components so the linkages, or corridors, are functional for genetic interchange purposes. Both core areas and linkages should be the focus of the watershed rehabilitation and recovery discussed above (such as road removal). Buffer zones around core areas should also be recognized in their contribution to habitat needs for these wildlife species.

State-of-the-art conservation biology and the principles that underlie the agency's policy of "ecosystem management" dictate an increasing focus on the landscape-scale concept and design of large biological reserves accompanied by buffer zones and habitat connectors as the most effective (and perhaps only) way to preserve wildlife diversity and viability (Noss, 1993).

The continued fragmentation of the Forest also is a major issue. It is documented that edge effects occur 10-30 meters into a forest tract (Wilcove et al., 1986). The size of blocks of interior forest that existed historically before management (including fire suppression) was initiated must be compared to the present condition. Again, this should be a landscape ecology analysis which looks at the larger picture of the fragmentation of habitat in surrounding concentric circles.

The NEPA analysis must disclose the results of monitoring population trends of TES plants <u>before</u> the public review process is completed.

NEPA analyses typically suffer from lack of disclosure of the details of plant surveys in areas that would be disturbed by proposed projects. Generally, survey methodology and results are not disclosed, and mitigation measures are not offered for public review. The variance in plant species' flowering seasons makes it difficult if not impossible for the surveyors to locate all species potentially present. And the lack of familiarity with the dozens of species on the part of surveyors also makes survey results suspect.

Additionally, there have been few conservation strategies written for TES plants as so little is known about most species. Baseline population information is lacking. Most of the discussion in this letter on population viability for wildlife species applies equally to TES plants.

The impacts of various silvicultural "treatments" on nearby TES plants populations must be monitored, reported, and considered in NEPA analysis.

The *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (hereafter, *Scientific Assessment)* recognizes the importance of maintaining large, old trees and the loss of big trees in Columbia Basin from logging. From the *Scientific Assessment:*

> There has been a 27 percent decline in multi-layer and 60 percent decline in single-layer old-forest structures, predominantly in forest types used commercially. (P. 181.)

> Emerging Science Issues: We had not anticipated the data indicating the extensive loss of large trees in the landscapes over much of the Basin. The harvest legacy has been more extensive than we thought. (P. 180.)
>
> Management outside the reserve boundaries includes an emphasis on conserving remaining old forest stands and roadless areas larger than 1000 acres. (P. 140.)
>
> Throughout most forested Ecological Reporting Areas (ERUs), native herblands, shrublands, and old multi-layered and single-layered forests have declined substantially in area and connectivity since the Basin was first settled by European-Americans. (P. 60.)
>
> (S)alvage emphasizes the extraction of specified volumes of dead and green trees at risk of dying. As such, harvest will emphasize larger trees, both green and recent dead, of desirable species … Our findings suggest that this type of harvesting is not compatible with contemporary ecosystem-based management. (P. 178.)

The failure of the FS to complete Forest Plan-required monitoring of old growth MIS means there is substantial doubt regarding the ability of existing old growth to sustain old growth dependent species. Therefore, no more logging should be even contemplated in old growth and near-old growth forest if we are to sustain old growth and the species that depend upon it. Thomas, et al. (1988) stated that "the best probability of success is to preserve all remaining old growth …"

Methodology exists for determining the presence of indicator and Sensitive wildlife species presence in forest areas and/or for monitoring population levels (Bachman et. al. 1990, Becker 1991, Bull et al. 1990; Copeland 1993, Foresman et. al. 1998, Jones & Raphael 1991, Raphael 1994, USGS 1997, Watson et. al. 1999, Weaver, et al., 1997; Zielinski et. al. 1996, Zielinski et. al. 1995). Some of these techniques, such as snow track surveys, are useful for multiple species in single transects.

Promoting logging in old growth in order to "restore" it is not supported by science. Emphasizing individual tree health subverts the goal of ecosystem integrity and long-term sustainability of forests and their myriad biotic components (McClelland and McClelland 1999). Management that attempts to restore "forest health" through routine cutting of dead, dying, and diseased trees and fire suppression can eliminate essential characteristics of old growth (Id.).

Old growth includes downed woody material that serves as shelter for old growth dependent species—it is not "excessive fire fuel" that needs removal. It also provides irreplaceable nutrients to the forest soil, and dead trees (snags) providing nesting habitat for many birds and cavity dwelling animals. Old growth forest also has important hydrological functions for the forest ecosystem. These things—features of the old growth forest itself—maintain the health of the forest ecosystem. In that context, old growth forests should be thought of as essential parts of whole, self-sustaining forest ecosystems. Targeting mortality for logging within old growth, or

logging to encourage growth of larger trees is a part of a failed management paradigm that fails to realize that natural, intact ecosystems are self-sustaining. Removing trees by logging has nothing to contribute to old growth forests or old growth dependent species.

The FS resists designation of reserve blocks of sufficient size and spatial arrangement to support old-growth associated species of wildlife, including boreal owl, pine marten, black-backed woodpecker, lynx, pileated woodpecker, fisher, and several species of migratory birds. Habitat quality is a key component of the analysis of old growth MIS reserve blocks, as is indicated in the Region One direction in Warren, 1990 and the science behind Forest Plan old growth standards. The obvious implication is that simply designating old growth is not enough to maintain viable populations of old growth dependent species. Disclose the quantity (total number of acres and block sizes) of old growth in the project area, and evaluate the quality of the blocks by considering the edge effect from natural and manmade openings caused by roads and logging.

The FS has stated: "Well distributed habitat is the amount and location of required habitat which assure that individuals from demes,[2] distributed throughout the population's existing range, can interact. Habitat should be located so that genetic exchange among all demes is possible." (Mealey 1983.)

In the process of identifying of old growth habitat, the FS must ground truth areas chosen from photo-interpretation and database examination. This is also important for identifying recruitment old growth, and to meet future old growth habitat needs. Old growth character should be well documented in maps that also display past impacts to old growth. For each project there should be an estimate of how many acres of potential snag loss has or will occur due to firewood cutting and wind events following logging.

Research reveals that the Forest Plan's target level of old growth to be scientifically unjustified. A recent study by Lesica (1996), suggests that old growth occupied 20-50% of many presettlement forest ecosystems in the Northern Rockies. The Forest Plan for the Kootenai National Forest also admits this:

> A review of applicable literature on wildlife species and their habitat needs indicated that a minimum of 8-10 percent of available wildlife habitat should provide old growth conditions (McClelland, 1978; Juday, 1978) at any given time. (A 17-9, emphasis in the original.)

Research suggests that it is essential to viability of goshawks that 20-50% of old growth within their nesting areas be maintained (Suring et al. 1993, Reynolds et al. 1992). USDA Forest Service (2000b) recommends that forest opening greater than 50-60 acres be avoided in the vicinity of goshawks. At least five years of monitoring is necessary to allow for effective estimates of habitat quality (Id.). Research suggests that a localized distribution of 50% old growth should be maintained to allow for viability of goshawks (Suring et al. 1993).

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[2]Subpopulations.

Goshawks are associated with habitat with large-diameter overstory trees, large standing dead or defective trees, downed logs, a deep duff layer, and formation of several canopy layers (Warren, 1990). Goshawks are often associated with a thick overstory cover and areas with a large number of large trees. For example, Hayward and Escano recommend an overstory canopy between 75 - 80% (Hayward and Escano, 1989). This study found that 89% of the trees surveyed in nest stands were larger trees (between 35-50" dbh) east of the Continental Divide in Montana.

According to the BE/BA for the Keystone Quartz FEIS in Region One,

> Goshawks prefer vegetation structure that permits them to approach prey unseen and to use their flight maneuverability to advantage (Widen, 1989, Beier and Drennan 1997). … In northern Arizona ponderosa pine and mixed conifer forests, Beier and Drennan (1997) found that goshawks did not select foraging sites based on prey abundance; abundance of some prey were lower on used than contrast plots. Goshawks selected foraging sites that had higher canopy closure, greater tree density, and greater density of trees >16" DBH than on contrast plots.

(Keystone Quartz FEIS B1-22.)

Edge-adapted species may compete with the goshawk and displace the goshawk if adequate amounts of forest interior habitat is not provided. Crocker-Bedford (1990) recommends that a foraging area of >5000 acres of dense forest, in which no logging is permitted, be designated for goshawks, with additional areas of 2500-5000 acres of more marginal habitat designated beyond this 5,000 acre foraging area.

In the western United Stares, pine marten are most abundant in mature to old-growth true-fir or spruce-fir forests and generally avoid open, drier coniferous forest. They prefer forest stands greater than 40% tree canopy closure, which protects them from predators and enhances the moist conditions favorable for prey species. (USDA Forest Service 1999 at III-257.)

Marten are closely associated with mature to old-growth timber stands, preferring moist habitat types where small mammals are more abundant. Pine marten prefer stands with greater than 40 percent canopy closure, and tend to avoid those stands with less than 30 percent closure. In addition to a closed canopy, marten require an abundance of large downed logs and snags. This provided secure resting locations, denning habitat and winter access to small mammals living beneath the snow. (Id. at III-580, 581.)

Buskirk and Ruggiero (1994) state, regarding the pine marten:

> Logging is commonly regarded as the primary cause of observed distributional losses in historic times in the western contiguous United States. Fire, insects, and disease are other important causes of tree death in the western conterminous United States, but the effects of these disturbances on martens have been studied little. Because logging is unique among these disturbances in removing boles from forests, and because of the importance of boles in contributing physical structure to habitats, logging is likely more deleterious to habitat quality for martens than other disturbances.

Fishers occur most commonly in landscapes dominated by mature to old-forest cover. (USDA Forest Service 1999 at III-254.) "Fishers prefer habitats with high canopy closure (greater than 80 percent) and avoid areas with low canopy closure (less than 50 percent). …The habitat requirements of fishers are thought to be associated with the physical structure of the forest and associated prey. This structure includes the vertical and horizontal complexity created by a diversity of trees sizes and shapes, light gaps, dead and downed wood and layers of overhead cover. Large-diameter spruce and grand-fir snags and large downed material are used for denning and foraging. Fishers tend to avoid non-forested areas." (Id. at 254.)

The black-backed woodpecker is on the Sensitive species list for the IPNF. Cherry (1997) states:

> The black-backed woodpecker appears to fill a niche that describes everything that foresters and fire fighters have attempted to eradicate. For about the last 50 years, disease and fire have been considered enemies of the "healthy" forest and have been combated relatively successfully. We have recently (within the last 0 to 15 years) realized that disease and fire have their place on the landscape, but the landscape is badly out of balance with the fire suppression and insect and disease reduction activities (i.e. salvage logging) of the last 50 years. Therefore, the black-backed woodpecker is likely not to be abundant as it once was, and continued fire suppression and insect eradication is likely to cause further decline.

Dolan (1998a) states, "Retention of all or most of the large snags will help compensate for past losses." But the FS generally **targets** large dead trees in logging projects. Dolan (1998b) states in regards to impacts on the black-backed woodpecker due to fire suppression and post-fire logging states:

> It seems that we have a huge cumulative effects problem here, and that each salvage sale removes habitat that is already very limited. We are having trouble avoiding a "trend to federal listing" call for the BBWO in salvaging burns, unless comparable acres of fire-killed dead are being created through prescribed burns.

The comments by other biologists attached to Dolan, 1998b reveal that the FS has yet to design a consistent, workable, scientifically sound conservation strategy to assure viable populations of black-backed woodpeckers.

In the process of identifying of old growth habitat, the FS should ground truth areas chosen from photo-interpretation and database examination. This is also important for identifying recruitment old growth, and to meet future old growth habitat needs. Old growth character should be well documented in maps that also display past impacts to old growth. For each project there should be an estimate of how many acres of potential snag loss will occur due to firewood cutting and wind events following the logging.

Please disclose the sizes and condition of openings from past logging in the cumulative effects analysis area, and display where proposed cutting units are in relation to those

old units. Deviations from Regional Guide and Forest Plan standards for dispersal must be disclosed.

Please do studies that consider landtypes, habitat types, slopes, aspect, etc. for this project, so that there would be assurance of successful reforestation. Please disclose (by providing maps, tables, and other documentation) the level of reforestation success from past even-aged logging in the immediate and surrounding compartments, explaining the dates of logging, the problems encountered and duration needed before certification of restocking.

Evaluate the potential for reforestation efforts in some cutting units to fail due to pocket gophers. If it is possible that pocket gophers will be a problem leading to the "need" to "control" gophers, then the area's suitability for even-aged timber management is in doubt.

