United States Department of Agriculture

Forest Service

August 2006

Environmental Assessment

South Grouse Hazardous Fuels Reduction Project

Sandpoint Ranger District, Idaho Panhandle National Forests
Bonner County, ID

For More Information Contact:
A.J. Helgenberg
Sandpoint Ranger District
1500 Hwy 2, Ste 110
Sandpoint, ID 83864
208-263-5111
http://www.fs.fed.us/ipnf/eco/manage/nepa/index.html

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

Table of Contents

CHAPTER 1 ♦ PURPOSE AND NEED 1
Introduction 1
Conditions that Determined the Need for the Project 1
Existing Forest Condition 1
Desired Forest Condition 4
Purpose and Need 6
Overview of Scientific Findings from Broad Scale to Site Specific 7
Proposed Action 9
Vegetation Treatments 9
Infrastructure Improvements 9
Logging Systems 9
Scope of the Analysis 10
Policy Direction and Legal Guidance 10
Forest Plan Direction 10
Laws 12
Final Rule – Administration of the Forest Development Transportation System 12
New National Programs and Policies 12
Bonner County Wildland Urban Interface Fire Mitigation Plan 14
Decisions to be Made 15
CHAPTER 2 ♦ COLLABORATION AND ALTERNATIVES 16
Introduction 16
Collaboration and Scoping 16
Public Meetings 16
Scoping 17
Field Trips 17
Issues 17
Key Issues 17
Analysis Issues 18
Issues Eliminated from Detailed Analysis 19
Alternatives, Including the Proposed Action 20
Alternatives Considered But Eliminated 20
Alternatives Considered in Detail 21
Comparison of Alternatives 30
Design Features and Mitigation Measures 32
Monitoring 32
Forest Plan Monitoring 32
Project Monitoring (Implementation and Effectiveness) 32
CHAPTER 3 ♦ AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES 35
Introduction 35
Past, Present and Reasonably Foreseeable Actions 35
Vegetation 38
Regulatory Framework 38
Methodology for Analysis 40
Affected Environment 40
Environmental Consequences 43
Consistency with the Forest Plan and Other Regulatory Direction 48
Compliance with Old Growth Standards 48
Fire and Fuels 48

Regulatory Framework 48
Methodology for Analysis 49
Affected Environment 50
Environmental Consequences 56
Air Quality 61
Regulatory Framework 61
Environmental Consequences 62
Consistency with the Forest Plan and Other Regulatory Direction 63
Wildlife 63
Regulatory Framework 63
Methodology for Analysis 64
Affected Environment and Environmental Consequences 65
Consistency with the Forest Plan and Other Regulatory Direction 84
Threatened, Endangered, and Sensitive (TES) Plants and Forest Species of Concern (Rare Plants) 85
Regulatory Framework 85
Introduction 85
Affected Environment 86
Environmental Consequences 89
Consistency with the Forest Plan and Other Regulatory Direction 95
Noxious Weeds 96
Regulatory Framework 96
Introduction 96
Affected Environment 97
Environmental Consequences 100
Consistency with the Forest Plan and Other Regulatory Direction 107
Soils 108
Regulatory Framework 108
Methodology for Analysis 109
Affected Environment 109
Environmental Consequences 110
Consistency with the Forest Plan and Other Regulatory Direction 117
Aquatic Resources 118
Regulatory Framework 118
Methodology for Analysis 120
Affected Environment 121
Environmental Consequences 122
Compliance with the Forest Plan and Other Regulatory Direction 126
Visual Quality 127
Regulatory Framework 127
Methodology for Analysis 127
Affected Environment 127
Environmental Consequences 128
Consistency with the Forest Plan and Other Laws and Regulation 129
Economic Feasibility 129
Regulatory Framework 130
Methodology for Analysis 130
Affected Environment 130
Environmental Consequences 130
Consistency with the Forest Plan and Other Laws and Regulations 131
Environmental Justice and Civil Rights 131
Regulatory Framework 131

Affected Environment 131
Environmental Consequences 131
List of Preparers 133
Line Officer Direction 133
Interdisciplinary Team Members 133
Agencies and Organizations Consulted 133
Federal, State, and Local Agencies 133
Other Organizations and Groups 133
References 135
Appendix A - Design Features and Mitigation Measures 150
Appendix B – Compliance with Old Growth Standards 163
Appendix C – Best Management Practices and Forest Plan Consistency for Aquatic Resources 166
Site-Specific Best Management Practices 166
Idaho Panhandle National Forests Forest Plan Consistency (IPNF, Forest Plan, p. II-33) 175
Appendix D – Fisheries Management Direction & Guidelines 177
Inland Native Fish Strategy Standards and Guidelines (USDA Forest Service 1995, A7-A13) 177
Forest Plan Guidelines (USDA 1987, pp. II – 29-31) 182
Appendix E – Cumulative Effects Analysis Information 183

List of Tables

Table 2-1. Vegetation and fuels treatments 27
Table 2-2. Road construction and maintenance 28
Table 2-3. Comparison of alternatives 30
Table 3-1. Past, present and reasonably foreseeable future actions 36
Table 3-2. Acres of existing forest cover type and change in cover type under the proposed action 45
Table 3-3. Principle National Fire Plan goals and outcomes. 49
Table 3-4. Fireline intensity interpretations* 50
Table 3-6. Acres of South Grouse project area by fuel model 54
Table 3-7. Existing potential fire behavior 54
Table 3-8. Post-treatment fire potential 58
Table 3-9. Issue indicators used to measure effects 65
Table 3-10. Flammulated owl habitat in areas proposed for treatment 70
Table 3-11. Summary of capable goshawk nesting habitat proposed for treatment 73
Table 3.12. Rare plant species and habitats analyzed in the project area. 86
Table 3-13. Weed species and their infestation level documented in the project area 97
Table 3-14. Coefficients used to predict potential detrimental disturbance for proposed logging and slash treatment scenarios including burning and piling 111
Table 3-15. Stands within activity areas with cumulative impacts of 11% or greater 113
Table 3-16. Estimated erosion and sediment delivery from project activities using the Disturbed WEPP model interface for hillslope activities and Road WEPP model for the road use activities 123

List of Figures

Figure 1-1. Vicinity map v
Figure 1-2. Example of existing fuels buildup and forest density 2
Figure 1-3. Home at risk, surrounded by dense forest (note the structure in the center of the picture) 3
Figure 1-4. Managed stand in Big Grouse timber sale approximately eight years after treatment 4

Figure 1-5. Restored cedar stand on Grouse Mountain..... 5
Figure 2-1. Proposed vegetation treatment map 22
Figure 2-2. Stand commercially thinned and underburned during Big Grouse Timber Sale..... 23
Figure 2-3. Regeneration harvest with planted ponderosa pine saplings in the Big Grouse Timber Sale area..... 24
Figure 2-4. Mixed treatment harvest in the Big Grouse Timber Sale area. 25
Figure 2-5. Proposed fuel treatments map 26
Figure 2-6. Proposed Logging Systems 29
Figure 3-1. Map of past harvest in the project area..... 39
Figure 3-2. Typical dry site conditions (stand 655-01-003) 41
Figure 3-3. Typical moist site conditions (stand 655-01-059)..... 42
Figure 3-4. Stand thinned in Big Grouse Timber Sale area in 2004 46
Figure 3-5. Fire history of the South Grouse project area..... 52
Figure 3-6. Existing canopy base height at 3- to 5-foot potential flame lengths 55
Figure 3-7. Post treatment transitions Fuel Model 10 to an 8, flame lengths are reduced and canopy base heights raised. 59
Figure 3-8. Cumulative effects area for watershed analysis in the South Grouse Project. 125

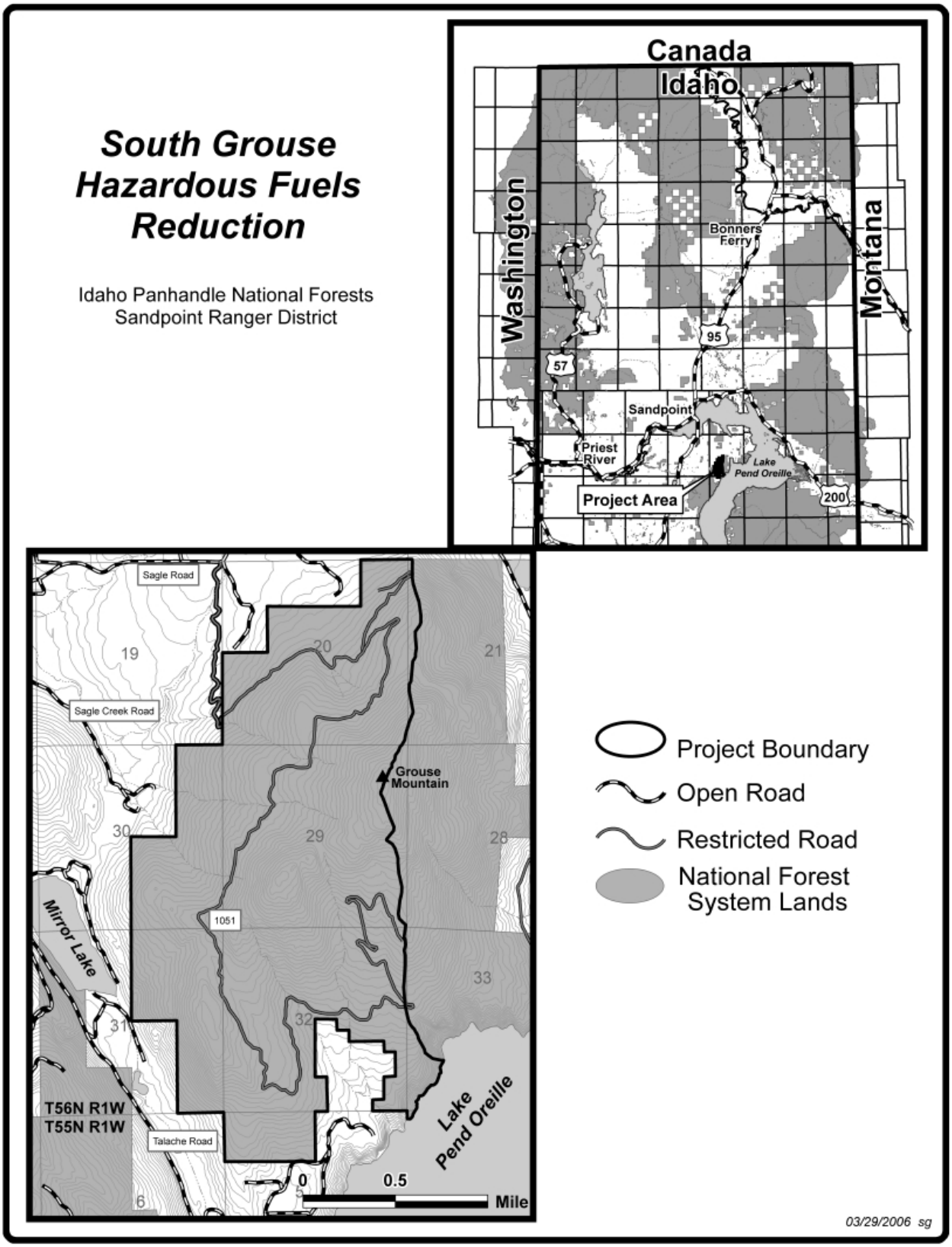

Figure 1-1. Vicinity map

CHAPTER 1 ♦ PURPOSE AND NEED

Introduction

The South Grouse Hazardous Fuels Reduction Project is located within Bonner County, Idaho, approximately eight air miles southeast of Sandpoint, Idaho (Figure 1-1). The project area consists of approximately 2,211 acres of low elevation, National Forest land surrounded on three sides by private land along the Sagle and Talache Roads. There is a total of 965 actual treatment acres within the project area. Elevations range from about 2,400 feet to 4,200 feet. There are no perennial fish-bearing or non-fish-bearing streams within the project area. There are five streams that are classified as either intermittent or ephemeral, three of which make up the headwaters of Fry creek.