Likewise, any potential that herbicide treatment or burning of competing vegetation will be needed to achieve reforestation raises a whole new set of cumulative impacts timber sale environmental analysis should be dealing with up front.

The IPNF has been unable to stay within the bounds of the Forest Plan's 40-acre limit on even-aged cutting units. If the FS cannot follow the Forest Plan, what implications does that have for the Forest Plan FEIS's validity, and the impacts of management of other resources impacted by clearcutting, such as wildlife, fish, recreation, and water quality?

Snags and downed woody debris have long been recognized as important components of functioning ecosystems. These forest features provide habitat for a wide variety of wildlife species and are important for nutrient cycling. Forest Service research shows that in forests of western Oregon and Washington, "snags are used by nearly 100 species of wildlife of which at least 53 species (39 birds and 14 mammals) are cavity-dependent. . . . (F)or some species the presence of dead trees can spell the difference between local extinction and the perpetuation of existing populations." (U.S. Forest Service 1985.) Mannan, 1977 recommended that forest managers "retain as much unmanaged forest land over 100 years as possible" and "retain all snags in riparian buffer strips."

We urge that scientifically sound snag retention requirements be employed within the project area. The IPNF snag guidelines—since they are largely based upon a research paper (Thomas, 1979) concerning the Blue Mountains in Oregon—are not sufficiently site-specific to the ecosystems of Northwest Montana. Indeed, the Wallowa-Whitman National Forest, where the Blue Mountains upon which Thomas' and IPNF snag guidelines are based are located, has even updated Thomas' snag recommendations based upon their finding that inadequate snag replacements would be supplied over the entire rotation. We refer to the "Wallowa-Whitman National Forest Green Tree Snag Replacement Guidelines, Revised Final 4/93." Therein, Tables 1 - 3 show that a mixed conifer stand must contain anywhere from 17.6 to 29.7 green tree replacement snags, depending on the size of the available green tree replacements and the logging method proposed. Those numbers of snags are only for meeting the minimum viability 40% habitat level—not shown to be sufficient in such a large area as the IPNF. That

document also mentions the need for assuring funding is available: "Induced mortality will require detailed tracking and a solid commitment from management to continually fund induced mortality throughout the rotation." (p. 5.)

The IPNF started to recognize the inadequacy of its present guidelines in the 1996 Mosquito Fly DEIS, wherein it stated:

> On the basis of the most recent U.S. Forest Service management recommendations for snag retention for snag dependent species, such as black-backed woodpecker and other primary cavity excavator species, the design criteria require that at least three suitable snags and 10 green tree replacements per acre for lodgepole pine and subalpine fir forests and six suitable snags and 20 green tree replacements per acre for all other forest types be left in harvested areas. (Page 2-21.)

USDA Forest Service (2000a) also calls for updated guidelines: "Apply snag and down woody material guidelines from the Upper Columbia River Basin Assessment to improve marten habitat" (p. 39). Although that Report doesn't state what those guidelines should be, we welcome the IPNF's acknowledgment of scientific evidence that refutes its inadequate guidelines. We urge prompt action to face this issue on a forestwide and site-specific basis.

In regards to the Thomas model, still used by the IPNF, Bull et al., 1997 state:

> This document presents new information on the retention and selection of trees and logs most valuable to wildlife.
>
> …Current direction for providing wildlife habitat on public forest lands does not reflect this new information. Since the publication of Thomas and others (1979), new research suggests that to fully meet the needs of wildlife, additional snags and habitat are required for foraging, denning, nesting, and roosting. Although we do not suggest specific numbers or snags to retain by forest type, two recent studies indicate that viable woodpecker populations occurred in areas with about four snags per acre.
>
> We suggest that the next step in snag management should involve creating a model that incorporates the new information on woodpecker foraging substrates (live trees, snags, and logs), home range sizes, number and characteristics of roost trees, multiple occupancy of snags, and needs for other habitat structures. Once this information is incorporated, the model may suggest changes to guidelines that specify numbers of snags and other habitat features by forest type and geographic area. Additional information on fall rates of snags, foraging needs of black-backed and three-toed woodpeckers, relation of the density of woodpeckers to that of secondary cavity nesters, and relation of snag density to woodpecker density would greatly improve the model.
>
> The guide most widely used in the past, Thomas and others (1979), prescribed the number of nest and roost trees to leave for specified woodpecker populations, but the number was based on a hypothetical,

> untested model and did not include any snags for foraging. Three studies (Baste 1995, Bull and Holthausen 1993, Dixon 1995) conducted in eastern Oregon have shown that retaining foraging structure is essential, in addition to nest an roost trees in managed landscapes. The Thomas model provided only two roost trees per pair per year, yet research has shown that individual pairs of pileated woodpeckers and white-headed woodpeckers use considerably more than two per year (Bull and others, 1992, Doxon 1995). Radio-telemetry studies have shown that home range sizes of pileated woodpeckers (Bull and Holthausen 1993), white-headed woodpeckers (Dixon 1995), and three-toed and black-backed woodpeckers (Goggans and others 1988) are considerably larger than those used in the Thomas model.
>
> Raphael and White (1984) found that the relation between numbers of snags and cavity nesters in not linear, which was assumed in the Thomas model. The substitution factor used in the Thomas model is variable and largely a function of snag density. Neitro and others (1985) thought allowing substitution of snags that reduced the number retained was not appropriate. The Thomas model did not take into account the habitat needs of some of the secondary cavity nesters, like bats and brown creepers, that use such snag features as loose bark. In addition, Bull and Holthausen (1993) found lower densities of pileated woodpeckers in nine study areas than predicted by Thomas and others (1979) based on the number of snags present. The above studies present new data suggesting that some of the assumptions and data used in the Thomas model are not valid, and that the prescribed snag densities need to be revised upward. (P. 28.)
>
> Ideally, data would be available on the exact number of snags required to support specific populations of primary and secondary cavity nesters. Unfortunately, this kind of information is not available. We do know, whoever, that the snag numbers presented by Thomas and others (1979) are not adequate to support the populations intended because of a lack of foraging strata and invalid assumptions used in the model. If management agencies have an objective to manage for viable populations of woodpeckers, providing numbers of snags that have been shown to support viable populations in the recent studies would be prudent. (P. 29.)

Results of monitoring cavity habitat condition and amount has generally shown that prescriptions have not been met following logging. Field surveys are necessary to determine the level of available snag and downed woody material in the cumulative effects analysis area, since it may be the case that proposals for cutting units must consider the need to offset the lack of snags in areas previously logged.

USDA Forest Service, 2000a (p. 39) states, “Pileated woodpeckers are indicators of old growth or late successional ponderosa pine and Douglas-fir forests.” We urge biologists observe the results from McClelland and McClelland (1999) which indicate that for nesting and roosting, pileated woodpeckers favor larch and ponderosa pine far more than Douglas-fir, although the latter are often used for foraging. Because of the relative rarity of the large, old larch and ponderosa pine forestwide as compared to the

historical range, the IPNF should design a conservation strategy that includes retention of all trees of these species approaching 20" dbh.

Project analysis must acknowledge that OSHA regulations require that soft snags generally be felled for worker safety. This means vast portions of the forest will be depleted of standing soft snags. The results of the differences between Forest Plan standards and guidelines and OSHA regulations must be acknowledged and the impacts disclosed.

One of the biggest problems with the FS's failure to deal forthrightly with the noxious weed problem on a forestwide basis is that the long-term costs are never adequately disclosed or analyzed. The public is expected to continuously foot the bill for noxious weed treatments—the need for which increases yearly as the IPNF continues the large-scale propagation of weeds, and fails to monitor the effectiveness of all its noxious weed treatment plans to date. There is no guarantee that the money needed for the present management direction will be supplied by Congress, no guarantee that this amount of money will effectively stem the growing tide of noxious weed invasions, no accurate analysis of the costs of the necessary post-treatment monitoring, and certainly no genuine analysis of the long-term costs beyond those incurred by site specific weed control actions.

Please explain, in clear, understandable language, the precise relationship between Forest Plan standards for soil productivity, FSH 2509.18, and Forest Service Handbook FSM 2500-99-1.

The FS is dodging the important issue of maintaining soil productivity as NFMA mandates. As indicated in the Forest Plan, FSM 2500-99-1 and FSH 2509.18, the FS assumes that maintaining soil productivity is achieved simply by limiting detrimental disturbance to no more than 15% or 20% of an Activity Area. The scientific adequacy of the FS's methodology for maintaining soil productivity on has never been demonstrated. The FS's determination that it may permanently damage the soil on 15% or 20% of an activity area and still meet NMFA and planning regulations is arbitrary. Neither the Forest Plan nor the FSM 2500-99-1 cite adequate scientific basis for adopting any percentage as a numerical limit.

The FS has essentially admitted that it is in the dark as far as doing scientific research on soil productivity changes following management activities. In response to comments on the Black Ant Salvage DEIS, Lewis & Clark NF, USDA Forest Service, 2002 states:

> Soil Quality Standards "provide benchmark values that indicate when changes in soil properties and soil conditions would result in significant change or impairment of soil quality based on available research and Regional experience" (Forest Service Manual 2500, Region 1 Supplement 2500-99-1, Chapter 2550 – Soil Management, Section 2554.1).
>
> A formal research study, the "Long Term Soil Productivity Study," is currently being conducted by the Research Branch of U.S. Department of Agriculture, Forest Service to validate these soil quality standards.

Even assuming that FSM 2500-99-1 contains nondiscretionary standards, a problem with these soil quality standards (and the FEIS's interpretation of them) is that they do not set any rational thresholds for cumulative reductions in soil productivity outside the activity areas of the proposed timber sale. It is thus the FS's position that significant losses of soil productivity in areas that have experienced livestock grazing, roads, landings, firelines created to fight wildland fires, and the loss of soil productivity from wildland fires themselves can simply be unlimited in any project area regardless of what further impacts are proposed.

The Forest Management Handbook at FSH 2509.18 directs the FS to do validation monitoring to "Determine if coefficients, S&Gs, and requirements meet regulations, goals and policy" (2.1 – Exhibit 01). It asks what we are asking: "Are the threshold levels for soil compaction adequate for maintaining soil productivity? Is allowing 15% of an area to be impaired appropriate to meet planning goals?" The Ecology Center recently asked the Northern Region if they have ever performed this validation monitoring of its 15% Standard, in their February 26, 2002 Freedom of Information Act request to the Regional Forester, requesting:

> The Forest Management Handbook at FSH 2509.18 provides the Forest Service with examples of validation monitoring to "Determine if coefficients, S&Gs, and requirements meet regulations, goals and policy." It asks "Are the threshold levels for soil compaction adequate for maintaining soil productivity? Is allowing 15% of an area to be impaired appropriate to meet planning goals?" We request all documentation of validation monitoring by the Forest Service in the Northern Region that answers those two questions.

The Regional Office's reply letter stated that there is no documentation that responds to this request.

FSM 2500-99-1 superceded similar directives issued in 1994 (FSH 2509.18). Both versions of these Regional directives have required implementation and effectiveness monitoring. But as the Regional Office's reply to the Ecology Center FOIA indicates, the FEIS is unable to cite the results of any monitoring, required by the Standards, to provide a basis for assuming the Regional Soil Standards actually protect **soil productivity**.

It is reasonable to expect that in order for the FS to insure that soil productivity is not or has not been significantly impaired, to assure that the forest is producing a sustained yield of timber, for one example, tree growth must not be significantly reduced by soil-disturbing management activities. Grier et al. (1989), in a Forest Service General Technical Report, adopted as a measure of soil productivity: "the total amount of plant material produced by a forest per unit area per year." (P. 1.) And they cite a study finding "a 43-percent reduction in seedling height growth in the Pacific Northwest on primary skid trails relative to uncompacted areas" for example. And in another Forest Service report, Adams and Froehlich (1981) state:

> Measurements of reduced tree and seedling growth on compacted soils show that significant impacts can and do occur. Seedling height growth has been most often studied, with reported growth reductions on

> compacted soils from throughout the U.S. ranging from about 5 to 50 per cent.

Adams and Froehlich (1981) also provide reasons why impacts beyond the directly compacted 15% or 20% of an area must be considered in any reasonable definition of soil productivity:

> Since tree roots extend not only in depth but also in area, the potential for growth impact also becomes greater as compaction affects more of the rooting area. In a thinned stand, for example, you can expect the greatest growth impacts in residual trees that closely border major skid trails or that have been subject to traffic on more than one side of the stem."

In other words, when an activity area reaches 15% or 20% detrimentally impacted soils via compaction, tree growth **outside the skid trail,** or beyond the compacted area, is affected.

FSM 2500-99-1 recognizes that soil productivity is defined not merely in terms of the absence of meeting the 15% standard. “Soil Function” is defined thus:

> Primary soil functions are: (1) the sustenance of biological activity, diversity, and productivity, (2) soil hydrologic function, (3) filtering, buffering, immobilizing, and detoxifying organic and inorganic materials, and (4) storing and cycling nutrients and other materials.

And “Soil Quality” is defined as: “The capacity of a specific soil to function within its surroundings, support plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation.”

Neither soil function nor soil quality, as FSM 2500-99-1 defines it, have ever been monitored on the IPNF following management activities. Unfortunately, the FS seems to have only interpreted monitoring requirements in terms of maintaining no more than 15% or 20% of activity areas in a detrimentally disturbed condition.

Page-Dumroese et al. 2000 (an earlier version of which is cited in FSM 2500-99-1) emphasize the importance of validating soil quality standards using the results of monitoring:

> Research information from short- or long-term research studies supporting the applicability of disturbance criteria is often lacking, or is available from a limited number of sites which have relative narrow climatic and soil ranges. …Application of selected USDA Forest Service standards indicate that blanket threshold variables applied over disparate soils do not adequately account for nutrient distribution within the profile or forest floor depth. These types of guidelines should be continually refined to reflect pre-disturbance conditions and site-specific information. (Abstract.)

The FS’s methodology might approach adequacy if the FS were to have actually validated it by performing objective, scientifically adequate measures of compaction such as measures of bulk density. Adams and Froehlich (1981) state: “While general field observations can be useful in recognizing severe compaction problems,

measurement of actual changes in soil density permits the detection of less obvious levels of compaction."

For a study done on the Kootenai NF and the Flathead NF in Montana, soil scientists measured soil bulk densities, macropore porosities, and infiltration rates using paired observations of disturbed vs. undisturbed soils. They discovered that although "the most significant increase in compaction occurred at a depth of 4 inches… some sites showed that maximum compaction occurred at a depth of 8 inches… (and) "Furthermore, … subsurface compaction occurred in glacial deposits to a depth of at least 16 inches." (Kuennen, Edson, and Tolle, 1979.) There is simply no way that the FS has enough soil bulk density and other compaction monitoring data collected at the adequate soil depths and in enough sites to be able to assure that the use of heavy machinery, as prescribed by the NLF Project, will not significantly or permanently impair the productivity of the soil.

Following a study by Cullen et al. (1991) which was carried out on the Kootenai NF and the Flathead NF, the authors concluded: "This result lends support to the general observation that most compaction occurs during the first and second passage of equipment." And Page-Dumroese (1993), in a Forest Service research report investigating logging impacts on volcanic ash-influenced soils, states, "Moderate compaction was achieved by driving a Grappler log carrier over the plots twice." She also cited other studies that indicated: "Large increases in bulk density have been reported to a depth of about 5 cm with the first vehicle pass over the soil." Williamson and Neilsen (2000) assessed change in soil bulk density with number of passes and found 62% of the compaction to the surface 10cm to come with the first pass of a logging machine. In fine textured soils Brais and Camire (1997) demonstrated that the first pass creates 80 percent of the total disturbance to the site.

Adams and Froehlich (1981) state, "Unfortunately, little research has yet been done to compare the compaction and related impacts caused by low-pressure and by conventional logging vehicles."

The FS often claims that helicopter yarding will cause no damage to the soil. But since several logs are lifted at once, before they clear the ground they drag. And when they drag, they cause soil compaction and displacement, and disturb and damage other vegetation.

Alexander and Poff (1985) reviewed literature and found that as much as 10% to 40% of a logged area can be disturbed by skyline logging. They state:

> There are many more data on ground disturbance in logging, but these are enough to indicate the wide diversity of results obtained with different equipment operators, and logging techniques in timber stands of different composition in different types of terrain with different soils. Added to all these variables are different methods of investigating and reporting disturbance.

Another problem with the FS's soil monitoring is that it fails to measure soil productivity in terms of loss of soil nutrients due to logging activities, including removal of boles, branches, and from site preparation methods such as burning. DeLuca (2001) states:

> Organic matter is clearly lost from forest floor and often from the mineral soil following wildfire or prescribed fire. Organic matter is also lost from sites when net mineralization is stimulated by higher temperatures caused by opening of the canopy and removal of understory. (Internal citations omitted.)

From Grier and others (1989):

> The potential productivity of a site can be raised or lowered by management activities causing a permanent or long-term increase or decrease in the availability of nutrients essential for plant growth. (P. 27.)
>
> …Any time organic matter is removed from a site, a net loss of nutrients from that site also occurs. In timber harvesting or thinning, nutrient losses tend to be proportional to the volume removed. (P. 27.)
>
> …Slash burning is a common site preparation method that can affect soil chemical properties tremendously. A great deal of controversy is often associated with using fire because of the wide variety of effects, some of which are definitely detrimental to site quality and some of which are beneficial. (P. 30.)

Logging projects that remove all or most of the tree canopy often create warm soil conditions that quickly decompose the litter layer and associated slow-release nutrients. In addition, severe cuts leave nothing for future soil organic matter contributions. Creating a silvicultural prescription that conserves or enhances appropriate organic matter reserves after timber harvest is essential for maintaining forest health and soil productivity (Jurgensen, et al., 1997). “Regeneration harvesting” would certainly decrease protective shade cover, thereby, increasing the temperature of the soils, thus lowing the soil’s ability to absorb nutrients.

Regarding maintaining productivity of forest soils during logging, Graham, et al., 1994 (cited in FSM 2500-99-1) state that sufficient amounts of coarse woody debris must be retained. FSM 2500-99-1 states:

> The loss of surface organic matter can cause nutrient and carbon cycle deficits and negatively affect physical and biological soil conditions. Objectives for fine organic matter layer thickness and distribution should be determined locally based on similar soils or ecological types. The direct benefits of coarse woody material to soils can vary widely, depending on ecological type. Research guidelines such as those contained in Graham et al.,1994 should be used if more specific local guidelines are not available. Since the management of coarse woody material is important to wildlife, fire, and other resources, integration based on local objectives needs to occur.

Many forest managers prefer to carry out prescribed burning in the spring, whereas wildlife have adapted to late summer and fall fires. Springtime burning is not mimicking natural processes, and wildlife have not evolved to withstand this impact. Agency biologists in the North Umpqua Ranger District have said that: “Many species are nesting and/or breeding during this time of year [spring] and plants are actively

adding new tissue. The heat and smoke from prescribed fires may interrupt these functions." And, "Neotropical migratory birds are beginning to arrive and establish territories and breed. Small animals and young are more susceptible to mortality from ground fires because they are less mobile and in the case of some birds, unable to fly. During spring, amphibians are widely dispersed and near the ground surface… During the hotter summer months and by late fall, most amphibians are concentrated near wet, riparian habitats or deeper in the ground substrates." NEPA documents must fully disclose the ecological problems inherent with spring burning proposals.

NFMA and the Forest and Rangeland Renewable Resources Planning Act (RPA) require management of national forest system lands in a manner that "maximizes long term net public benefits" [36 CFR 219.1(a)]. The FS's planning regulations have defined the term "net public benefits" as the "overall value of positive effects (benefits) less all associated inputs and negative effects (costs)." NFMA requires a sophisticated consideration of benefits and costs, including use of both market and non-market methods of determining existing and future resource values, methods to determine opportunity costs, and use of best available quantitative and qualitative techniques [(36 CFR 219.12(e); 219.12(f)2; 219.1(b)12]. Costs and benefits must be assessed not only from the perspective of the FS, but from the perspective of "all other private and public" interests (36 CFR 219.12(g)3i).

The FS must meet the substantive requirements regarding economic analyses set forth in NFMA. This means incorporating a wide range of external economic costs that will be passed on to public agencies, private landowners, business owners, and others adversely affected by the timber sale in combination with other timber sales ongoing and planned across the Forest, the Region, and the national forest system, as a whole. These include:

- decreased private property values in the proposed project area attributable to lost scenic, aesthetic, and recreational values on the lands affected by the proposed timber sale and other timber sales in this area;
- lost business and revenue incurred by those engaged in the manufacturing, distribution, and sale of alternative fiber products in the region who face competition from subsidized public timber sales;
- lost business and revenue incurred by those engaged in ecologically sensitive timber harvest on private lands who face unfair competition from subsidized public timber sales implemented under less costly, less ecologically sensitive practices such as those usually proposed by the Forest;
- costs incurred by county and state governments related to repair and maintenance of roads damaged by log trucks;
- costs incurred by county and state governments as well as private individuals related to loss of life or personal injury from collisions with or accidents caused by logging trucks transporting logs from national forest system lands;
- lost revenue and jobs incurred by those engaged in businesses related to recreation, fisheries, tourism, and other non-timber forest uses that will be precluded by proposed timber sales. Even if the site-specific effects of the proposed timber sale on these uses are small, the cumulative effects of one sale in combination with all others in the affected watersheds may significantly alter the aesthetic attraction of these entire watersheds to the point where business related to non-timber uses are no longer viable;

- increased filtration costs incurred by private water users downstream attributable to the increased sediment load created by the proposed timber sale and all others in the affected watersheds.

The FS must show the timber sale would meet the test of "cost practicability" required by NFMA regulations at 36 CFR 219.27(b)7. The FS must complete the necessary qualitative and quantitative assessments to incorporate the costs identified above as well as all other external economic costs. If costs cannot reasonably be assessed on an individual timber sale basis, then the FS must first complete the analysis on a national, regional, or watershed scale and then assign a proportion of these costs to individual sales using established quantitative methods.

In addition, in order to comply with NFMA economic analysis requirements NEPA documents must adequately discuss or assign value to a wide range of ecosystem services performed by intact forests in proposed project areas. To meet the letter and intent of NFMA, the FS must analyze the market and non-market benefits of unlogged forests in analysis areas, including:

- their role in regulating the flow of water in the affected watersheds, specifically, their role in mitigating flash floods and other catastrophic precipitation events;
- their role in purifying water for downstream users;
- their role in maintaining long term forest productivity.
- Unmanaged forests in proposed project areas provide a source of native organisms and ecological processes vital to regeneration and forest development in surrounding areas. In addition, the older and larger trees are a genetic reservoir of immense value to reforestation efforts on similar sites throughout the region;
- the economic value of non-timber uses of the proposed sale area including gathering of forest products, recreation, hunting, fishing, and wildlife observation, and;
- their role in mitigating pests. The structurally diverse habitats in the proposed sale area support bird and bat species that prey upon insects and rodents harmful to forest and cropland health.

The FS must utilize state of the art methods for calculating the market value of these and other ecosystem services provided by forests in proposed project areas. For example, an international team of scientists recently completed an economic assessment of the ecosystem services provided by 12 distinct ecosystems, estimating the annual market value of these ecosystems to be 33 trillion dollars [Nature's Services: Societal Dependence on Natural Ecosystems, (Island Press, Washington, D.C.)]. Many other natural resource economists have devised quantitative and qualitative methods for assessing the value of ecosystem services.

The FS must make use of these methods and incorporate ecosystem service value as a standard component of the agency's environmental assessment process. Failure to do so will artificially inflate the value of forests as timber relative to their role in regulating climate, purifying water, and supporting aesthetic or recreational uses. Unless project NEPA analyses incorporate ecosystem service values, they cannot meet NFMA's mandate to properly assess the value of all forest resources and functions that have a market value [36 CFR 219.12(e)(1)ii, iii].

Each of the effects noted above requires analysis by the Forest Service because they fall squarely within the definition of direct, indirect, and cumulative effects as well as connected actions described by NEPA (40 CFR 1508.7, 1508.8,1508.25) and are significant on a regional scale.

The abstract of General Accounting Office (GAO) report # GAO-01-1101R dated September 21, 2001 states:

> GAO reviewed the Forest Services total costs associated with its timber sales program for fiscal years 1998 and 1999. Serious accounting and financial reporting deficiencies at the Forest Service during fiscal years 1998 and 1999 precluded GAO from making an accurate determination of the total federal costs for the timber sales program. These deficiencies made the Forest Service's cost information totally unreliable.

The last TSPIRS report produced by the Forest Service was for fiscal year 1998. Since the TSPIRS report can no longer be used to satisfy the economic monitoring requirements, there is no fiscal monitoring occurring. Lacking up-to-date monitoring, please explain how economics data for the NEPA document is complete and accurate.