The project area includes all or portions of sections 5 and 6, Township 55 North, Range 1 West of the Boise Meridian and sections 20, 21, 28, 29, 30, 31, 32, and 33, Township 55 North, Range 1 West of the Boise Meridian. In compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations, Sandpoint Ranger District has prepared this environmental assessment (EA) to disclose the potential effects of hazardous fuel reduction and forest health restoration activities in the Grouse Mountain Area. It also provides the supporting information for a determination to prepare either an environmental impact statement or a finding of no significant impact (FONSI).

Conditions that Determined the Need for the Project

Existing Forest Condition

The vegetation patterns and hazardous fuel conditions in the project area are influenced by many factors including climate, topography, wildfires, and human activities. The changes we see from the early 1900s to today are primarily attributed to human-related factors: activities associated with wildfire suppression, timber harvest, and the introduction of white pine blister rust.

Wildfire Suppression: Most of the forest in the South Grouse project area became established following a fire in 1910. Prior to 1910, fire had a major influence on the vegetation in the project area (USDA 1997, Quigley and Arbelbide 1997, USDA Forest Service 1998, and USDA Forest Service, unpublished report).

Dry sites (52% of proposed treatment acres) were burned frequently by low- or mixed-intensity fires and did experience occasional patches of stand replacing fires. Where low-intensity fires occurred at relatively short intervals (less than 25 years), stand structures were maintained with large, open-grown ponderosa pine and western larch (both of which are adapted to survive fire), and lesser amounts of Douglas-fir. These fires tended to kill the younger, more shade tolerant Douglas-fir trees because of their thin bark. Surface and ladder fuels were greatly reduced because of these fires. Mixed-intensity fires on these sites created some openings where dense patches of young trees became established.

Moist sites (48% of proposed treatment acres) experienced less frequent mixed-intensity fires and occasional stand replacing fires. These forests types are very productive and disturbance patterns favored stand structures dominated by large western larch and western white pine (which are adapted to reproduce and compete following fire) with lesser amounts of more shade tolerant grand fir, western hemlock, and western red cedar. Even with less frequent fires and more trees, surface and ladder fuels were generally less than what they are today. On both dry and moist forest types, the occasional stand replacing fires such as the 1910 fire, started the forest cycle over and created conditions for the establishment of a new forest.

Generally, these fires created a mosaic across the landscape of large openings with a few scattered fire survivors and some untouched patches of forest.

After 1910, a more aggressive fire fighting policy was established, which effectively excluded the influence of fires from this landscape (see Fire and Fuels section in Chapter 3). In the absence of fire, these forest stands have developed differently than the forests prior to 1910. The changes to western warm, dry forests have been well documented (see Fire and Fuels section in Chapter 3). On dry forest types in the project area, a lack of fire has allowed thick stands of trees to develop. Natural openings that were historically kept open by fire have become smaller or absent. Most dry sites are now homogenous, high-density, closed canopy stands dominated by Douglas-fir. These trees are crowding the once open-grown ponderosa pine and western larch that survived the 1910 fire (see Vegetation section in Chapter 3). This competition for limited resources is predisposing these relic ponderosa pine trees to western pine beetle attack (Samman, et al. 2000). Without the influence of fire or other disturbance, Douglas-fir is also out-competing the younger ponderosa pine and western larch in these stands. This preponderance of Douglas-fir (and in places, grand fir) facilitates the extensive spread of root disease and bark beetle caused mortality (James 2005).

On moist forest types, because the fire intervals were less frequent, the effects of fire exclusion are more subtle. However, a reduction of fire adapted species and an increase in the amount of more shade tolerant species due to the exclusion of low- and mixed-intensity fires over the past 90 years has reduced ecological diversity. These forest types are now composed of more homogenous, high-density stands dominated by grand fir, Douglas-fir, and western redcedar with negligible amounts of western white pine and healthy western larch (Figure 1-2). As on dry sites, root diseases and bark beetles are causing extensive mortality of Douglas-fir and grand fir. The greater amount of these shade-tolerant species and associated mortality on both the dry and moist forest types has increased surface fuel loading, fuel ladders, and crown densities (see Vegetation section in Chapter 3).

Figure 1-2. Example of existing fuels buildup and forest density

Timber Harvest: Historic logging has influenced the existing condition of the forest vegetation on Grouse Mountain (see vegetation cumulative effects section). Small sales that occurred between 1924 and 1940 likely removed both sound snags and fire-surviving trees that had high economic value. Although, this logging did not have a great influence on the existing forest conditions, these harvests did remove trees that likely could have contributed some structural and species diversity to the stands that exist today.

White Pine Blister Rust: Prior to the introduction of blister rust, western white pine was a dominant species on moist forest types, and often formed pure stands (USDA Forest Service, unpublished report). Today, white pine has been reduced to being a minor component on these forest types, farther reducing ecological diversity. In this area, species such as grand fir and Douglas-fir have replaced the niche that western white pine once occupied. Unfortunately, these trees species are more susceptible to insect and disease attacks. Additionally, blister rust continues to kill the few large, older surviving trees and the younger, natural regeneration.

Existing Forest Condition Conclusion

In summary, aggressive fire suppression, past timber harvest, and introduction of white pine blister rust have affected the vegetation patterns and hazardous fuel conditions within the South Grouse project area. With the increased number of shade-tolerant species such as Douglas-fir and grand fir, the remaining ponderosa pine, western larch, and western white pine are experiencing high competition levels for water, light, and nutrients. The combination of past disturbances (or lack of) and competition has lead to increased mortality and is essentially converting the project area from a predominantly ponderosa pine, western larch, and western white pine forest to a forest dominated by shade-tolerant species. In addition, the current forest structure is much denser than past conditions. This dense structure has created, and will continue to create, extensive fuel ladders and increased crown densities. The combination of dense stand structure and subsequent mortality has lead to an increase in the amount of both standing and surface fuel available for a large-scale wildfire.

Figure 1-3. Home at risk, surrounded by dense forest (note the structure in the center of the picture)

Along with this, the human population adjacent to the project area is also increasing. The lowlands and lakeshore around National Forest lands of Grouse Mountain are mostly private property (Figure 1-1).

Homes, cabins, and the infrastructure supporting these properties need protection from wildfires (Figure 1-3). Therefore, fire suppression will continue. The current forest conditions, however, have increased the risk of extreme fire behavior and have reduced the chance for successful fire suppression.

Desired Forest Condition

The "desired forest condition" is a conceptual picture of what a healthy, sustainable forest in the project area would look like, and the types of ecological processes that would occur there. To maintain healthy, sustainable ecosystems, species and forest structures must be adapted to disturbances such as insects and disease, fire, and climatic variability.

The Forest Service's Interdisciplinary (ID) Team derived the desired forest condition based on ecological research that revealed the historic vegetation structure, pattern, and composition, as well as the disturbance factors that existed previously (wildfire suppression, past timber harvest, and white pine blister rust), as described above. To achieve a healthier, more sustainable ecosystem within the project area, western larch, western white pine, and ponderosa pine should be well represented. These long-lived seral species are adapted to the disturbances described. This species mix with lesser amounts of Douglas-fir, grand fir and western redcedar would better represent the historic species mix (USDA Forest Service, unpublished report). The resulting forest would be healthier and more resistant to large insect and disease outbreaks, and insure a variety of habitats for many animal species and ecological processes. Ideally, the desired vegetative structure would typically only support low fire intensity. Surface and ladder fuels would be light, scattered, and discontinuous. High canopy base height and lower crown densities would typically prevent crown fires (Figure 1-4). This condition would reduce fire behavior so that effective, rapid, and safe fire suppression could take place minimizing fire damage and risk to people, private property, and natural resources values (see Fire and Fuels section in Chapter 3).

Figure 1-4. Managed stand in Big Grouse timber sale approximately eight years after treatment

Across the project area, a mosaic or patch-like vegetation pattern of various age classes and size classes would develop. The dry-site mosaic would consist of an open canopy with a lot of sunlight reaching the forest floor. Relative to existing forest conditions, stand conditions on drier sites would resemble those

found historically in the Pend Oreille subbasin when frequent, light, ground fires maintained open-grown stand structures dominated by large ponderosa pine and western larch and lesser amounts of Douglas-fir (USDA Forest Service, unpublished report). Young seedlings, saplings, and pole-sized trees would be growing in groups in patchy, scattered open spaces within these stands. Fewer trees, fewer snags, and less surface and ladder fuels as compared to existing conditions would typify dry sites.

The moist-site mosaic would have a higher level of canopy closure and be more even-aged with a variety of tree species capable of occupying these habitats. These moist-site stands would typically have more trees per acre than the dry sites. The vegetation conditions would be similar to those that occurred prior to European settlement and the introduction of white pine blister rust, when western white pine and western larch were much more abundant (USDA Forest Service, unpublished report). In desired forest conditions, stands on moist sites would contain more western white pine and western larch and less Douglas-fir and grand fir. Additionally, areas that contain higher proportions of large, healthy western red cedar would be maintained (Figure 1-5). The ladder fuels would be low and the crowns would be high in these stands with little to no lower branching. Surface fuels would be lower than existing conditions with the bulk of the fuel loading occurring as large, rotting logs scattered across the stand.