Numerous government studies confirm the Forest Service's financial losses and lack of accountability. According to the most recent GAO report on the timber sale program, released in 1998, the USFS lost over $1 billion selling National Forest timber between 1995 and 1997.

In a report released in January 2001, the GAO found the USFS has not provided Congress and the public with a clear understanding of what is accomplished with appropriated funds. According to the report, "the Forest Service and Congress do not have accurate financial data to track the cost of programs and activities and to help make informed decisions about future funding."

The GAO states:

> For fiscal years 1995, 1996, 1997, and previous years, the Office of the Inspector General reported that because of significant internal control weaknesses in various accounting subsystems, the Forest Service's accounting data were not reliable. Despite these weaknesses, we used the data because they were the only data available and are the data that the agency uses to manage its programs.

In January 1999, the GAO named the financial management system of the USFS to its "High Risk List" of government programs susceptible to waste, fraud and abuse. The GAO reported the problems were worsened by a new accounting system that had not been able to produce necessary reports on assets, liabilities and revenues. In January 2001, the GAO reported, "the Forest Service does not appear to be fully committed to making performance accountability one of its top priorities, and major hurdles to achieving performance accountability remain."

Since fiscal year 1996, the Department of Agriculture Inspector General has been unable to form an opinion on the financial health of the USFS, due to a lack of supporting documents to verify accounts for land, buildings and equipment, as well as errors in financial statements.

On March 26, 1998, Barry Hill, Associate Director of Energy, Resources and Science Issues at the GAO, testified before the House Committees on Resources, Budget, and Appropriations and the Subcommittee on Interior and Related Agencies. Mr. Hill concluded:

> Forgone revenue, inefficiency, and waste throughout the Forest Service's operations and organization have cost taxpayers hundreds of millions of dollars. The agency's financial statements are unreliable, and expenditures of significant amounts cannot be accounted for. Inefficiency within the Forest Service's business processes is accompanied by numerous shortcomings in the agency's accounting and financial and information systems that preclude the Forest Service from presenting accurate and complete financial information. For example, in reporting its fiscal year 1995 financial results, the Forest Service could not identify how it spent $215 million of its $3.4 billion in operating and program funds.

In sworn testimony in 1992, former Forest Service Chief of Law Enforcement John McCormick warned Congress, "The agency has become comfortable with lying to the public, ignoring long-festering problems and serving the timber industry as government agents of environmental destruction." We don't see that much has changed within the agency since McCormick made that statement.

Fifteen years into Forest Plan implementation, the FS has failed to complete adequate and meaningful monitoring for many of the items required by the Forest Plan. As a result, the impacts of logging, mining, road building, grazing, and other management practices are poorly understood.

For every project proposal, it is important that the results of past monitoring be incorporated into planning. All Interdisciplinary Team Members should be familiar with the results of all past monitoring pertinent to the project area, and any deficiencies of monitoring that have been previously committed to. For that reason, we expect that the following be included in the NEPA documents or project files:

- A list of all past projects (completed or ongoing) implemented in the proposed project area watersheds.
- The results of all monitoring done in the project area as committed to in the NEPA documents of those past projects.
- The results of all monitoring done in the proposed project area as a part of the Forest Plan monitoring and evaluation effort.
- A description of any monitoring, specified in those past project NEPA documents or the Forest Plan for proposed project area, which has yet to be gathered and/or reported.

The 1998 Forest Plan Monitoring and Evaluation Report states, "Necessary monitoring continues to be limited by available funding. The recommendations that follow will likely not occur without increased funding levels."

At the Washington Office level, the Forest Service has declared that funding was not to be an excuse to fail to meet forest plan implementation monitoring commitments.

National Forest System Associate Deputy Chief David Unger gave a speech entitled Expectations for Monitoring of Forest Plan Implementation, wherein he had this to say:

> There will be no additional "special" dollars to do monitoring. The funds that you already receive must be used. Recall that monitoring is an integral part of the total management process. That means that a year's activities under the Forest Plan are not completed until the monitoring of the effects of those activities, as specified in the Forest Plan, is completed.

Similar sentiments are echoed elsewhere in the report—that sufficient monitoring could not be carried out because of budget limitations. It appears that the officials responsible for seeing that sufficient monitoring take place have decided that more resource extraction should hold priority over understanding the impacts of past resource extraction, despite the concerns of resource specialists. The IPNF's past and ongoing failure to adequately monitor the impacts of implementing its Forest Plan means that site-specific project decisions would be implemented without the Responsible Official being able to accurately understand the impacts. This letter now discusses some of the IPNF's deficiencies in monitoring specific items.

MONITORING ITEM D-1

Forest Plan monitoring item D-1 is to measure the effects of Off-Road Vehicles (ORVs) on resources, uses, and public safety (Forest Plan at IV-11). The data source specified is very ambiguous. There is no description of how the data source will be used to measure conflicts or effects. ORV impacts are to be reported on an annual basis however reporting has not been consistent. No monitoring results were included in 1997 and 1994 reports. The 1995 noted illegal use on the St. Joe Lake Trail #49 and #48. Again in the 1993 report this same illegal use was reported as well as illegal use in 8 other areas causing erosion trail degradation and user conflicts. Plans to inform users of travel restriction to off-road vehicles were suggested as action to mitigate this damage. No action to deal with illegal trail usage or to inform users of trail restrictions has been reported on. Severe damage by ORVs was reported on the Chilco Mountain trail and rehabilitation was slated to begin following the 1993 monitoring report. There is no indication that restoration was ever done. The IPNF is not adequately monitoring effects of off-road vehicles.

Since the Forest Plan was written, there have been significant increases in the numbers of ORVs and snowmobiles in the forest. Also, the technology has evolved such that machines can move easier, faster, and over areas not previously accessible. The cumulative impacts of those factors has never been analyzed at either the Plan or project level.

Without consistent and meaningful monitoring of this item, it is impossible for the FS to be able to understand the cumulative effects of ORV impacts to resources such as wildlife populations, soil productivity, and water quality.

The Coeur d'Alene Ranger District's 1998 Access Management Environmental Assessment (AMEA) states that "Traditional recreation activities such as hiking, horse packing, hunting and other remote-area activities are being displaced by an

increasingly mobile and motorized recreator." This sounds something like reporting for Forest Plan monitoring item D-1, but does not distinguish between ORV and other motorized travel. The relationship between the AMEA and item D-1 is unclear at best. The significance of the described conflict on recreationalists and the amount attributable to ORVs is unclear. Moreover, the AMEA's preferred Alternative would add an additional 143 miles of motorized trail. Future "reasonably foreseeable actions" include new trail construction for motorcycles and additional ATV trail systems.

The implications of increasing ORV use on the Forest include increasing the spread of noxious weeds along roads and trails. This is but another cumulative impact never analyzed at the Forest Plan nor site-specific project level.

The AMEA explicitly states that its Preferred Alternative is likely to bring wide-ranging furbearers "closer to listing under the Endangered Species Act," and that animals "unable to move great distances would either become acclimatized to the disturbance or their population numbers would be reduced."

In essence, the astounding cumulative effects of ORVs—already poorly understood because of yearly increase in ORV use and because monitoring for Forest Plan item D-1 has not been adequate—will be exacerbated by any project which increases access or disturbance to wildlife, water quality, and nonmotorized recreation experiences.

MONITORING ITEM F-2: (Grizzly bear recovery)
the data source is very ambiguous. It is not clear how information is to be gained from Idaho Fish and Game. Also there is not enough stated specificity in the data sources. Until the 1998 report, the monitoring reports did not estimate population trends, therefore how recovery is proceeding is unclear. Forest Service recovery efforts seem to be failing since the U.S. Fish & Wildlife Service has determined uplisting from "Threatened" to "Endangered" is warranted. Also USDA Forest Service (2000a) admits that "populations are at or below half of the carrying capacity of the habitat…". Reports discuss acres of secure habitat for the grizzly but do not indicate what this has to do with recovery. Further, a number of reports state "the primary threat to recovery of grizzly bear populations is direct mortality from hunting" however no actions have been discussed (such as more road obliteration, etc.) as to how to remedy this situation (1996 report pg. 32).

MONITORING ITEM F-3 (Woodland caribou recovery)
This item is to be monitored and reported annually and the "threshold to initiate further action" is "not working towards recovery." The data source is very unclear. Monitoring reports do not include population levels, therefore how recovery is to be monitored is vague. Multiple reports state that caribou habitat is averaging less then 50 percent of the targeted conditions. Further, the 1996 report discusses the increase in mortality of caribou as a result of management activities adjacent to caribou habitat (pg. 33). In a number of reports it is discussed that data on the current populations are inconclusive to determining if recovery is occurring. The IPNF is failing to take actions to minimize the impacts of management activities on caribou habitat and continues to degrade the habitat without seeing how Forest Plan implementation is affecting recovery.

The failure to positively demonstrate recovery reveals that the IPNF, has been unable to comply with NFMA's viability requirements and is failing to meet its Forest Plan recovery goals.

MONITORING ITEM G-1 (Water/fish): Greater than 80% of potential emergence success
The IPNF declared that this was not a meaningful monitoring measure, and dropped this item without undergoing proper NEPA and NFMA forest plan amendment process.

MONITORING ITEM G-2 (Water/fish): Validate R-1/R-4 model
The IPNF now uses an updated version of the R-1/R-4 model—WATSED, which is itself an update of the WATBAL model. The only recalibration of WATSED was the addition of landtypes to the model. Barry Rosenberg had a brief conversation with Jerry Niehoff on July 13, 1999 in the Supervisor's Office in the presence of Steve Johnson, Rick Patton and Mike Mihelich. Rosenberg asked Patton when the last time the model was recalibrated, he said he wasn't sure and referred the question to Niehoff. Niehoff said the last time the model was changed was when landtypes were added to it several years ago.

There is no reference in IPNF monitoring reports that the data accumulated has actually been used to validate and/or recalibrate WATSED. Until the model's confidence levels are established through monitoring data the portion of any project analysis which relies on WATSED is questionable.

MONITORING ITEM G-3 (Water/fish): Validate fish habitat trends identified in the Forest Plan
The 1994 report states that habitat attributes are sub-standard in many watersheds; several fish populations continue on a downward trend (pg. 11), yet it appears no actions have been taken outside those forced by the public on behalf of bull trout. The 1998 Report reveals that habitat monitoring has been poorly designed and carried out, is unreliable, and is unable to show habitat trends in response to road building, logging, ORV use, and other actions that impact water quality.

MONITORING ITEM G-4: Fish population trends - cutthroat trout and bull trout
Information to be gained and how it is to be gathered is vague. The 1996 report states westslope cutthroat trout have a stable population but populations in the Upper Priest Lake system will likely result in a long-term decline of bull trout and westslope cutthroat populations due to competition (pg. 42). No actions are discussed to deal with this problem. Also no population numbers are stated. There was no reporting in 1994 despite the 2 year reporting requirement. The 1993 report suggests physical fish habitat and loss of residual pool depth and volume have resulted in a downward trend in fish populations (pg. 45). No actions are discussed to remedy this problem. The IPNF is not collecting the data, as required. The 1998 Report only has population trends reported once—for the portion of the Little North Fork Coeur d'Alene River from Laverne Creek to Deception Creek. These results, following over a dozen years of Forest Plan implementation, are not sufficient monitoring.

MONITORING ITEM K-1: Prescriptions and Effects on Land Productivity

USDA, 2000a provides monitoring data on impacts to soils. The problem is, the number of cutting units adequately monitored is too few to be able to make accurate prediction of the next proposed site-specific project. Too many variables (slope, aspect, soil type, yarding method, etc.) exist for the monitoring done to date to account for. Furthermore, USDA, 2000a reveals that monitoring of impacts of livestock grazing fails to apply the definitions of "detrimentally disturbed soils" and "activity area", meaning that cumulative effects with other past and proposed activities cannot be reliably estimated.

We request that complete cultural resources surveys be completed which satisfy the terms of the National Historic Preservation Act and its implementing regulations. These surveys must be done for all areas that are proposed for ground disturbing activities, including road construction, helicopter landing pad construction, ground-based log skidding units, and all other areas where the surface will be disturbed. Please include in your NEPA documentation, the survey methodology used, a copy of any Memoranda of Agreement with the State Historic Preservation Office, and the qualifications of the people doing the survey work.