Figure 1-5. Restored cedar stand on Grouse Mountain

As the vegetation moves towards the desired species composition, structure, and disturbance patterns, animals adapted to these conditions would likely return to these habitats or increase their use of available habitat. Overall species richness would be expected to increase in response to increases in the degree of interspersion or the mixing of plant communities and successional stages. Thus, the area would provide for a wider variety of wildlife species. Additionally, the diversity and amounts of forbs, shrubs, and grasses would be expected to increase as fire returns to portions of the project area. Collectively, the increases in types and amounts of forbs, grasses, and shrubs would enhance foraging opportunities for big game and other wildlife species (see Wildlife section in Chapter 3). Insect and disease occurrence would be at low levels, infecting mostly weakened or stressed trees of all sizes. As these trees die and turn into snags, a sustainable level of nesting/denning and feeding habitat for birds and small mammals would be maintained.

Purpose and Need

The purpose and need for the South Grouse Hazardous Fuels Reduction Project was derived from field reviews and surveys of the resources in the Grouse Mountain area and responds to goals and objectives of the Idaho Panhandle National Forests (IPNF) Forest Plan (1987), National Fire Plan, Healthy Forests Initiative, Healthy Forests Restoration Act and the Bonner County Wildland Urban Interface Fire Mitigation Plan. The purpose and need is also responsive to recommendations made under the Interior Columbia Basin Ecosystem Management Project and the Pend Oreille Geographic Assessment. The purposes of this project are to:

- **Reduce hazardous fuels within the project area to lessen wildfire risk to communities and infrastructure, private and National Forest System lands, and resource values.**

  The project area has a high risk of wildfire due to increased surface fuel loading, fuel ladders, and crown densities. In addition, hazardous fuels continue to accumulate as forest insects, diseases and other disturbances (such as snow and wind storms) kill more trees. These hazardous fuel conditions, in conjunction with the steep terrain and topography-influenced winds, have the potential to produce severe fire behavior.

  The elevated wildfire risk and potential for extreme fire behavior pose a direct threat to the natural resources and developments both within and surrounding the project area. These natural resources and developments are of considerable value both locally and regionally and include clean air, clean water, visual aesthetics, wildlife habitat, healthy forests, private land, homes, cabins, and other public infrastructure. Because of the risk of losing these values, it would be socially unacceptable for wildfire to assume its historic role. For that reason, fire suppression will continue. However, in the event of a wildfire in this area, the severe fire behavior could result in flame lengths, spread rates and fire intensities higher than firefighters could safely and effectively suppress. Additionally, a fire could easily move into the crowns of the trees, further impeding fire suppression efforts. Therefore, there is a clear need to reduce fuels within the project area in order to alter fire behavior. This would reduce the negative impacts of a severe wildfire to these values as well as create safer conditions for both the public and firefighters and provide for more effective fire suppression.

  Fuel reduction immediately adjacent to private land and developments would provide a defensible space where firefighters could safely suppress smaller fires spreading from private land onto National Forest lands or fires spreading from National Forest lands to private lands. Conversely, limiting fuel reduction to areas adjacent to private land only would not protect other resource values or provide protection against a large, fast moving fire burning across the landscape. Fuel reduction efforts in key locations throughout the project area would disrupt the fuel continuity and create strategic fuel breaks that would greatly diminish the risk of a large fire. By reducing the quantity and spatial arrangement of forest fuels, the behavior of potential wildfires would be altered. Potential spread rates and fire intensities would be lowered improving the ability to successfully suppress fires and effectively reduce risks to life, property, and natural resources.

- **Restore, enhance, and protect forest ecosystem components to improve forest health, reduce threats from catastrophic wildfire and insect and disease infestations, and increase biological diversity.**

  Restoration, enhancement, and protection of forest ecosystem components cannot be separated from fuel reduction activities. To achieve a fuel condition where low fire intensities can be maintained for the long-term, forest cover, structure, pattern, and species composition must be restored to those occurring under low- and mixed-intensity fire regimes. The need to change forest composition and structure is tied to the Forest Service's objective of maintaining ecosystems with "high ecological

integrity. Ecological integrity for vegetation is defined as having a species composition, diversity, and functional organization expected from natural habitats of the region and they are resilient to environmental change and disturbance occurring within their natural range of variability" (USDA Forest Service unpublished report).

The current forest composition and structure is less resilient to natural disturbances than the forest composition and structure that occurred historically. Trending toward ecological integrity would promote stands and forest landscapes that are more resilient to droughts that periodically occur in this ecosystem. This would improve forest health, reduce the risk of insect and disease outbreaks and large, severe wildfires, and emphasize the long-term dominance of ponderosa pine, western larch, and western white pine. Additionally, stands found in areas with low- and mixed-intensity fire regimes usually had fewer trees per acre, especially in the understory, and much larger trees than the forest stands that dominate the landscape today. These more open, mature structures have declined in the subbasin and have been replaced by dense stands of immature/medium size trees (USDA Forest Service unpublished report). These stands currently dominate the project area.

By restoring some stands to conditions found under low- and mixed-intensity fire regimes, fire (both prescribed and natural) may be used as a maintenance tool. Furthermore, moving toward a forest composition and structure more like those found under low- and mixed-intensity fire regimes would potentially favor those wildlife species associated with these forest types. These forest types are currently well below levels believed to have occurred historically in the Pend Oreille subbasin (USDA Forest Service unpublished report), which in turn may have resulted in some reduction of wildlife species associated with these forest types including flammulated owl and pileated woodpecker. Restoring stands that are currently dominated by lower stocking of seral species would improve forest health; reduce the risk of severe fire behavior and insect and disease infestations, and increase diversity of habitat and associated species over current conditions.

Overview of Scientific Findings from Broad Scale to Site Specific

To arrive at our purpose and need for the project, the ID Team used information from a number of scientific assessments. Starting at the broad scale of the Columbia River Basin, the team derived general information about characteristics of the ecosystem in the basin. From there, the team "stepped down" their analysis to more specific levels of information - from the river basin level, to a subbasin level, to a landscape area level, to a watershed area level, and finally to a project area level. General information from these assessments and how they relate to the South Grouse Hazardous Fuels Reduction Project area are briefly described below.

Interior Columbia Basin Ecosystem Management Project (ICBEMP)

The ICBEMP Scientific Assessment (Quigley and Arbelbide 1997) evaluates all National Forest and BLM-administered lands in a 63 million-acre area within eastern Oregon, eastern Washington, all of Idaho, and western Montana. According to the assessment, the South Grouse Hazardous Fuels Reduction Project area is located in Forest Cluster 4 (heavily roaded, moist forest types with moderate to high hydrologic integrity and low forest, aquatic, and composite integrity). The ICBEMP assessment findings show that the primary risks to ecological integrity in Forest Cluster 4 are:

- Loss of late and old forest structures in managed areas,
- Forest compositions that are susceptible to insects, disease and fire, and
- Risk to hydrologic and aquatic systems from fire potential.

Pend Oreille Geographic Assessment

In the Pend Oreille Geographic Assessment, the level below the Columbia River Basin scale was defined as "subbasin." The South Grouse Hazardous Fuels Reduction Project is located in the Pend Oreille Lake subbasin, one of 164 subbasins in the Columbia River Basin. The IPNF has been assessing ecological conditions in the Pend Oreille Lake area, which includes the Pend Oreille Lake subbasin (USDA Forest Service unpublished report). The assessment has identified ecosystem trends and changes over the last 100 to 200 years. The Pend Oreille Geographic Assessment area is divided into Landscape Analysis Areas (LAAs). The South Grouse Hazardous Fuels Reduction Project is located in the "Purcell Trench LAA". Although the Pend Oreille Geographic Assessment is not complete, several findings relate to the South Grouse Hazardous Fuels Reduction Project area:

- There is a loss of long-lived tree species such as western larch, western white pine, and ponderosa pine, and an increase in Douglas-fir and grand fir.
- There is a lack of wildfire as a natural disturbance factor.
- There is an increased risk of severe stand-replacing fire on dry habitats due to fuel accumulations from the exclusion of fire.

South Grouse Hazardous Fuels Reduction Project Area Information

The Forest Service has been conducting field reconnaissance within the South Grouse Hazardous Fuels Reduction Project area since 2004. Information obtained during this time has revealed that:

- There has been a reduction in long-lived tree species (western white pine, western larch and ponderosa pine) and old forest structure due to logging, fire suppression, white pine blister rust, and increases in species such as Douglas-fir and grand fir. These vegetation conditions have created a very homogeneous forest that lacks structural and tree species diversity.
- Lack of natural fires (from fire suppression) and an increase in dying trees has allowed forest fuels to increase. If left untreated these fuels could increase the risk of wildfire.

In summary, in order to maintain healthy, sustainable ecosystems and forest conditions that are less susceptible to severe fire, it is imperative to have species and forest structures that are adapted to disturbances such as insects and disease, fire and climatic variability. This is consistent with the findings of the ICBEMP, Pend Oreille Geographic Assessment, and project area evaluation. Findings in these assessments recommend converting from species that are shade-tolerant but drought- and fire-susceptible to species that require more sunlight and are more adapted to drought and fire. Such a species shift would better represent the historic species mix. Treatments can trend the ecosystem toward desirable conditions, and will not accelerate undesirable trends (Quigley and Arbelbide 1997 and USDA Forest Service, unpublished report).

Proposed Action

We are considering conducting hazardous fuel reduction and vegetation restoration activities on National Forest lands within this area in order to respond to the purpose and need. Potential management activities proposed for this project will be conducted with the primary purpose of reducing wildfire threat to human lives, private property, and other values within the wildland urban interface (WUI). In addition, activities are designed to begin restoring ecosystems which evolved under a more frequent fire regime and to move the resource area towards desired future conditions described above. The proposed action is consistent with the Bonner County Wildland Urban Interface Fire Mitigation Plan which defines the WUI as wildlands within two miles of places of human habitation and/or the infrastructure that serves these points and calls for the modification of forest fuels in these areas.

Vegetation Treatments

We are proposing vegetation treatments on about 965 acres of the 2,211-acre project area. Regardless of the treatment proposed, relic, remnant structure (trees, snags and logs) would be maintained. Large diameter trees, particularly ponderosa pine, western larch, and western white pine and clumps containing concentrations of large diameter snags and trees would be retained. No verified or recruitment old growth stands will be entered or affected. As outlined below, primary vegetation treatments include commercial thinning, regeneration harvest, mixed harvest, prescribed burning (without prior harvest), and creation of fuel breaks adjacent to private property. Fuel treatments including prescribed burning (602 acres) and machine piling (191 acres) would occur in conjunction with commercial thinning, regeneration harvest, and mixed harvest treatments.

- Commercial Thinning on 449 acres
- Regeneration Cutting on 189 acres
- Mixed Treatments on 155 acres
- Fuel Treatments in conjunction with the thinning and harvests, as follows:
    - Prescribed Burning following harvest on 602 acres
    - Machine Piling on 191 acres
- Prescribed Burning (Natural Fuels Treatment without prior harvesting) on 150 acres and
- Creation of Fuel Breaks Adjacent to Private Property (does not include harvesting) on 23 acres.

(All acres shown above are approximations based on aerial photography interpretation, field visits and GIS/GPS data)

Infrastructure Improvements

In order to fully meet fuel reduction and vegetation management objectives, infrastructure improvements on National Forest lands are necessary within the project area. Transportation system improvements include the construction of 1.7 miles of temporary roads, maintenance of six miles of existing roads, and development of three helicopter landings.

Logging Systems

The following logging systems (793 acres total) would be used to meet vegetation management and fuel reduction objectives throughout the project area.

- Cable Yarding on 332 acres
- Ground-Based Yarding on 55 acres and
- Helicopter Logging on 406 acres.

(All acres shown above are approximations based on aerial photography interpretation, field visits and GIS/GPS data)

Scope of the Analysis

The South Grouse Hazardous Fuels Reduction Project EA is a project-level analysis. The scope of the analysis is confined to addressing the potential environmental consequences and issues related to project implementation. It does not attempt to address decisions made at higher levels, but rather to implement direction provided at those higher levels. The South Grouse Hazardous Fuels Reduction Project EA tiers to the IPNF Forest Plan EIS as directed by 40 CFR1502.20.

In accordance with NEPA, it is the responsibility of the agency to assess direct and indirect environmental effects resulting from an agency action as well as the cumulative effects of all past, present and reasonably foreseeable actions. Each resource in Chapter 3 analyzes only those actions that fall within the cumulative effects analysis area described for that resource and that have the potential to affect the resource. 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.

Policy Direction and Legal Guidance

Forest Plan Direction

The Forest Plan provides direction for all resource management programs and resource activities on the Idaho Panhandle National Forests. The Forest Plan consists of Forest-wide goals and standards as well as Management Area specific standards and guidelines that provide for land uses and resource outputs. The Forest Plan embodied the provisions of the National Forest Management Act (NFMA) of 1976 and its implementation regulations, as well as those of other guiding documents. Forest Plan goals (p. II-1 & II-2 of the Forest Plan) that guided the development of the purpose and need are:

- Provide efficient fire protection and fire use to help accomplish land management objectives.
- Manage the forest resources to protect against insect and disease damage.
- Provide for a diversity of plant and animal communities.
- Maintain high quality water to protect fisheries habitat, water based recreation, public water supplies, and be within state water quality standards.
- Manage resource development to protect the integrity of the stream channel system.

Many Forest Plan standards are applicable to the general design of the proposed action. Specific Forest Plan standards (pp. II-32-34, II-38-39) that guided the development of the purpose and need are:

- 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.
- Project design will provide for site preparation and slash hazard reduction practices that meet reforestation needs of the area.
- Maintain concentrations of total sediment or chemical constituents within State standards.

- Encourage utilization of Forest products to reduce biomass, which must be disposed of otherwise.
- 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.
- Vegetation management will favor the use of fire, hand treatment, natural control, or mechanical methods whenever feasible and cost effective. Direct control methods, such as chemical or mechanical, may be used when other methods are inadequate to achieve control.

The IPNF Forest Plan designated Management Areas (MAs) to guide the management of National Forest lands within the Idaho Panhandle National Forests. Each MA provides for a combination of activities, practices, and uses appropriate to the management goals and objectives of that specific management area. The South Grouse Hazardous Fuels Reduction Project area is comprised of lands in three MAs. Management areas are described in detail in the IPNF Forest Plan on pages III-1 through III-87; summaries of the management area goals specific to the project area are as follows:

Management Area 1: "Management Area 1 consists of lands designated for timber production…" (p. III-2). Management goals are to manage suitable timber production lands for tong-term growth and production of commercially valuable wood products. Part of this goal includes:

- Providing cost effective timber production;
- Protecting soil productivity;
- Meeting or exceeding state water quality standards;
- Providing wildlife habitat;
- Providing opportunities for dispersed recreation; and
- Meeting visual quality objectives.

Management Area 4: "Management Area 4 consists of lands designated for timber production within big game winter range" (p. III-17). The lands are predominantly on southerly exposures below 4,000 feet in elevation. Achieving the MA 4 goal requires providing sufficient forage to support big game habitat needs through scheduled timber harvest and permanent forage areas. This also includes the same goals, as MA 1 listed above except, that dispersed recreation opportunities would be provided when consistent with wildlife habitat needs.

Management Area 9: "Management Area 9 consists of areas of non-forest lands, lands not capable of producing industrial products, lands physically unsuited for timber production and lands capable of timber production but isolated by the above type lands or nonpublic ownership" (p. III-39). Steep slopes, thin soils and surface rock or rock outcrops often on higher ridges above 5,000 feet in elevation characterize these lands. Management goals are to maintain and protect existing improvements and resource productive potential and meet visual quality objectives.

Inland Native Fish Strategy (INFS) Riparian Habitat Conservation Areas (RHCA) – The standards and guidelines under INFS provide the management direction for RHCAs. In 1995, this direction replaced previous Forest Plan direction for managing riparian areas using standards and guidelines described for Management Area 16.

Laws

Shown below is a partial list of federal laws and executive orders pertaining to project-specific planning and environmental analysis on federal lands. While most pertain to all federal lands, some of the laws are specific to Idaho. References to these laws and orders, as well as disclosures and findings required by them, can be found throughout this document and the project file.

Federal Laws

- The National Environmental Policy Act of 1969 (as amended)
- The Clean Water Act of 1977 (as amended)
- The Clean Air Act of 1970 (as amended)
- The National Forests Management Act (NFMA) of 1976 (as amended)
- The Forest and Rangeland Renewable Resource Act (RPA) of 1974 (as amended)
- The Archaeological Resources Protection Act (1979)
- The National Historic Preservation Act (1966)
- Idaho Forest Practices Act (1974) and amendments
- Multiple Use Sustained-Yield Act of 1960
- Endangered Species Act (ESA) of 1973 (as amended)
- American Indian Religious Freedom Act of 1980

Executive Orders

- Executive Order 11593 (protection and enhancement of the cultural environment)
- Executive Order 11988 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)
- Executive Order 13186 (Migratory Bird Treaty Act)

Final Rule – Administration of the Forest Development Transportation System

In January 2001, the Forest Service Manual (FSM), which governs regulations concerning the management, use and maintenance of the National Forest Transportation (Road) System, (Chapter 7700) was revised with a “Final Rule.” The Final Rule set forth that if a Forest level roads analysis has not been completed, the Responsible Official determines whether a roads analysis is needed at the project scale, and if so, what level of analysis is necessary to support a project-level decision. The Idaho Panhandle National Forests has not completed a forest-level roads analysis. In May of 2004, the Sandpoint District Ranger established direction for a roads analysis for the South Grouse Hazardous Fuels Reduction Project (project file – roads section).

New National Programs and Policies

The National Fire Plan - During the last ten years, wildfires have increased in size and intensity within the United States. In 2000, in response to a request by then President Clinton, the Secretaries of Agriculture and the Interior developed an interagency approach to respond to severe wildland fires, reduce their impacts on rural communities, and assure sufficient firefighting capacity in the future (USDA and USDI 2000). This report, known as the National Fire Plan (NFP), outlined a strategy to reduce

wildland fire threats and restore forest ecosystem health in the interior West. In 2001, Congress funded the NFP to reduce hazardous fuel and restore forests and rangeland. In response, the Secretaries of Agriculture and the Interior, along with Western Governors and other interested parties, developed a 10-year strategy and implementation plan for protecting communities and the environment (USDA and USDI 2001). This plan, coupled with the Federal Wildland Fire Management Policy (NIFC 2001), forms a framework for federal agencies, States, Tribes, local governments, and communities to reduce the threat of fire, improve the condition of the land, restore forest and rangeland health, and reduce risk to communities. The South Grouse Hazardous Fuels Reduction Project proposes fuel reduction activities that would meet some of the objectives outlined for hazardous fuel reduction in the NFP such as fuels reduction within the wildland urban interface.

The Healthy Forest Initiative - In 2002, the Bush Administration launched the Healthy Forest Initiative (HFI). The HFI reduces administrative process delays for hazardous fuel reduction and ecosystem-restoration projects on Federal land. Additionally, a number of administrative actions were undertaken through the HFI including the development of new categorical exclusions, new CEQ guidance to conduct environmental assessments, and new endangered species act procedures.

Healthy Forests Restoration Act - Sixteen months after HFI, Congress passed the Healthy Forests Restoration Act of 2003 (HFRA) (P.L. 108-148) to expedite hazardous fuel reduction and forest restoration projects on specific types of Federal land that are at risk to wildland fire or insect and disease epidemics. The act helps rural communities, States, Tribes, and landowners restore healthy forest and rangeland conditions on State, Tribal, and private lands. The purposes of this act are:

- to reduce wildfire risk to communities, municipal water supplies, and other at-risk Federal land through a collaborative process of planning, prioritizing, and implementing hazardous fuel reduction projects;
- to authorize grant programs to improve the commercial value of forest biomass (that otherwise contributes to the risk of catastrophic fire or insect or disease infestation) for producing electric energy, useful heat, transportation fuel, and petroleum based product substitutes, and for other commercial purposes;
- to enhance efforts to protect watersheds and address threats to forest and rangeland health, including catastrophic wildfire, across the landscape;
- to promote systematic gathering of information to address the impact of insect and disease infestations and other damaging agents on forest and rangeland health;
- to improve the capacity to detect insect and disease infestations at an early stage, particularly with respect to hardwood forests; and
- to protect, restore, and enhance forest ecosystem components to promote the recovery of threatened and endangered species, improve biological diversity, and enhance productivity and carbon sequestration.

Criteria for projects to be authorized under this act include fire regime and condition class, location to communities at risk (Federal Register, January 4, 2001, Vol. 66, No. 3, p. 751-777), and collaboration. The following explains how this proposed project meets the intention and criteria of the Healthy Forest Restoration Act of 2003. The Act, in Section 102, contains the following criteria met by this proposal:

- The project area exists on **"Federal land in wildland-urban interface areas"** (HFRA 2003, sec. 102(a)(1)). The Bonner County WUI Fire Mitigation Plan of May 2004 identifies the project area as wildland urban interface.

- The project maintains and **contributes towards the restoration** of the structure and composition of old growth stands (HFRA 2003, sec. 102(e)(2).