The USFWS is, or soon will be designating critical habitat for bull trout and Canada lynx. Since habitat in the project area is likely, or ought to be, designated critical habitat, the FS must undergo formal consultation with the USFWS as part of this project proposal.

Many of the documents cited in this letter were provided to the IPNF as attachments to appeals of the Douglas-fir Beetle Project or Iron Honey project. The Ecology Center also provided a copy of dozens of scientific references in DEIS comments on the Lolo Post-Burn Project, Lolo NF. The project file for the Black Ant Salvage timber sale, Lewis & Clark NF also contains electronic versions of many of these documents. Please obtain copies of the documents in the list of references from these FS sources. If there are any in the list of references at the end of this letter that you cannot get from FS sources, please let us know so that we can be sure they will be placed in the project files during the comment period.

We expect that project interdisciplinary team will be aware of these issues as they develop the Twomile project proposal, and inquire if they are uncertain about how these comments relate to project planning. Thank you for your consideration of these important issues. Please keep our organizations on the list to receive all future mailings regarding this project proposal.

We conclude this comment letter with this passage from Frissell and Bayles (1996):

> Most philosophies and approaches for ecosystem management put forward to date are limited (perhaps doomed) by a failure to acknowledge and rationally address the overriding problems of uncertainty and ignorance about the mechanisms by which complex ecosystems respond to human actions. They lack humility and historical perspective about science and about our past failures in management. They still implicitly subscribe to the scientifically discredited illusion that humans are fully in control of an ecosystemic machine and can foresee and manipulate all the possible consequences

of particular actions while deliberately altering the ecosystem to produce only predictable, optimized and socially desirable outputs. Moreover, despite our well-demonstrated inability to prescribe and forge institutional arrangements capable of successfully implementing the principles and practice of integrated ecosystem management over a sustained time frame an at sufficiently large spatial scales, would-be ecosystem managers have neglected to acknowledge and critically analyze past institutional and policy failures. They say we need ecosystem management because public opinion has changed, neglecting the obvious point that public opinion has been shaped by the glowing promises of past managers and by their clear and spectacular failure to deliver on such promises.

Sincerely,

*And on behalf of:*
Alliance for the Wild Rockies
PO Box 8731
Missoula, MT 59807
405-721-5420

Jeff Juel
The Ecology Center

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FEB 27
CD'A RIVER R.D.

Kootenai Environmental Alliance

Joseph P. Stringer
District Ranger
Coeur d'Alene River Ranger District
2502 East Sherman Avenue
Coeur d'Alene, ID 83814

February 26, 2003

Dear Mr. Stringer:

The following comments and concerns are in response to the January 28, 2003 Twomile project letter. The Environmental Assessment (EA) for this project needs to supply accurate scientific analysis, expert agency comment, and high quality information, NEPA at 40 CFR 1500.1(b), as part of the analysis of issues associated with the project. These issues include the National Fire Plan, fire effects, and cumulative effects to the watershed from logging activities within and adjacent to the analysis area.

National Fire Plan (NFP):
The EA should provide information contained in the NFP regarding NFP requirements to reduce fire risks on private property adjacent to national forests. If there are specific requirements of the NFP relating to removal of brush, removal of small diameter trees, and protection of water supplies, these requirements should be included in the discussions concerning the NFP and the Twomile Project.
Specific requirements of the NFP that require timber sales on national forests, and directs that the volume removed be counted toward timber targets should be included in the EA. If the NFP includes specifications regarding the minimum and maximum diameter of trees required to be logged in order to be in compliance with NFP fuel reduction/fire hazard reduction projects, these specifications need to be included in the EA.

Fire issues:
The following analysis is taken from the USDA Forest Service publication Fire Management Today, Volume 61, No. 2, Spring 2001. The article "An ecologically based strategy for fire and fuels management in national forest roadless areas" included the following statements from page 13. "In the Sierra Nevada, McKelvey and others (1996) and Weatherspoon (1996) identified timber harvest as the single most important factor responsible for an increase in potential fire severity. In the Klamath Mountains of northwestern California, Weatherspoon and Skinner (1995) found that partial-cut stands with fuels treatment (lop and scatter or broadcast burning) burned more intensely and suffered higher levels of tree mortality than adjacent areas left uncut and untreated. Fire and fuel models also suggest that mechanical treatments alone, including silvicultural thinning and biomass removal, are not likely to be effective at reducing fire severity in dense stands (van Wagtendonk 1996)."

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Also from page 13 "In eastern Oregon and Washington, Lehmkuhl and others (1995) reported a positive correlation between logging, on the one hand, and fuel loadings and predicted flame lengths, on the other hand. They attributed the increased fire hazard in intensively managed areas to leftover slash fuels from tree removal activities (including thinning) and to the creation of dense, early-successional stands through overstory removal."
The fire analysis in the EA needs to supply accurate scientific analysis, high quality information, and expert agency comments that support the statement on page three of the project letter that commercial logging will reduce fire hazards in the analysis area. The scientific research that has shown short-term fire hazard reductions after commercial logging activities need to be included in the Fire analysis section of the EA.

Page three of project notice mentions tree thinning and both commercial and precommercial thinning treatments. The following information regarding thinning is taken from pages 15 and 16 of the article in Fire Management Today. "Although thinning has long been a part of intensive forest management, its efficacy as a tool for fire hazard reduction at the landscape level is controversial and remains fundamentally experimental in nature (DellaSala and others 1995; FEMAT 1993; Henjum and others 1994; SNEP1996; USDA Forest Service 2000). Few empirical studies have tested the relationship, even on a limited basis, between thinning or other fuels treatments and fire behavior. These studies, supported by anecdotal information and the analysis of recent fires, suggest that thinning treatments have highly variable results. In some instances, thinning intended to reduce the fire hazard appeared to have the opposite effect (Huff and others 1995; van Wagtendonk 1996; Weatherspoon 1996). Thinning might reduce fuel loads, but it also allows more solar radiation and wind to reach the forest floor. The net effect is often reduced fuel moisture and increased flammability (Agee 1997; Countryman 1955). Moreover, mechanical treatments fail to mimic the ecological effects of fire, such as soil heating, nutrient cycling, and altering forest community structure (Chang 1996; DellaSala and others 1995; Weatherspoon and Skinner 1999). In fact, according to the Sierra Nevada Ecosystem Project report, "although silvicultural treatments can mimic the effects of fire on structural patterns of woody vegetation, virtually no data exist on their ability to mimic the ecological functions of natural fire. Silvicultural treatments can create patterns of woody vegetation that appear similar to those that fire would create, but the consequences for nutrient cycling, hydrology, seed scarification, non-woody vegetation response, plant diversity, disease and insect infestation, and genetic diversity are almost unknown" (SNEP 1996)."

The fire analysis in the EA needs to provide high quality information, expert agency comments, and accurate scientific analysis regarding the expected environmental impacts to each of the areas where commercial and precommercial thinning activities would occur with each Action Alternative.
The fire analysis also needs to provide high quality information, expert agency comments and accurate scientific analysis to describe each of the areas that have a relatively high level of hazardous fuels, as described on page four of the project letter. This analysis should indicate whether any of these areas have had previous logging activity.

Twomile Watershed/cumulative effects:
Page one of the project letter indicated the watershed is classified as functioning at risk (FAR), and on page two it was stated there has been a small amount of logging on national forest lands within the analysis area.
The watershed analysis in the EA needs to describe the activities within the watershed that have resulted in the watershed being in a FAR classification. The analysis should include the current conditions for each Creek within the analysis area regarding bedload movement, and indicate whether flow data within the analysis area indicates peak flows are believed to have increased during the past 20 years. The analysis should also indicate whether logging activities on private lands in the watershed contributed to the FAR classification.
There should be a cumulative effects analysis that will describe the condition of the watersheds adjacent to the analysis area in the event fire projects are planned in areas adjacent to the Twomile area.

Vegetation:
The vegetation analysis needs to indicate the number of stands in the analysis area that once contained a significant amount of mixed, open stands of ponderosa pine, with the estimated number of acres for the all of the stands that historically were in this category. On page two of the project letter it is indicated many stands contain mature Douglas-fir (DF). The stand numbers for the stands with mature DF need to be disclosed. Information should also be supplied for the stands with mature DF that would be logged as part of an Action Alternative.

Road access:
On page four it was stated the Twomile watershed has limited access. The roads analysis should describe the current status of roads 271, 424, and 2322 that are within the analysis area. The sections of national forest land within the analysis area that do not have any system or non-system roads needs to be displayed in the EA.

Sincerely,
Mike Mihelich
Mike Mihelich Forest Watch Coordinator

Literature citation:
DellaSala, D.A.; Frost E. 2001, An ecologically based strategy for fire and fuels management in national forest roadless areas. Fire Management Today, Volume 61, No.2, Spring 2001.

# APPENDIX F - NOXIOUS WEEDS

## Regulatory Framework For Noxious Weeds

Federal legislation, regulations, policy and direction that require development and coordination of programs for the control of noxious weeds, and evaluation of noxious weeds in the planning process include: The National Forest Management Act (1976); the National Environmental Policy Act (1969); Forest Service Manual (Chapter 2080, as amended, (1995); Executive Order #13112 (February 1999); Idaho Panhandle National Forests, Forest Plan (1987); and the Idaho Panhandle National Forests Weed Pest Management EIS (1989).

The Forest Service Handbook (FSH 3409; PF Doc. NW-1), on Forest Pest Management defines a strategy for managing pests, including noxious weeds, as "A decision-making and action process incorporating biological, economic, and environmental evaluation of pest-host systems to manage pest populations". (FSH 3409.11 6/86; PF Doc. NW-1) This strategy is termed Integrated Pest Management (IPM). The Forest Plan provides the following direction for implementing an Integrated Pest Management program: "Noxious weed control will be based on an integrated pest management approach, which includes but is not limited to the current practices of inventory, monitoring, some hand-pulling, and some biological control. Noxious weed control will be conducted in cooperation with counties, other agencies, and private landowners." The overall IPNF strategy is to contain weeds in currently infested areas and to prevent the spread of weeds to susceptible but generally un-infested areas. The noxious weeds management strategy for the Coeur d'Alene River Ranger District was outlined in the "Noxious Weeds Final Environmental Impact Statement" (IPNF, 2000; PF Doc. NW-2). It follows the general IPNF strategy. All weed treatments conducted on the Coeur d'Alene River Ranger District are conducted according to the guidelines contained in the EIS. Some additional key objectives of this strategy include:

- *Protect the natural condition and biodiversity of the Coeur d'Alene River Basin ecosystem by preventing or limiting the spread of aggressive, non-native plant species that displace native vegetation.*
- *Eliminate new invaders before they become established.*
- *Protect sensitive and unique habitats.*
- *Reduce weed sources at potential dispersion sites, such as recreation sites, trail heads, and dispersed campsites, and along main travel routes (roads and trails).*
- *Comply with Federal and State laws regulating management of noxious weeds.*

Noxious weeds are those plant species that have been officially designated as such by Federal, State, or County officials. In *Weeds of the West* (Whitson et al. 1992; PF Doc. NW-3), a weed is defined as "a plant that interferes with management objectives for a given area of land at a given point in time." 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; PF Doc. NW-4). The Idaho Noxious Weed Law defines a "noxious weed" as any exotic plant species 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; PF Doc. NW-5). Both Federal and State laws define noxious weeds primarily in terms of interference with commodity uses of the land. However, the impacts of noxious weeds on non-commodity resources such as water quality, wildlife and natural diversity are of increasing concern.

# Affected Environment for Noxious Weeds

## Characterization

The recent scientific assessment of the Interior Columbia Basin found that herbaceous and shrub wetland vegetation types in the Upper Columbia River Basin (including riparian habitats) have declined in area from historical conditions, in part due to invasion by certain noxious weed species (Quigley and Arbelbide 1997; PF Doc. NW-6). Wetland habitat in the analysis areas is also vulnerable to decline from encroaching weeds. Rangelands and dry forest types within the analysis areas and surrounding region were described in the above assessment as having low ecological integrity, again in part due to noxious weed invasions (Quigley, Haynes et al. 1996; PF Doc. NW-7).