- The project …**"focuses largely on small-diameter trees, thinning, strategic fuel breaks and prescribed burns to modify fire behavior, as measured by the projected reduction of uncharacteristically severe wildfire effects…"** (HFRA 2003, sec. 102(f)(1)(A)). This project's mechanical treatment would mainly commercially thin stands, typically harvesting smaller, weaker or diseased trees (see the 'Vegetation Management' portion of Alternative 2 in the "Alternatives Considered in Detail" section in Chapter 2). Some 23 acres of strategic fuel breaks along the national forest boundary adjacent to private land are planned (see the 'Vegetation Management' section referred to above and Vegetation section in Chapter 3). Finally, all treatment acres would receive some form of prescribed burning. The measures modeled to predict reduction of wildfire effects include wildfire flame-length and rate of spread (see the Fire and Fuels section in Chapter 3).

- The project … **"maximizes the retention of large trees, as appropriate for the forest type, to the extent that the trees promote fire-resilient stands."** (HFRA 2003 sec. 102(f)(1)(B)). Large, fire-resistant trees such as ponderosa pine, western white pine and western larch dominated the presettlement forests of this area. The proposed project would retain those large trees remaining on the landscape and promote restoration of historic forest conditions by planting those species in some harvest units (see the Alternative 2 description in the "Alternatives Considered in Detail" section in Chapter 2).

Bonner County Wildland Urban Interface Fire Mitigation Plan

The Grouse Mountain area was identified as a priority for hazardous fuel reduction treatments in the Bonner County Fire Wildland Urban Interface Fire Mitigation Plan (2004). During 2004, Bonner County in collaboration with the Forest Service, other federal and state agencies, rural fire districts, and private landowners developed a plan to mitigate fire risks in the county. This effort, led by the Bonner County Wildland Urban Interface Fire Mitigation Committee, not only defined fire risks on private lands within the WUI, but also identified fire risks and mitigation strategies on federal and state lands.

Bonner County defined the WUI as the area or zone where structures and other human development meet or intermingle with undeveloped wildland fuels, including all wildland within 2 miles of structures or development. In this plan, hazardous fuels treatments were identified as needed activities to create defensible space and fuel breaks around and near homes and businesses. The objective of this work is to reduce risk to life and property, increase firefighter and public safety, as well as to reduce fire suppression costs. The implementation strategy includes reducing the physical threat of wildfire by implementing hazardous fuels treatment projects. The plan is consistent with the Idaho Statewide Implementation Strategy for the NFP.

Decisions to be Made

This EA is not a decision document. The EA discloses the environmental consequences of proceeding with the proposed action or any alternatives, and aids the deciding officer in determining whether the effects disclosed would have a significant effect on the environment. If the deciding officer determines there would be no significant effects, an alternative will be selected and a Finding of No Significant Impact and a Decision Notice will be issued. The final decision will be based on the information in this document, on public comments, financial considerations, and on how well the chosen alternative meets the purpose and need of the project and complies with applicable state and federal laws, agency policy, and Forest Plan direction.

The deciding officer will determine whether the Forest Service should manage vegetation on National Forest System land to protect adjacent communities, subdivisions, private property, and natural resources from the risks associated with wildland fire. If so the following elements would be decided:

- Where and to what extent should such activities occur in the project area?
- What is the long-term transportation system and how will it be managed?
- What design features and mitigations should be used to meet laws and Forest Plan direction?
- How should such features be applied?
- What monitoring is needed to assure that desired results are achieved?

CHAPTER 2 ♦ COLLABORATION AND ALTERNATIVES

Introduction

The South Grouse Hazardous Fuels Reduction Project is an authorized project under HFRA. HFRA encourages meaningful public participation early in project development through collaboration with State and local government agencies and interested persons. Collaboration is the key to successful development of a proposed action and alternatives. This chapter describes the public involvement methods used, the issues that were raised, and how the agency used the collaborative process to develop the project proposal. Details of the proposed action and other alternatives are also discussed in this chapter.

Collaboration and Scoping

HFRA requires hazardous fuel reduction projects to be developed in a manner consistent with "A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan" (HFRA 2003 sec. 104(f)). One of the action items in this implementation plan addresses local level collaboration and recommends coordinating with Federal and State agencies, local governments, landowners and other stakeholders, and community-based groups. The National Fire Plan also 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 South Grouse Hazardous Fuels Reduction proposal was developed using a collaborative, community-based approach to hazardous fuel reduction and forest health issues. The Grouse Mountain area was originally identified as a priority for hazardous fuel reduction treatments in the Bonner County Fire Wildland Urban Interface Fire Mitigation Plan (2004). This plan was developed in collaboration with Bonner County, the Forest Service, other federal and state agencies, rural fire districts, and private landowners. Additionally, the ID Team used information gathered using several methods in the collaborative process including public meetings, scoping, and on site field trips, to develop this project.

Public Meetings

In November 2004, the Bonner County Wildland Urban Interface Fire Mitigation Committee (BONFIRE) sent a letter to all landowners within a mile of National Forest System lands on Grouse Mountain (398 invitations mailed out). This letter invited these landowners to attend a meeting to discuss fuel reduction opportunities on their lands and to introduce a potential Forest Service fuel reduction project on Grouse Mountain. At this meeting, BONFIRE representatives discussed Stevens Grant Assistance available to private landowners in the South Grouse Area, which can be used to perform hazardous fuels reduction work in the immediate vicinity of homes. Representatives from the Forest Service outlined the current hazardous fuels situation on National Forest System Lands on Grouse Mountain and discussed a project that would be designed to address this situation. Attendees were asked to note their interest in receiving a site visit from a BONFIRE representative and/or collaborating with the Forest Service in the development of a hazardous fuel reduction project on Grouse Mountain.

In December 2004, BONFIRE sent a letter to those attendees who were interested in collaborating with the Forest Service, to invite them to a meeting in January to develop a treatment proposal for Grouse Mountain. At this meeting, members of the public and Forest Service discussed the needs of the area and the purpose of the project. Attendees stressed the need to treat problems before a catastrophic fire took place. Forest Service representatives conducted a stand by stand review of the area discussing hazardous fuel conditions, insect and disease-caused mortality, and potential treatment options. Details were

discussed among the group and a refined treatment proposal was developed. The project goals of improving forest health and reducing hazardous fuels were defined. Wildlife habitat improvement opportunities and fire use were discussed. Issues such as smoke, noise, increased traffic, dust abatement, wildlife, aquatics, and past logging were identified as well. Members of the public were especially concerned about preserving the visual integrity of the area, controlling noxious weeds, and balancing short-term risks with long term benefits. Attendees agreed that management of the road system should continue as it has for the past several years, with the gates opened only for a couple of weeks in the late summer for firewood cutting and during hunting season to provide opportunities for disabled hunters. The need for increased recreational access was also talked about.

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 key to the decision. Scoping is used to develop and refine alternative management actions using a collaborative process. After developing a treatment proposal, the scoping process for this project was initiated with the *Quarterly Schedule of Proposed Actions* (SOPA) for the Idaho Panhandle National Forests beginning in January 2005, and continuing through the current issue. On February 16, 2005, a scoping notice that included a "Request for Comments" letter was mailed to 32 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. During scoping, letters were received from Idaho Department of Parks and Recreation, Idaho Department of Fish and Game, Idaho Conservation League, Selkirk Conservation Alliance, Kinnikinnick Chapter of The Idaho Native Plant Society, Northwest Access Alliance, and several adjacent landowners. The comment period ended March 18, 2005 with a total of sixteen respondents

Field Trips

A field trip through the project area was conducted on April 14, 2005. Ten individuals and organization representatives attended including members of the Idaho Conservation League, Selkirk Conservation Alliance, The Lands Council, and Kinnikinnick Chapter of The Idaho Native Plant Society. Stops on the tour were made to show a variety of current forest conditions, illustrate the need for hazardous fuels reduction and forest restoration work, and discuss concerns about project components and treatments. Three main issues were identified during this field trip -- permanent road construction, the introduction and/or spread of noxious weeds and vegetation restoration using prescribed fire.

Comments received during public meetings, scoping and field trips were analyzed and used to help identify issues, define the analysis of effects, and refine the proposed action and project design. The most prominent issues are presented in the issue and alternative discussions in this Chapter and in Chapter 3.

Issues

Issues were identified by the interdisciplinary team using current knowledge of conditions and concerns and through collaboration and scoping described above. These issues reflect both agency and public concerns. After consideration, these issues were sorted into three categories: key issues, analysis issues, and issues eliminated from detailed analysis. The issues are described below.

Key Issues

Key issues are those within the scope of the project and of sufficient concern to drive the development of alternatives and/or refine the proposed action. Key issues are used to develop the specific activities of the action alternatives, sharply identify effects of the proposed action, and help define the scope of the

environmental analyses and documentation. The key issues are specific to this geographic area and proposal, and provide a good comparison between alternatives during analysis.

Concerns related to permanent road construction and associated resource impact was the only key issue that could be used to develop an alternative to the proposed action. These concerns were repeated during the collaborative process and an alternative addressing this issue was proposed by Idaho Department of Parks and Recreation. All other key issues that were identified through other resource concerns did not warrant the development of separate alternatives. Instead, they were used to develop and refine activities associated with the proposed action. These key issues are described below. The Selkirk Conservation Alliance proposed one additional alternative related to vegetation treatment. The alternatives proposed by Idaho Department of Parks and Recreation and the Selkirk Conservation Alliance are discussed in the alternatives section.

- **Effects on Vegetative Communities**
  Changes in stand/forest composition, structure, and landscape pattern can affect forest health and other resource elements, such as fish and wildlife habitat. This project is designed to improve forest health and protect water quality and fish and wildlife habitat.

- **Effects on Fuel Characteristics and Fire Behavior**
  Activities associated with wildfire suppression, timber harvest, and the introduction of white pine blister rust, have caused a substantial change in stand conditions and related fire behavior. Changes in surface, ladder, and crown fuels have resulted in the potential for an increase in fire intensity and severity when fires do start. These intense fires threaten human life and property, are difficult to suppress, and can result in the loss of key ecosystem components. This project is designed to decrease fuel loading and breakup fuel continuity across the landscape. These changes in hazardous fuel conditions have the potential to lower fire intensity and decrease the potential for a crown fire, thereby increasing fire suppression effectiveness.

- **Effects of Road Construction**
  Road construction and potential use patterns have the potential to affect soil productivity, water quality, fish and wildlife habitat, and vegetative communities. Design features and mitigation measures have been identified to reduce the risk of adversely affecting soil, fish, wildlife, and vegetative resources from road construction.

- **Effects on Noxious Weed Populations**
  There are some noxious weeds in the project area and along roads leading to the project area. Managers and the public are concerned about the risk of project activities on the spread of existing weed infestations and introduction of new weed invaders. Design features have been identified to reduce the risk of noxious weed spread and new infestations.

Analysis Issues

Analysis issues are concerns about effects of proposed activities on the environment that are remedied by refining the design of a project or by applying mitigation measures. Analysis issues are not used to develop alternatives, but are carried forward in the analysis in order to provide a comparison of the alternatives and their effects. Most comments were related to the effects of the proposed action on various resources. Contents of the comments are sorted and summarized below. In addition, there were comments on the potential cumulative effects of the project on various resources. Cumulative effects will be analyzed for each of the resources discussed below. Each resource analysis in Chapter 3 provides details on the issues relevant to that resource, and how they are measured. Mitigations and project design features developed to minimize the effects of analysis issues are listed in Appendix A.

- **Effects on Water Quality**
  Road building and harvesting have the potential to deliver sediment to live streams and increase water yield, which can affect water quality both within the project area and downstream. Existing springs and domestic water sources can also be affected.

- **Effects on Wildlife Habitat**
  Potential changes in forest conditions and increased access from road building may affect certain wildlife species. Of particular concern are big game, and threatened, endangered, and sensitive species.

- **Effects on Fish Habitat**
  Water quality and changes in channel characteristics can affect fish populations and/or habitat within the project area or downstream.

- **Effects on Soil Productivity**
  Soil productivity can be reduced by removal of organics and associated nutrients or by detrimental impacts such as compaction, displacement, rutting, surface erosion, puddling, or severe burning. Road building can impact soil productivity.

- **Effects on Visual Quality**
  Proposed activities could adversely affect the visual quality of the area as viewed from the valley and lake.

- **Effects on Air Quality**
  Smoke from underburning and pile burning, and dust generated from logging operations and truck traffic have the potential to affect local and regional air quality.

- **Effects of Project Activities on Noxious Weed Introduction and Spread**
  Proposed activities including canopy removal and ground disturbance could increase the risk of noxious weed introduction and spread.

- **Effects of Project Activities on Sensitive and Rare Plants**
  Relative amount of canopy opening and/or ground disturbance can affect rare plant populations or suitable habitat.

Issues Eliminated from Detailed Analysis

Issues that were 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence were eliminated from detailed analysis. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of these issues and reasons for their elimination from detailed analysis are summarized below.

- **Effects on Access**
  Several comments were received regarding road management in the South Grouse area. Road 1051, currently provides access to the South Grouse project area. The road is currently restricted by two gates and is kept closed throughout the year except for occasional periods of firewood cutting during the summer months. The only other regularly scheduled use of the road is disabled hunting by permit behind the closed gates during hunting season. Some comments were to leave the road open to the public throughout the year while others wanted the road to be kept closed

during and after project activities. A few comments suggested opening the road for non-motorized access only. This issue was considered but not analyzed in detail because changing current access restrictions does not address the purpose and need and does not facilitate the implementation of the proposed action. Therefore, changing access was considered outside the scope of the proposed action.

- **Effects on Old Growth**
  No allocated or recruitment old growth stands would be treated with any alternative. Additionally, small pockets of large, old trees, which do not meet the minimum criteria for old growth allocation, would be retained. Therefore, the effects of project activities on old growth were not analyzed in detail.

- **Loss of Control During Prescribed Burning**
  Prescribed burning is conducted only when weather and moisture conditions are favorable for control, and when adequate resources of personnel and equipment are available. Implementing design features described in Appendix A to address this issue would be highly effective at keeping a prescribed fire under control. For these reasons, this issue was eliminated from further analysis.

Alternatives, Including the Proposed Action

This section is intended to present the alternatives in comparative form, sharply defining the issues, and providing a clear basis for choice among options by the responsible official. Detailed analysis of alternatives is located in Chapter 3.

Generally, for authorized hazardous fuel reduction projects, HFRA states that the Forest Service "shall study, develop, and describe—(A) the proposed agency action; (B) the alternative of no action; and (C) an additional action alternative, if the additional alternative—(i) is proposed during scoping or the collaborative process…and (ii) meets the purpose and need of the project, in accordance with regulations promulgated by the Council on Environmental Quality" (HFRA 2003 sec. 104(c)). Additionally, for projects that occur within the WUI and are located no further than 1½ miles from the boundary of an at-risk community, HFRA does not require the development of any alternative to the proposed agency action (HFRA 2003 sec. 104(d)(2)).

For this project, the Forest Service considered four alternatives: no action, the proposed action, a temporary roads alternative, and a reference condition alternative. The temporary roads alternative and the reference condition alternative were considered but eliminated from detailed study as described below.

Alternatives Considered But Eliminated

Federal agencies are required by NEPA to rigorously explore and objectively evaluate a range of reasonable alternatives, and to briefly discuss the reasons for eliminating any alternatives that were not considered in detail (40 CFR 1502.14). Two alternatives were proposed during scoping and are discussed below.

Temporary Roads Alternative
The Idaho Department of Parks and Recreation proposed an alternative differing from the proposed action by suggesting all new roads be temporary. This means that roads constructed would be decommissioned upon project completion. The issue behind this alternative is concern about a lack of money and resources to adequately maintain the existing roads and any new ones.

This issue was discussed again on the April 14 field trip when several individuals voiced concern over lack of maintenance on existing roads and resource damage from road construction in general. At this point, district staff revisited the areas where permanent road construction was proposed to determine if vegetation management and fuel reduction activities could be accomplished without the construction of these roads.

Originally, two permanent roads and several short temporary road spurs were proposed. Based on additional field reconnaissance and analyzing the need for long-term access, the permanent road segment planned across unit 3 was **changed** to a temporary road. The permanent road segment on the northwest side of the project area was looked at to determine if it was needed to 1) enhance long-term fire protection access for National Forest and nearby private lands, 2) provide access post harvest activities (grapple piling, tree planting, and prescribed burning), and 3) facilitate timber harvest activities. After additional field reviews and analysis, district staff determined that these activities could be completed without constructing this road. Instead, a short temporary spur would be constructed and decommissioned upon project completion. Therefore, because the suggested temporary road construction only alternative has been built into the proposed action, this alternative was eliminated from further consideration.

Reference Condition Alternative
The Selkirk Conservation Alliance (SCA) offered a concept of an alternative. In part, the concept stated: "If pre-settlement conditions are used for a reference condition, please disclose the site specific approximation of the historic conditions and use that as a "reference condition" alternative. This would enable the public to compare the degree to which the action alternatives meet the reference condition." This reference condition alternative would propose to restore the project area to pre-settlement conditions.

The end result of this alternative would be similar to that of the proposed action. While the proposed action proposes to reduce the fuel hazard, the method of doing that would begin to restore the project area to historic vegetative conditions. The Forest Service recognizes that to precisely mimic historic conditions is not feasible or practical; however, the proposed action strives to achieve conditions similar to how the site was maintained naturally. Those conditions were characterized by open stands of large, fire-resistant trees. Frequent, low-intensity ground fires tended to maintain this condition by keeping ground fuels low and minimized dense regeneration of shade-tolerant trees. The result of the proposed action and the SCA alternative concept would be similar; therefore, there is no need to consider both in detail. For these reasons, the SCA alternative was dropped from further consideration.

Alternatives Considered in Detail

Alternative 1: No Action
Under the No Action alternative, current management plans would continue to guide management of the project area. No commercial harvest, noncommercial thinning, road building or fuel treatments would be authorized through this project to accomplish project goals. Existing road maintenance, weed treatment, and recreation activities would continue.

Alternative 2: The Proposed Action
Alternative 2 was developed to respond to the purpose and need described in Chapter 1. Proposed activities are designed to 1) reduce wildfire threat to human lives, private property, and other values within the wildland urban interface (WUI), 2) restore ecosystems which evolved under a more frequent fire regime, and 3) to move the resource area towards desired future conditions described in Chapter 1. The following section describes Alternative 2 in detail, starting with vegetation treatments.

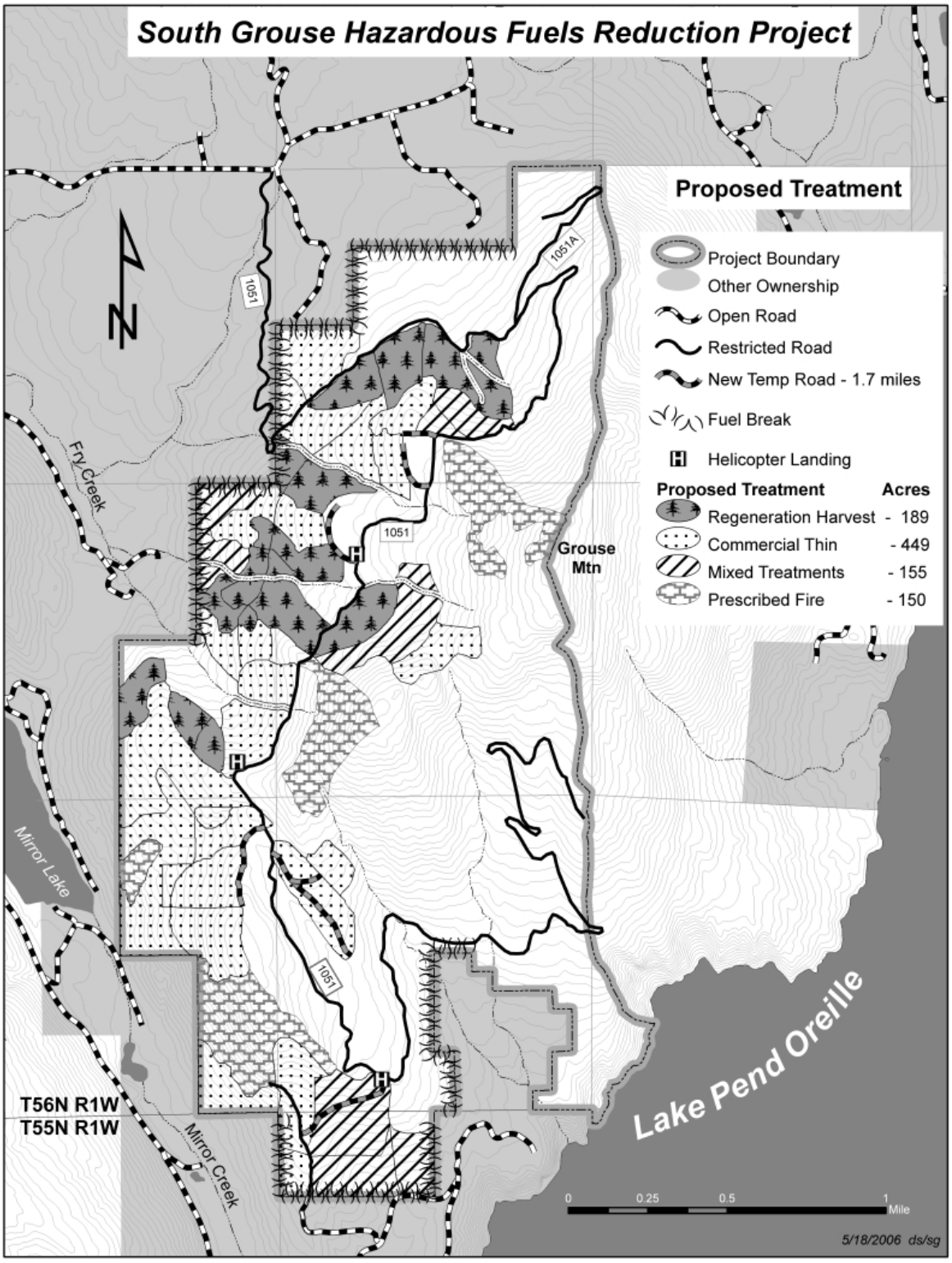

Figure 2-1. Proposed vegetation treatment map

Vegetation Treatments

Vegetation treatments would occur on about 965 acres of the 2,211-acre project area. Regardless of the treatment proposed, relic, remnant structure (trees, snags and logs) would be maintained. Large diameter trees, particularly ponderosa pine, western larch, and western white pine and clumps containing concentrations of large diameter snags and trees would be retained. No verified or recruitment old growth stands will be entered or affected. Primary vegetation treatments include commercial thinning, regeneration harvest, mixed harvest, prescribed burning, and creation of fuel breaks adjacent to private property (Figure 2-1).