The spread of noxious weeds can primarily be attributed to human-caused dispersal such as vehicles and roads (Roche and Roche 1991; PF Doc. NW-8), contaminated livestock feed, contaminated seed, and ineffective revegetation practices on disturbed lands (Callihan et al. 199; PF Doc. NW-9). Vallentine (1988; PF Doc. NW-10) explains that some of the worst noxious plant problems are caused by weed species such as leafy spurge, Canada thistle, the knapweeds, and dalmatian toadflax. The introduction of these and other noxious weeds has occurred throughout the Coeur d'Alene River Basin, especially in urban and agricultural areas, along major highways and travel routes, and areas within the forest that have experienced disturbance from intense recreation, roading, and timber harvest (USDA Forest Service, Toward An Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin, February, 1998, pages 39-40; PF Doc. NW-11). Non-native species can impact the native flora and reduce native biodiversity, especially in diverse habitats like riparian zones, sensitive communities like wetlands, or inherently rare communities like subalpine balds, fens and seeps.

Roads and trails serve as corridors for the dispersal of many noxious weed species. Noxious weed seeds and plant parts are moved along road systems by vehicles, people, wildlife and livestock, allowing the establishment of noxious weeds into previously uninfested areas. Improved roads can act as conduits for the invasion of adjacent ecosystems by converting natural habitats to those highly vulnerable to invasion (Gelbard and Belnap, 2003;NW-12) Many of the road systems within the project area contain infestations of noxious weed species such as spotted knapweed, toadflax, and St. Johnswort.

In disturbed forested habitats, most weed species tend to proliferate in early successional stages and are reduced in density as canopy cover closes (Zack 1999; PF Doc. NW-13). However, in the interim, these transitory populations serve as seed sources for continued species expansion. Some species, such as spotted knapweed, produce large quantities of seed, which may remain dormant in the soil for many years until disturbance from fire, timber harvest or other disturbance provides favorable conditions for their germination and growth.

## Existing Noxious Weeds Condition

A limited program of noxious weed treatment has been ongoing on the Coeur d'Alene River Ranger District since 1989. Until 1996, weed surveys were limited on the Coeur d' Alene River Ranger District. In 1996, noxious weed surveys were conducted at 76 sites. Over 1,800 acres of potential habitat for infestation were documented for these sites, with an estimated 822 acres of actual infestation (IPNF 2000; PF Doc. NW-2). The major noxious weed species and weeds of concern identified include:

- meadow hawkweed (*Hieraceum pratense*)
- spotted knapweed (*Centaurea biebersteinii*)
- orange hawkweed (*Hieraceum aurantiacum*)
- dalmatian toadflax (*Linaria genistifolia* ssp. *dalmatica*)
- Canada thistle (*Cirsium arvense*)
- St. Johnswort (*Hypericum perforatum*)

- yellow toadflax (*Linaria vulgaris*)
- oxeye daisy (*Leucanthemum vulgare*)
- common tansy (*Tanacetum vulgare*)
- Viper's bugloss (*Echium vulgare*)

All of the above listed species occur in the Twomile Resource Area. Viper's bugloss (*Echium vulgare*) is a new invading species of particular concern that is present in several roadside spots in the resource area. Other species that would be considered for treatment if found to be present include leafy spurge (*Euphorbia esula*), hound's-tongue (*Cynoglossum officinale*), rush skeletonweed (*Chondrilla juncea*), sulfur cinquefoil (*Potentilla recta*), purple loosestrife (*Lythrum salicaria*), bull thistle (*Cirsium vulgare*), yellow star thistle (*Centaurea solstitialis*), musk thistle (*Carduus nutans*), and diffuse knapweed (*Centaurea diffusa*). No inventories specifically for noxious weeds have been done for this project. Weed infestation data was collected during the course of road and rare plant inventories, and has been used in prioritizing proposed weed treatments. This information is contained in the rare plant survey documentation in the project file (PF Doc. TES-16).

Vegetative communities within the Coeur d'Alene subbasin vary from dry and semi-dry to moist forest habitats and wetlands. A description of these communities and their susceptibility to weed invasions can be found in the project file in PF Doc. NW-14. The suitability of a site to weed invasion depends on the weed species, climatic factors that are expressed in the cover vegetation type, and the type of activity, when applicable. Table 1 of PF Doc. NW-14 has been adapted from the scientific assessment of the Interior Columbia Basin, and displays susceptibility of the Resource Area's major vegetative community types to invasion by several weed species of concern.

Dry community types, as shown in NW-14, are highly susceptible to weed invasion from such species as spotted knapweed, Dalmatian toadflax, and St. Johns wort. These species are currently infesting many sites in the Resource Area. A high percentage of forest cover types in the Twomile area are of the weed-susceptible Douglas-fir, and ponderosa pine/larch types.

The diverse habitats and shifting dynamics of riparian zones make them uniquely susceptible to weed invasions. The richest plant communities along a river system are the most vulnerable to invasion (Planty-Tabbacchi et al. 1996; PF Doc. NW-15). Research has shown that the number of native species, as well as their total biomass, would decrease within locations infested by noxious weeds. Orange and meadow hawkweed, knapweed, blueweed, purple loosestrife, and common tansy are common riparian area invaders in the subbasin. Weeds have been brought into these areas by vehicle travel on roads and cattle grazing. Drainages provide a means of dispersing weed seeds for long distances. Most of the listed Sensitive plants for the Coeur d'Alene River Ranger District are associated with moist to wet forests, and are at risk of losing suitable habitat due to weed invasion in these areas.

As shown in Table F-1, certain cover types have a high degree of vulnerability to invasion by several weed species. A "high" risk rating indicates that a particular weed can successfully establish and become dominant in a cover type in the absence of intense or frequent disturbance. Weed species considered *invaders* in some of the forest cover types found in the Resource Area include spotted knapweed, diffuse knapweed, bull thistle, Canada thistle and sulfur cinquefoil.

Other weed species are considered *colonizers*, able to invade and establish in certain cover types after soil disturbance or canopy removal. Beetle-affected forest cover types within the analysis areas fall into this "moderate susceptibility" category for many weed species of concern, including oxeye daisy, Dalmatian toadflax, orange and meadow hawkweeds, leafy spurge and yellow star thistle.

Based on the information regarding susceptibility of broad scale cover types, the table below represents the amount of habitat vulnerable to invasion by one or more weed species. Acres under Alternative 1 are the forest cover types existing on National Forest System lands in the Resource Area. Acres under Alternatives 2 through 4 represent the change in cover types predicted to result from proposed activities.

***Table F-1. Acres of susceptible vegetative cover types, by alternative.***

| Forest Cover Type | Alt 1*& Alt. 4 | Alt 2 | Alt 3 |
|---|---|---|---|
| Interior Douglas-fir | 3,449 | 2,828 | 2,726 |
| Interior ponderosa pine/Larch | 618 | 1,239 | 1,341 |
| Grand fir | 412 | 412 | 412 |
| Lodgepole pine | 91 | 91 | 91 |
| White pine | 103 | 103 | 103 |
| **Total acres** | 4,673 | 4,673 | 4,673 |

**Stands included under Alternative 1 include the total of all Forest Service administered lands in the Resource Area.*

# Environmental Consequences to Noxious Weeds

### Methodology Used in the Analysis of Environmental Consequences to Noxious Weeds

Analysis was conducted using results of past noxious weed surveys, documented distribution of weed species in habitats similar to those found in the proposed treatment sites, types of proposed treatments and the risk of weed spread and introduction of new weed invaders from the proposed activity, based on current knowledge and professional judgment.

Indicators used to measure impacts on weed spread and introduction include the number of acres proposed for ground-based timber harvest and/or fuels treatment, the number of miles of proposed new road construction and reconstruction, and the proximity of proposed treatment areas to known weed infestations.

### Effects to Noxious Weeds Common to All Action Alternatives

#### *Direct and Indirect Effects to Noxious Weeds*

Areas of soils disturbance in susceptible habitats are at risk for weed invasion, particularly when ground-disturbing activities occur near existing infestations. The majority of the Twomile Resource Area is at risk of weed invasion and spread due to the predominance of dry forest types as displayed in Table NW-1. Different management activities vary in the level of risk for weed invasion on affected sites. There would be little direct effect to noxious weeds due to activities; most effects would be indirect or cumulative in nature. “Features Designed to Reduce Noxious Weeds” under all action alternatives (Chapter 2) would help reduce, but not eliminate, the risk of weed spread due to proposed activities.

Pre-treatment of all roads used in the timber sale is a feature of Alternatives 2 and 3. Treatment of roadside blueweed (*Echium vulgare*) populations that were located during field surveys is also a feature. Blueweed is classified as a “new invader,” with a limited occurrence in the Resource Area, and can be effectively controlled. The project area has been evaluated for opportunities to treat weed infestations if additional funding becomes available. A list of features and opportunities for noxious weed treatment is included in the project file (PF Doc. NW-16).

Timber harvesting, road construction/ rehabilitation, and various fuels treatments would have the greatest risk of introducing and spreading weeds in the project area.

**Timber harvesting** is a feature of Alternatives 2 and 3. Shelterwood and seed tree regeneration harvests would be the primary systems used, while commercial thinning would be used on approximately 10 percent of the harvested acres. The regeneration treatments would remove most of the overstory trees and underburning would be used as site preparation for tree planting. Units where shelterwood or seed tree harvest is implemented with skyline yarding and underburning would have the highest risk in terms of weed spread. More soils disturbance would occur with this type treatment when compared to intermediate harvests, such as thinning. The increased amount of sunlight reaching the ground would also make these units more prone to weed invasion by sun-dependent species such as spotted knapweed. Alternatives 2 and 3 would have the majority of units yarded by helicopter, so the acreage most at risk from this combination of treatments is relatively small.

Commercial and precommercial thinning would result in a much lower risk of weed spread than with regeneration treatments because most of canopy cover would remain, and there would be no site preparation. Weeds such as Dalmatian toadflax and spotted knapweed are shade intolerant and would not spread readily in the more shaded intermediate treatment units.

**Road construction, reconstruction, reconditioning, decommissioning, and fire line construction** would cause soil disturbance. Many roads in the project area are currently weed- infested and there is a risk of indirectly introducing noxious weeds into newly disturbed sites. Road construction could link already infested sites to further increase weed spread. This occurs by means of equipment, animals, off-road vehicles and other vehicles. Since most of the project area roads would be temporary, rehabilitation would occur, such as ripping and grass seeding, prior to road closure, therefore reducing the risk of invasion.

**Fuels Treatments** such as prescribed fire would directly affect some weeds, and may indirectly affect some habitats, making them more susceptible to weed invasion.

- ***Spotted knapweed (Centaurea maculosa****) plants present before burning may re-sprout from root crowns, and seedlings may emerge from the seed bank or invade bare ground from an off-site seed source following fire. Differences in the observed response of spotted knapweed to fire may be regional, may differ with the density of the infestation, may be different in low fire severity versus high fire severity microsites, and in spring versus fall burns (USFS 2003; NW-17).*

- ***Toadflax (Linaria spp.)*** *is likely to be top-killed by fire, however its deep, extensive root system is likely to survive even severe fire and allow re-establishment of the population from vegetative buds on roots. Toadflax is able to recover after fire and may even be promoted by fire, especially if other species are reduced. The post fire environment is well suited to establishment by seed. (USFS 2003; NW-17).*

- ***Canada thistle (Cirsium arvense)*** *varies in its response to fire, depending on vegetation and site characteristics, as well as frequency, severity, and season of burning. This species is slightly damaged to enhanced by fire. It can survive fire and re-sprout vegetatively from its extensive perennial root system, or colonize bare ground via seedling establishment after fire. Several studies have indicated the presence of Canada thistle in burned areas where it was absent from the pre-fire community and/or adjacent unburned areas (USFS 2003; NW-17).*

- ***Cheatgrass (Bromus tectorum)*** *is an invasive species that has been widely documented to increase on sites following fire (USFS 2003; NW-17). The effect cheat grass invasion on dry sites following fire is to out-compete native forbs for moisture, thus becoming the dominant ground cover.*

Prescribed fire would be used to prepare regeneration harvest units for planting and for fuels reduction, following slashing in commercial and non-commercially treated units. Exposure of mineral soil is likely in regeneration units, thereby creating a suitable seedbed for weed introduction. Weed populations, constituting a ready seed source, are documented to exist on roads and within units proposed for treatment. Though many of the common weeds invade after site preparation, they tend to decrease as the site becomes stocked with planted conifers and native vegetation. This is a long-term process of vegetation succession, taking up to 20-30 years or more to achieve canopy closure. In all action alternatives, prescribed fire would be used both within and outside the boundaries of harvest units. The objective of these fires would be to reduce smaller diameter fuels with a low intensity burn. There would be a risk of fires burning outside of the unit boundaries or at a higher severity than desired, thereby increasing the spread of certain weed species on susceptible acres. Burning prescriptions would strive to minimize those risks.