Fuel treatments including prescribed burning (602 acres) and machine piling (191 acres) would occur in conjunction with commercial thinning, regeneration harvest, and mixed harvest treatments. Following harvest, prescribed fire would be used to reduce hazardous fuels, recycle forest nutrients, and to prepare sites for planting. Fuels would be burned under controlled conditions allowing desirable effects of fire to be obtained while confining the burn to a pre-determined area. Burning would occur in either the spring or fall when conditions were appropriate. Machine piling would occur in areas that have moderate slopes (less than 35 percent) where fire intolerant species would be retained. Piles would be burned in late fall during periods of low fire danger. A comparison of alternatives is summarized in table 2-1.

Figure 2-2. Stand commercially thinned and underburned during Big Grouse Timber Sale

Commercial Thinning (449 acres) would act to reduce both fuel ladders and crown density, thus reducing the chance of a fire moving into the tree crowns (Figure 2-2). Additionally, thinning would be used to modify stand structure in areas where there is the opportunity to maintain or enhance the growth of healthy trees (particularly western larch and ponderosa pine), and to trend the stand towards desired structural stages. Stands that are proposed for commercial thinning typically contain a significant number of healthy trees. Trees that would be removed would generally be smaller or less dominant in the stand, species not desired for future stand composition, or diseased or dead and not needed to meet future stand objectives. These treatments would improve tree vigor and diameter growth and would accelerate the development of desirable late-successional forest features.

With the current fuel conditions, these stands cannot be prescribed-burned safely without mechanical treatment first. Because of the large quantities of fuels already present, using prescribed fire prior to

removing some of the vegetation could initiate high fire intensity and severe fire behavior, making fire control difficult and unsafe. Moreover, most of the trees would likely be killed, including those favored for retention and species usually resistant to low-intensity fires. Therefore, mechanical removal of some of the forest fuels is necessary. However, depending upon site conditions and tree species left, the post-harvest slash and residual fuels can either be machine-piled and burned, or a low intensity prescribed burn can be implemented. In general, thinned stands would not be open enough to allow for successful establishment of desired tree species. However, the removal of trees affected by insects and disease mortality may result in the creation of small openings large enough to plant seedlings of long-lived seral species like western larch, ponderosa pine and western white pine.

Regeneration Harvest and Reforestation (189 acres) is proposed in stands where significant tree mortality has occurred, will likely continue to occur, and where hazardous fuel levels are high. In contrast to the example above, stands with this fuel condition contain only a few healthy trees, so thinning is not a viable option. A thinning that leaves unhealthy or weak trees may result in a short-term reduction of fire hazard. However, many of those unhealthy, residual trees would continue to die and/or break, quickly reverting the stand back into a hazardous fuel condition. To achieve longer-lasting effects in these unhealthy stand situations, most of the trees in the stand would need to be cut. Undesirable trees, trees susceptible to or infested with root disease, or trees at risk of being killed by insects, would be removed. Priority would be given to retaining cedar-dominated riparian areas and the largest, healthy western larch, ponderosa pine and western white pine.

Both current and potential hazardous fuel accumulations would be reduced. This treatment would not result in a clearcut, but there would be fairly open areas in the resulting stand until in-growth occurs. Intermixed between and within the open areas, stringers and islands of trees would be left untreated in a clumpy, irregular spacing mimicking the disturbance pattern typically caused by mixed severity fire. The clumpy, irregular pattern would break-up fuel continuity, contribute to both structural and compositional diversity, and blend openings into the surrounding landscape making them appear more natural. Additionally, none of these openings would exceed 40 acres. The post-harvest fuels and slash would be machine-piled and burned or prescribe-burned, and western white pine, ponderosa pine and/or western larch seedlings would be planted (Figure 2-3).

Figure 2-3. Regeneration harvest with planted ponderosa pine saplings in the Big Grouse Timber Sale area.

Mixed Harvest (155 acres) would occur in stands in which both regeneration harvest and commercial thinning are needed (Figure 2-4). Within these stands, existing trees and structure would be retained in a thinning where possible and practical. In general, these opportunities for thinning are associated with concentrations of fire-resistant trees, or with slopes that would allow machine piling and burning (and a corresponding option to retain trees less tolerant of fire such as western red cedar), or in areas with relatively little insect and/or disease damage. Areas of insect and/or disease-affected trees and areas with heavy fuel loading where slopes or other operational constraints preclude machine piling would be regenerated. In these areas, post-harvest fuels and slash would be prescribe-burned and western white pine, ponderosa pine and/or western larch seedlings would be planted. This treatment method would not only reduce hazardous fuels but would also create a more diverse stand structure.

Figure 2-4. Mixed treatment harvest in the Big Grouse Timber Sale area.

Prescribed Burning (150 acres) would be used in a number of stands to reduce fuel loading, maintain and restore desired forest cover and native plants, and restore fire as an ecological process (Figure 2-5). Dry site stands proposed for this treatment typically have scattered clumps of trees and fairly light surface and ladder fuels. These conditions allow for the safe application of prescribed fire without any mechanical treatments first. These dry site stands would benefit most from the restoration of fire. Additionally, areas with existing shrub fields would be burned to revitalize decadent brush and reduce fuel loading. These brush fields have become old, decadent, and have accumulated substantial amounts of dead fuels. Their effectiveness as fuel breaks has decreased. Under very dry conditions, these brush fields can burn with higher intensity- especially during high wind events. In addition, these brush fields connect dense timber stands and could (without treatment) carry wildfires from one forest stand to another. Prescribed burning not only consumes the larger, drier, woody debris in these shrub fields, but also stimulates growth of succulent, young vegetation. That new growth will serve as both an effective fuel break and improved big game browse.

Fuel Breaks (23 acres) would be created along private land boundaries (Figure 2-5). These fuels breaks would vary in width and would consist of removing dead vegetation and insect and diseased affected trees. In addition, healthy trees would be thinned and pruned, shrub cover would be reduced, and fuels would be machine piled and burned.

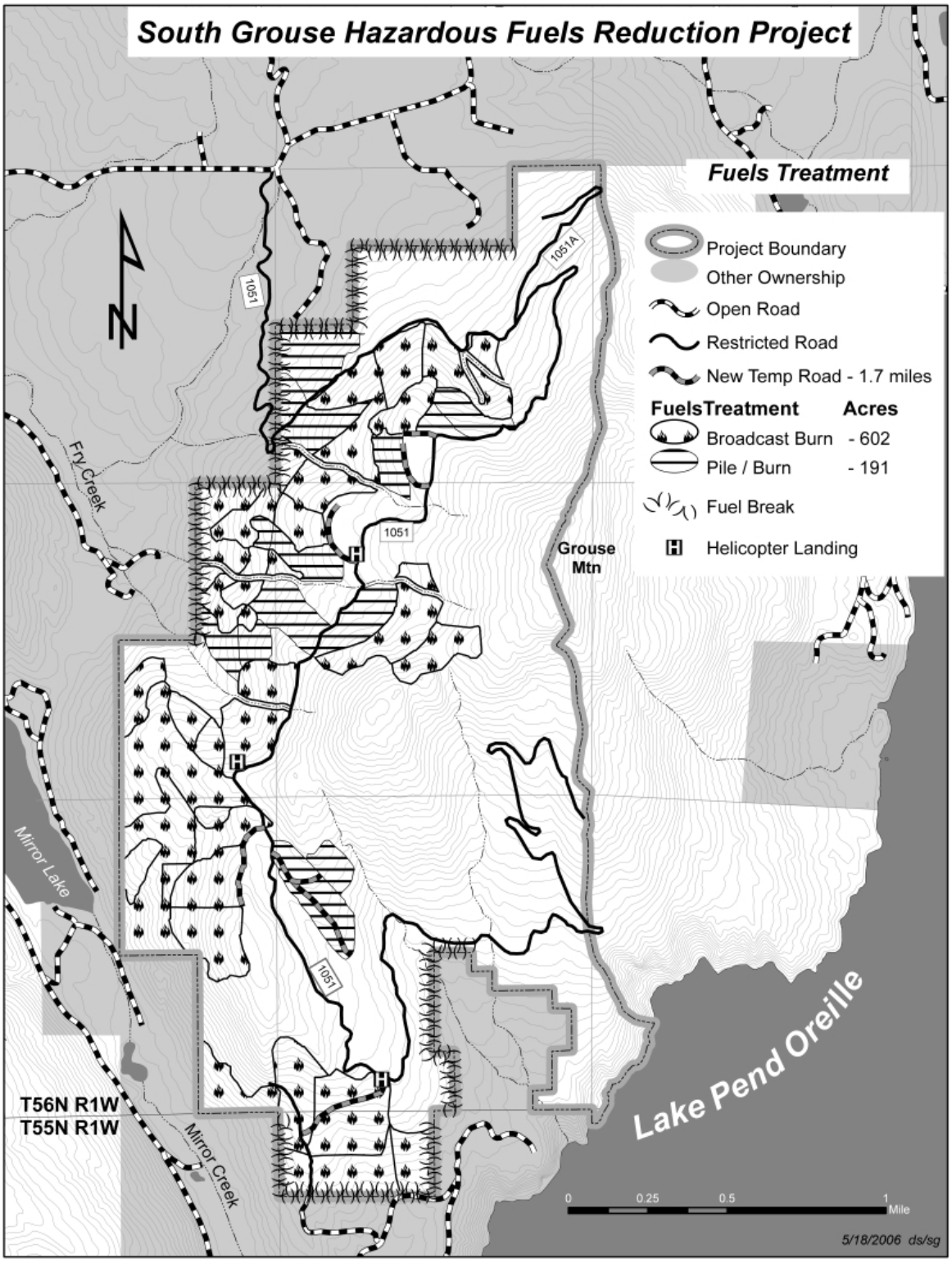

Figure 2-5. Proposed fuel treatments map

Table 2-1. Vegetation and fuels treatments

Description	Alternative 1 Acres*	Alternative 2 Acres*
Commercial Thinning	0	449
Regeneration Cutting	0	189
Mixed Treatments	0	155
Subtotal harvest treatments	**0**	**793**
Prescribed burning (following harvest treatment)	0	602
Natural Fuels Treatment (prescribed fire with no harvesting)	0	150
Machine Piling and burning	0	191
Fuelbreaks (fuelbreak treatment only)	0	23**
Subtotal fuel treatments	**0**	**965**
Reforestation (all regeneration harvest acres reforested and mixed treatment acres as appropriate)	0	About 280 acres