Chipping as a ground-based mechanical fuels treatment would disturb the soil and provide areas for weed invasion, with no further prevention measures. There is also the potential for equipment to spread weed seeds from infested sites to newly disturbed ground. Contract provisions for construction equipment washing would greatly reduce this risk (Chapter 2, Features Designed to Reduce the Spread of Noxious Weeds).

**Cumulative Effects to Noxious Weeds**

While existing infestations of certain weed species may continue to increase on Federal lands and adjacent private lands, proposed activities under all action alternatives would minimize the risk of weed spread by application of the "Features Designed to Reduce the Spread of Noxious Weeds" described in Chapter 2. Weed treatment and prevention practices as proposed would minimize, but not eliminate, the risk of weed spread. The Forest Service does not have control over activities occurring on private lands; weed introduction and spread is likely occurring.

***Cumulative Effects to Noxious Weeds Resulting From Reasonably Foreseeable Actions***

A list of reasonably foreseeable and ongoing projects in Coeur d'Alene River Ranger District is included in Chapter 2. Projects include weed treatment, timber harvest on federal, and private lands, timber stand improvement, road maintenance, prescribed burning, recreation and road access, and slash disposal. Additional weed treatment will be considered in the Resource Area depending on available funding.

Implementation of foreseeable future and current actions on National Forest lands will, in most cases, have a low level of cumulative impacts on the risk of weed spread, since the Coeur d'Alene River Ranger District is committed to implementing treatment and prevention practices (Chapter 2, "Features Designed to Reduce the Spread of Noxious Weeds") where ground or vegetation disturbance and/or canopy removal would occur.

**Effects to Noxious Weeds as a Result of Implementing Alternative 1 (No-Action)**

*Direct and Indirect Effects to Noxious Weeds Under Alternative 1*: With the No Action Alternative, there would be a natural reduction in forest canopy cover due to forest insect and disease induced mortality. Canopy loss would make conditions in the dry Douglas-fir and ponderosa pine/larch cover types more suitable to certain common weed species such as St. Johns wort, thistles, toadflax, and spotted knapweed. Where these species are already established in affected areas, they would likely increase. However, these effects would be limited because of the lack of ground disturbance occurring with this natural event. The direct effect of the loss of canopy and resulting indirect effect of increased light and a warmer, drier micro-environment, would be most pronounced on dry, Douglas-fir, ponderosa pine/larch habitat types. There would be little direct, indirect, or cumulative effect to moist forest and riparian habitats. In habitats with a developed shrub layer, the shrub cover would increase, limiting the risk of weed encroachment. Douglas-fir cover types with grass/forb understories would be affected to a greater degree by invading weeds.

Indirectly, the lack of fuels treatment in Alternative 1 would, over time, increase the risk of high severity fire in the event of a wildfire. High severity burned areas have more exposed mineral soil that would be susceptible to weed invasion.

*Cumulative Effects to Noxious Weeds Under Alternative 1:* Cumulatively, areas where continued tree mortality results in significant canopy loss would be at greater risk of weed spread, particularly in dry habitats which are already open to semi-open and dominated by grass-forb understories. Stands with higher rates of fuels accumulation would be at increased risk of a severe wildfire, exposure of mineral soils and increased risk of weed spread. The cumulative effects of Alternative 1 are expected to be low to moderate.

**Effects to Noxious Weeds as a Result of Implementing Alternative 2**

*Direct and Indirect Effects to Noxious Weeds Under Alternative 2*: The harvest and fuels treatments in Alternative 2 would be similar to Alternative 3, except that a greater proportion of the activities would be ground based, resulting in more soils disturbance and weeds risk. Most of the harvest acres would be in dry ponderosa pine/larch and Douglas-fir cover types. This alternative would have the greatest effect in terms of weeds risk due to the amount of ground disturbing activities such new road construction, road reconstruction, timber harvest, cable yarding and site prep methods associated with regeneration treatments.

*Cumulative Effects to Noxious Weeds Under Alternative 2:* Cumulative effects with this alternative would be low to moderate. Most of the harvest treatment acres would be at risk of weeds invasion and this alternative would have the most road construction.

**Effects to Noxious Weeds as a Result of Implementing Alternative 3**

*Direct and Indirect Effects to Noxious Weeds Under Alternative 3:* The effects of this alternative would be similar to, but slightly less that of Alternative 2. Most of the units would be helicopter yarded and the amount of new road construction would be approximately one fourth that of Alternative 2.

*Cumulative Effects to Noxious Weeds Under Alternative 3:* The cumulative effects of this alternative would be very similar to that of Alternative 2.

**Effects to Noxious Weeds as a Result of Implementing Alternative 4**

*Direct and Indirect Effects to Noxious Weeds Under Alternative 4:* Alternative 4 would impact the least acreage with ground disturbing activities. Fewer total acres would be treated, there would be no commercial harvest, and there would be less underburning for fuels reduction. No road construction would be implemented. The direct and indirect effects of Alternative 4 would be very low.

*Cumulative Effects to Noxious Weeds Under Alternative 4:* Cumulative effects would be similar to Alternative 1. Although effects due to soils disturbance would be low, a relatively small proportion of the resource Area would be treated to reduce the risk of wildfire.

**Cumulative Effects to Noxious Weeds as a Result of Implementing the Identified Opportunities**

Watershed restoration projects such as road obliteration, removal or improvement of stream crossings and placement of instream structures to benefit fish habitat could increase the risk of weed spread and of new invasions through moderate levels of soil and vegetation disturbance. Weed treatment and prevention practices would reduce this risk (Chapter 2, Features Designed to Reduce the Spread of Noxious Weeds). In addition, removal of problematic road segments would reduce or eliminate chronic erosion of topsoil, which can discourage establishment of native species and encourage invasion of weed species that readily establish on disturbed soils. Removal of unneeded roads and road segments also reduces the availability of travel corridors that hasten the spread of weeds from vehicle traffic.

Weed treatment and prevention projects would be conducted in accordance with the noxious weed features included in the Coeur d'Alene River Ranger District Noxious Weeds Final EIS (USDA 2000). Timber stand improvement work would have no effect on the spread of weeds.

## Consistency With the Forest Plan and Other Applicable Regulatory Direction in Regard to Noxious Weeds

All action alternatives proposing management activities within the Twomile Resource Area, with the provisions for minimizing weed spread (Chapter 2, Features Designed to Reduce the Spread of Noxious Weeds), would meet the intent of the Forest Plan for noxious weeds. Alternative 1 (No Action) would also meet the intent of the Forest Plan. The Forest Plan (1987; PF Doc. NW-18) lists objectives for noxious weeds:

**k. Range (PF Doc. 18, p. II-7-8):**

***Noxious weed control will be based on an integrated pest management approach, which includes, but is not limited to, the current practices of inventory, monitoring, some handpulling, and some biological control.***

Weed control on the Coeur d'Alene River Ranger District is conducted in accordance to guidelines established in the Noxious Weeds Final Environmental Impact Statement, 2000 (PF Doc. NW-2). The guidelines provide for a strategy of integrated weed control, including inventory, monitoring, and manual, chemical, biological, and cultural treatment methods. An "adaptive" strategy is outlined that allows for consideration of new treatment methods, if they become available, and treatment of new infestations that may

be discovered. The FEIS identified a total of 76 infested sites across the District that are planned for weed treatment. Each site was analyzed for weed species present, infestation level, and the most effective method of treatment (PF Doc.NW-2. Site #68 (Road. 271) is within the Twomile Resource Area. Other infested roads, trails, and meadows in the Twomile Resource Area were considered for treatment. A list of priorities for weed treatment is included in Project File (PF Doc. NW-16). The extent of weed treatment is dependent of the availability of funding.

***Noxious weed control will be conducted in Cooperation with counties, other agencies, and private landowners.***

The Coeur d'Alene River Ranger District is an active member of the Inland Empire Cooperative Weed Management Area, a group of County, Federal, State, and other agencies and private citizens that work together on noxious weed control efforts in northern Idaho. District weed project managers coordinate and share information about planned weed treatments with the group on a regular basis. In accordance with the FEIS, the public is notified when weed treatments are planned to occur on Forest Service lands and on lands adjacent to private.

***Many noxious weed species, including knapweed, St. Johns wort and common tansy, are widespread and control would require a major cooperative effort with counties and private landowners. Major programs to eradicate such species are not possible within expected budget levels. Priority will be given to small infestations of species new to an area, where moderate control actions have a good chance of preventing the establishment of new problems. (Forest Plan, p. II-7; PF Doc. NW-18).***

The Noxious Weeds FEIS, 2000 (PF Doc. NW-2) listed elimination of new invaders (weed species not previously reported in the area) before they become established in the Purpose and Need for Action (FEIS, 2000 (PF Doc. 2, p. 1). Surveys conducted for the FEIS, and subsequent to it, identify sites of new invading species and make them a priority for treatment. There is one documented infestation site of blueweed, considered a new invader, in the Resource Area on Road 424E. It has been identified as an opportunity for treatment. Other new invaders that are found in the Resource Area would be treated, given the availability of funding.

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# APPENDIX H - TRANSPORTATION

## Introduction

The transportation analysis area covered an area approximately 5,182 acres in size, which is larger than the Twomile Resource Area. The analysis area is the same area as used in the Roads Analysis Report (PF Doc. TRAN-1).

The Roads Analysis Report documents the roads analysis performed for the Twomile Resource Area and is the basis for the transportation plan (PF Doc. TRAN-2) for the area. The report also helped identify and prioritize road construction, reconstruction, and decommissioning opportunities. The purpose of the Roads Analysis Report is to:

> *"Provide line officers with critical information to develop road systems that are safe and responsive to public needs and desires", and provide roads that…are affordable and efficiently managed and have minimal negative ecological effects on the land" (FS-643, "Roads Analysis: Informing Decisions about Managing the National Forest Transportation System, USDA Forest Service, 1999).*

Decisions about the transportation system in the Twomile Environmental Assessment were based on the roads analysis recommendations.

## Regulatory Framework for Transportation

The regulatory framework governing management of transportation on National Forest System lands is based on:

- **National Forest Management Act (NFMA):** *Directs that roads be designed to standards appropriate for intended uses and requires the re-vegetation of roads within 10 years of the termination of temporary and undeveloped roads created under contract, permit or lease.*
- **Clean Water Act (CWA):** *Section 404 of the Clean Water Act authorizes the Secretary of the Army to issue permits for the discharge of dredged or fill material into wetlands (33 CFR 322). Roads for timber management are exempt from the permit process if they are constructed and maintained with the use of BMPs listed in 40 CFR 323.a as well as those approved in the rules and regulations of the Idaho Forest Practices Act.*
- **State of Idaho Forest Practices Act (FPA):** *The purpose of Rule 040, Title 38, Chapter 13 of the Idaho Code is to provide standards and guidelines for road construction and maintenance that will maintain forest productivity, water quality, and fish and wildlife habitat.*
- **Alaska National Interest Lands Conservation Act (ANILCA):** *Access to non-Federal inholdings is governed by Section 1323(a) of this act. Implementing direction for this authority is found in regulations at 36 CFR 251 Subpart D-Access to Non-Federal Lands.*
- **National Forest Roads and Trails Act:** *Authorizes the road and trail systems for the National Forests, the granting of easements across Forest Service administered lands, the construction of maximum economy roads and the imposing of requirements on road users for maintaining and reconstructing roads.*
- **36 CFR 219:** *Sets the requirements for integrating forest resources, including transportation access and travel management, into the planning process, integrating biological, physical, social, and economic factors and environmental design criteria. Integration could involve the Endangered Species Act, the Clean Water Act and the National Historic Preservation Act.*

- **36 CFR 212:** *Establishes the requirements for the administration of the forest transportation system and provisions for acquisition of rights-of-way. Describes a minimum road system and requires a science-based analysis to plan the road system.*
- **36CFR 251, subpart D**: *Governs procedures by which landowners may apply for access across National Forest System lands, the terms and conditions that govern any special use authorization that is issued by the Forest Service to permit such access, and the criteria that authorized officers must consider in evaluation such applications. The rules provide that, subject to the terms and conditions set out in the rules, "landowners shall be authorized such access as the authorized officer deems to be adequate to secure them reasonable use and enjoyment of their land."*
- **36 CFR 261.12 and 261.54:** *Establishes prohibitions on National Forest System road that are enforceable by the Forest Service.*
- **FSM 2700:** *Provides direction for special uses management on National Forest System lands. Chapter 2730 – Road and Trail Rights-of-way Grants, covers policies, authorities, and direction for granting rights-of-way for roads and trails across National Forest System lands and interests in lands.*
- **FSM 5400, Chapter 5460:** *Provides direction concerning rights-of-way acquisition.*
- **FSM 7700:** *Provides direction for the planning, construction, reconstruction, operation and maintenance of the Forest Transportation System. Sets forth the authority, objectives, policy, responsibility and definitions related to the Forest Transportation System.*
- **IPNF Forest Plan:** *Forest-wide management direction in the form of goals, objectives and standards are contained in Chapter II. Goals for transportation facilities is to construct, manage and maintain transportation facilities to meet management area goals in a cost effective way while meeting safety, user, and resource needs. Chapter III of the Forest Plan provides more specific management direction for individual management areas. The Forest Plan provides some specific direction related to access and road management. Forest Plan standards for lands in the analysis area are to utilize the lowest standard road meeting transportation objectives compatible with resource protection and area management goals.*

## Existing Transportation System

Approximately 37 miles of existing road are within the Twomile Transportation Analysis Area, and approximately 6.8 miles of these roads are on private lands. (The acres in Chapter 3, Aquatics may differ due to different analysis boundaries.) Approximately 6.2 miles of National Forest System Road (NFSR) are currently open to cars and trucks in the Twomile Transportation Analysis Area (PF Doc. TRAN-3); however, approximately 17.4 miles (including the private parcels) are physically open and receiving car and truck traffic at this time.

Road 271 provides access into the Twomile Transportation Analysis Area from the north, through Twomile Saddle and from the south, from I-90 at Osburn Idaho. A portion of Road 271 is poorly maintained and not recommended for car traffic. Road 424 connects Twomile Saddle to Dobson Pass and allows access into the area from the east. Road 6533 provides access into the area from the south through Silverton via a private road. Roads 953 and 954 spur off the 424 Road and provide access from the east. Many of the interior roads were built for mineral exploration and timber harvest and are either brushed-in or have access to them restricted by an earth barrier. Road 6533 is closed with a gate. The open roads in the area are designed to pass a moderate volume of multi-purpose traffic involving a variety of forest uses, from recreation to timber and heavy-equipment transport.

The following table summarizes the existing condition of the Twomile Transportation Analysis Area. Open roads are delineated as being physically open to high clearance truck traffic, even though the road may be closed according to the Coeur d'Alene River Ranger District Travel Plan. Roads that are physically open but closed according to the Travel Plan may be used for administrative traffic.

***Table H.1. Existing Road Conditions in the Transportation Area, by Ownership***

| Existing condition | NFS[1] Lands | Other Lands | Total |
|---|---|---|---|
| Transportation Analysis Area (acres) | 4,705 | 477 | 5,182 |
| Road miles | 30.0 | 6.8 | 36.8 |
| Road density (miles of road per square mile of land) | 4.1 | 9.2 | 4.5 |
| Open road miles (roads not on the Travel Plan are open to administrative use only) | 12.4 | 5.0 | 17.4 |
| Open road density | 1.7 | 6.7 | 2.1 |
| System road miles | 8.6 | 0 | 8.6 |
| CD'A RRD Travel plan road miles | 6.2 | 0 | 6.2 |
| Unclassified roads | 21.4 | 6.8 | 28.2 |

Currently there are 8.6 miles of classified (system) roads located in the Twomile transportation analysis area. There are also approximately 28 miles of unclassified (non-system) roads within the transportation area. Approximately 6.8 miles of these roads are on private lands. All roads within the transportation area consist of native or gravel surfaces, except for 0.7 miles of the southern end of Road 271, which is maintained by Shoshone County.

***Revenue Gulch Access***

Teleview Road 6533 is recommended as the best overall road access for the area south of Nuckols Gulch. Analysis details for this recommendation are contained in the Revenue Gulch Access Analysis, Appendix E of the Roads Analysis Report (PF Doc. TRAN-1).

## Environmental Consequences to Transportation

***Direct and Indirect Effects to Transportation Common to all Alternatives***

There are multiple separate parcels of private property within the Transportation Analysis Area. Access to these parcels would not be changed with any of the alternatives other than about 70 yards of road that would be constructed on private lands in section 10 under Alternative 2.

***Direct, Indirect, and Cumulative Effects to Transportation Under the Alternatives***

Direct, Indirect and Cumulative Effects to Transportation Under Alternative 1: The transportation system would remain the same as the existing condition. The management of each road would not change. This alternative would have a total road density of approximately 4.5 miles of road per square mile of land. No roads would be scheduled for decommissioning (Table H-2).

Direct, Indirect and Cumulative Effects to Transportation Under Alternative 2: Road construction, reconstruction, and reconditioning would begin in 2005. Yarding of units could also begin in 2005. Approximately 9 miles of existing (closed) road would be managed as additional trail (Table H-2). During activities, the open road density would be 2.6 miles of road per square mile of land (Table H-3). After the completion of post sale activities, open road density would be 1.7 miles of road per square mile of land, with total road density reduced to approximately 4.4 miles of road per square mile of land (Table H-4).

Direct, Indirect and Cumulative Effects to Transportation Under Alternative 3: Road construction, reconstruction, and reconditioning would begin in 2005. Yarding of the units could also begin in 2005. Approximately 9 miles of existing roads would be managed as additional trails (Table H-2). During activities, the open road density would be 2.3 miles per square mile of land (Table H-3). After the completion of post-sale activities, the open road density would be 1.7 miles of road per square mile of land. After activities are implemented, this alternative would reduce total road density to approximately 4.3 miles of road per square mile of land (Table H-4).

Direct, Indirect and Cumulative Effects to Transportation Under Alternative 4: Approximately 3.4 miles of road would be decommissioned. Approximately 9 miles of existing roads would be managed as additional trails, as displayed in the table below. No roads would be scheduled for construction, reconstruction or reconditioning. During activities, the open road density would be 2.1 miles per square mile of land (Table H-3). After completion of project activities, Alternative 4 would reduce total road density to approximately 4.1 miles of road per square mile of land (Table H-4).

***Table H-2. Project Activities/Conditions by Alternative***

| Project Activities/Conditions | Alt 1 | Alt 2 | Alt 3 | Alt 4 |
|---|---|---|---|---|
| Reconditioning of system roads (miles) | 0.0 | 1.2 | 1.2 | 0.0 |
| Reconstruction of system roads (miles) | 0.0 | 1.4 | 0.1 | 0.0 |
| New system road construction (miles) | 0.0 | 1.9 | 1.0 | 0.0 |
| Temporary road construction (miles) | 0.0 | 0.0 | 0.0 | 0.0 |
| Unclassified road converted to trail (miles) * | 0.0 | 4.2 | 4.2 | 4.2 |
| System road managed as trail (miles)** | 0.0 | 4.6 | 4.6 | 4.6 |
| Existing FS road added to system (miles) | 0.0 | 0.1 | 0.1 | 0.0 |
| Private road added to system roads (miles) | 0.0 | 0.5 | 0.5 | 0.0 |
| Unclassified road decommissioned (miles) | 0.0 | 3.4 | 3.4 | 3.4 |
| Miles of right of way added*** | 0.0 | 0.7 | 0.5 | 0.0 |

** includes 2.0 miles needed as long term as NFSR roads (action alternatives)*
*** includes 2.3 miles outside of Transportation Area (action alternatives)*
**** includes 0.5 miles outside of Transportation Area (alternatives 2 &3)*

***Table H-3. Open Roads During Activities.***

| Open roads during activities | Alt 1 | Alt 2 | Alt 3 | Alt 4 |
|---|---|---|---|---|
| Roads administratively open during activities (miles) | 17.4 | 21.1 | 18.5 | 17.4 |
| Open road density during activities* | 2.1 | 2.6 | 2.3 | 2.1 |
| Travel plan roads open during activities (miles) | 6.2 | 6.2 | 6.2 | 6.2 |
| Open travel plan road density during activities (miles) | 0.8 | 0.8 | 0.8 | 0.8 |

** Roads not on travel plan are open to administrative use only.*

***Table H-4. Transportation System after Activities.***

| Transportation system after post sale activities | Existing | Alt 1 | Alt 2 | Alt 3 | Alt 4 |
|---|---|---|---|---|---|
| Road miles | 36.8 | 36.8 | 35.8 | 35.0 | 33.4 |
| Road density (miles/sq mile) | 4.5 | 4.5 | 4.4 | 4.3 | 4.1 |
| Open road miles* | 17.4 | 17.4 | 14.1 | 14.1 | 14.1 |
| Open road density (miles/sq mile)* | 2.1 | 2.1 | 1.7 | 1.7 | 1.7 |
| System road miles | 8.6 | 8.6 | 11.1 | 10.2 | 8.6 |
| Travel plan road miles | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 |
| Unclassified roads (miles) | 28.8 | 28.8 | 25.3 | 25.3 | 25.3 |

** Roads not on travel plan are open to administrative use only.*

## Consistency With Forest Policy and Legal Mandates in Regard to Transportation

### *Forest Plan*

A goal of the Forest Plan is that roads will be developed and managed to the minimum standards and miles necessary to meet the objectives of the management areas. The IPNF Forest Plan designated the Twomile Resource Area for timber production (MA 1), big game winter range (MA 4), riparian (MA16), and a small polygon delineated as minimum investment (MA 9). All of the management areas have standards that apply to the development and/or use of the road system. Proposed road construction with alternatives 2 and 3 would occur in MA 1 and MA4. Forest plan standards for facilities on MA 1 & 4 designated lands are to utilize the lowest standard road meeting transportation objectives compatible with resource protection and area management goals. The Forest Plan standards for road work will be met as specified in Appendix A and in the Transportation Plan RMOs (Road Management Objectives) (PF Doc. TRAN-4).

Opportunities to change the road system to reduce the problems and risks or to be more consistent with Forest Plan direction and strategic intent of the roads system include:

- *Reducing problems and risks associated with the physical attributes of the road system such as replacing the culverts on Road 271 that are undersized.*
- *Road decommissioning opportunities that were identified are consistent with Forest Plan direction and strategic intent of the road system.*
- *Opportunities were identified to minimize the road system to and to lower the maintenance levels.*
- *Other opportunities were identified to improve the existing road network through reconstruction and maintenance to reduce adverse effects and risks.*
- *Special use permits, and federal road and trail easements will preserve access to private lands across National Forest lands.*
- *Road construction and reconstruction will be the minimum necessary to efficiently meet safety, user and resource needs.*
- *Facilities reflect cost efficiency, cost effectiveness, user needs, safety and environmental concerns in design speed selection.*
- *Road and trail management will adhere to the management goals of each management area.*

The Twomile Resource Area does not contain any areas that are of a size and configuration sufficient to protect the inherent characteristics of a roadless condition as defined by the Forest Plan (FP VI-31) (PF Doc. TRAN-5). Therefore, no ecological attributes would be affected by roading of currently unroaded areas.

The Inland Native Fish Strategy amends the Forest Plan and contains additional guidelines and standards related to the design, operation and maintenance of the transportation system. Specific requirements for roads are included in Appendix A as they apply to timber sale contract clauses and road construction specifications.

The roads analysis for the Twomile Resource Area documents the compliance of the treatments proposed under each alternative (PF Doc. TRAN-1). The Roads Analysis Report identifies roads within the Transportation analysis area as needed or not needed. The Roads Analysis Report is used to determine of a minimum road system, identify roads with recreation benefit, and identify roads necessary for management of National Forest Lands and private lands. In addition, the Roads Analysis Report identifies how the project is in compliance with the Forest Plan and other resource standards.

***Coeur d'Alene River Ranger District Travel Plan***

The Transportation System for all alternatives would be consistent with the decisions made in the Coeur d'Alene River Ranger District Travel Plan. .

The Road Analysis Report for the Twomile Resource Area documents the procedure used to recommend the road system needed for management in the Transportation Analysis Area. The information and analysis was used to identify opportunities and set priorities for future National Forest road systems within the Transportation Analysis Area. The report was produced concurrently with the Twomile Wildland Urban Interface Hazardous Fuel Reduction Environmental Assessment and is in the project files (PF Doc. TRAN-1).

The Road Analysis Report recommends that about 60 percent of the Transportation Analysis Area be roaded so that ground based conventional logging systems can be used to perform vegetation treatments that use timber harvest. Most of the remaining 40 percent would be managed using helicopter for timber harvesting. Alternatives 2 and 3 would build a portion of that road which is consistent with the Roads Analysis Report recommendations.