*All acres shown above are approximations based on aerial photography interpretation, field visits and GIS/GPS data.
**23 acres would receive fuelbreak treatment only. Another 37 acres of fuelbreak treatment is already counted in the prescribed burning or machine piling and burning treatments acreages, for a total of 60 acres of fuelbreak treatments.

Infrastructure Improvements

There are currently 2.4 mi/mi^2 of system road density in the project area and all roads are closed to motorized vehicles. Road 1051, a local road beginning at County Road 247, currently provides access to the South Grouse project area (Figure 2-1). The road extends south from the county road for approximately 1.2 miles through private property before entering the project area at the National Forest Boundary. The road is currently restricted by a gate near the junction with the county road, and by a second gate at the forest boundary. It is kept closed throughout the year except for occasional periods of firewood cutting during the summer months. The only other regularly scheduled use of the road is disabled hunting by permit behind the closed gates during hunting season.

Other than Road 1051, there are only two other existing minor local roads within the project area. The first, the 1051A, is a short spur road off of the main 1051 and is accessed only when the 1051 is open (Figure 2-1). The second originates on private land on the southern end of the project area and ends on a steep, rocky hill face (Figure 2-1). This road is blocked at the property line and is inaccessible. The current transportation system, however, is not adequate to facilitate all vegetation and fuels management activities. Some temporary roads and helicopter landings would need to be constructed and road maintenance activities would be needed to make the current roads suitable for trucks and equipment (see below). Current access would not change since all temporary roads and landings would be decommissioned after project activities are completed. A comparison of alternatives is summarized in table 2-2.

- **Temporary roads (1.7 miles)** would be constructed to facilitate vegetation and fuels management activities. Construction of temporary roads would reduce the cost of fuel treatments and provide more access and control points for prescribed burning and fuels treatment. Temporary roads would be fully decommissioned after use. Decommissioning would entail full or partial recontouring of the road prism, the removal of any culverts, stabilizing fill slopes and restoring stream crossings back to natural grade, the introduction of woody debris, and revegetation as needed.

- **Road Maintenance (6 miles)** to meet standards suitable for use by large trucks and equipment maintenance of existing roads would be implemented. Maintenance would include clearing brush, shaping or grading the road prism, and maintaining drainage structures. Maintenance would facilitate vegetation restoration activities while helping to reduce potential and existing sediment risks to the watershed.

- **Helicopter Landings (3 Landings)** would be developed in flat areas at or near existing or proposed road junctions to minimize the amount of required excavation and disturbance. These proposed helicopter landings would be rehabilitated after completion of project activities (Appendix A).

Table 2-2. Road construction and maintenance

Description	Alt. 1 Miles	Alt 2 Miles
Temporary Road Construction (includes reconstruction/realignment of 2233uz)	0	1.7
Road Decommissioning (Temp Roads + 2233uz)	0	1.7
Road Maintenance (1.2 miles of total on Sagle Rd outside project area)	6.0	6.0

Logging Systems

The following logging systems would be used to meet vegetation management and fuel reduction objectives throughout the project area (Figure 2-6).

- Cable Yarding on 332 acres;
- Ground-Based Yarding on 55 acres; and
- Helicopter Logging on 406 acres.

(All acres shown above are approximations based on aerial photography interpretation, field visits and GIS/GPS data)

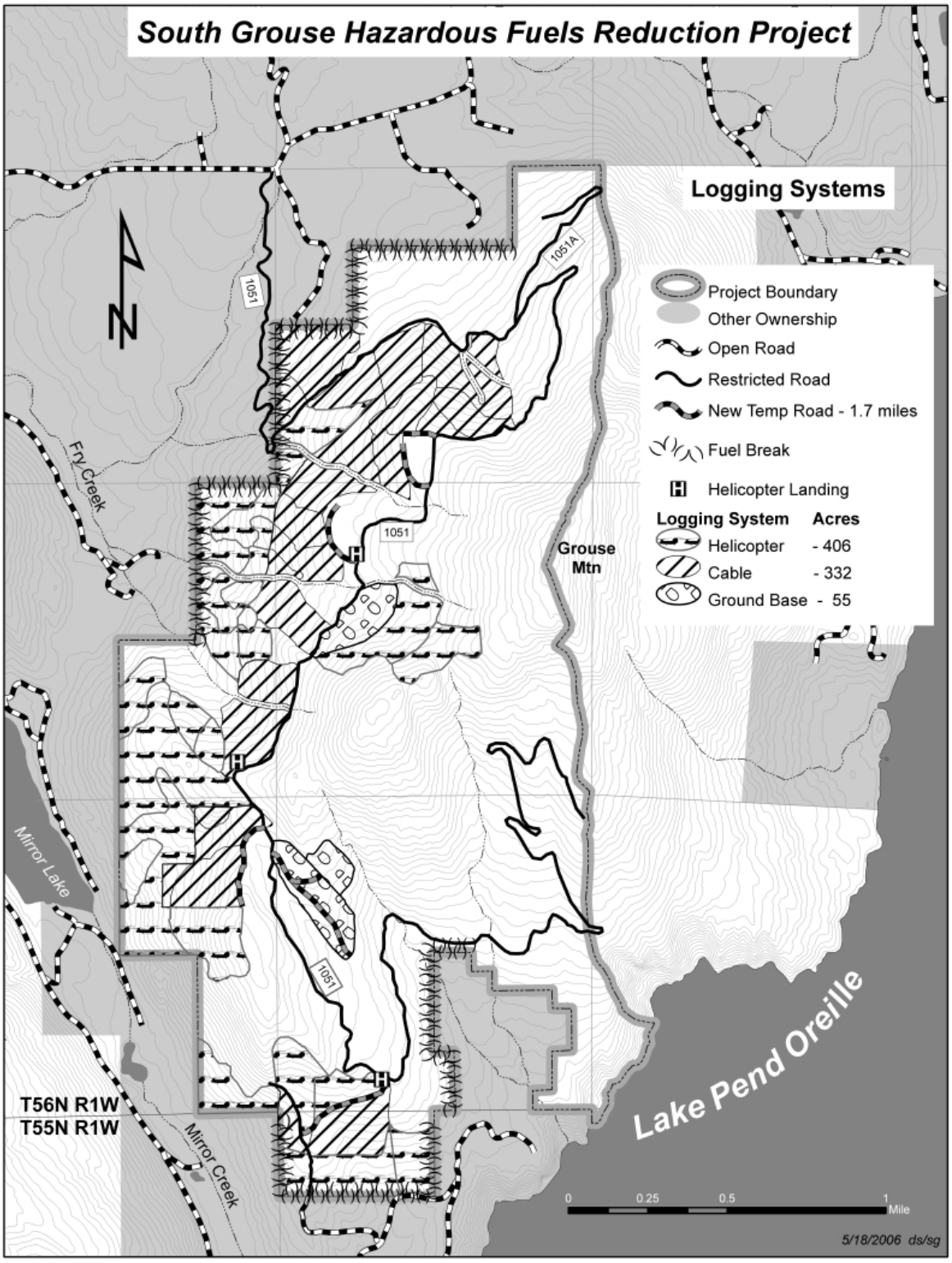

Figure 2-6. Proposed Logging Systems

Comparison of Alternatives

Table 2-3 displays how well each alternative achieves the purpose and need and how each issue indicator is affected. For detailed information on the analysis of each resource, please refer to Chapter 3.

Table 2-3. Comparison of alternatives

Purpose and Need Indicators	Alternative 1 No Action	Alternative 2 Proposed Action
Comparison of indicators of alternatives' ability to suppress unwanted fires		
Short Flame Length (% of area within treatment units with average expected surface fire flame length of **2.2 feet**)	33% of area now	93% of area after treatment
Moderate Flame Length (% of area within treatment units with average expected surface fire flame length of **10.2 feet**)	55% of area now	5% of area after treatment
High Flame Length (% of area within treatment units with average expected surface fire flame length of **15 feet**)	12% of area now	2% of area after treatment
Slow rate of spread (% of area within treatment units where fire would spread at **0.1** mph)	33%	93%
Moderate rate of spread (% of area within treatment units where fire would spread at **0.4** mph)	55%	5%
High rate of spread (% of area within treatment units where fire would spread at **2.6** mph)	12%	2%
Air quality	No direct effects, however potential severe wildfire may exceed air quality standards for short period	Prescribed burning would meet NAAQS standards. Wildfire likely controllable when fire small; air quality not likely to exceed standards.

Purpose and Need Indicators	Alternative 1 No Action	Alternative 2 Proposed Action	
Comparison of effects of forest restoration treatments to reduce fuel hazard			
Forest cover type change (acres treated to favor large trees; seral species)	Current condition acres	Acres after treatment	Change in cover type acres
• Western red cedar	247	149	-118
• Douglas-fir/grand fir	1499	950	-549
• Western larch	112	188	+ 76
• Ponderosa pine	97	587	+490
• Western white pine	28	129	+101
Soil productivity (% detrimental soil disturbance)	<15% on 793 acres	<15 % on 723 acres Stand 65501074 = 15.7% (31 ac) Stand 65501007 = 15.8% (39 ac) These areas will be restored to reduce impacts to below current condition.	
Comparison of effects on wildlife, plants, and visual quality			
T&E wildlife; bald eagle	No effect	No effect	
Sensitive wildlife species: Black-backed woodpecker, Flammulated owl, pygmy nuthatch, northern goshawk	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	May impact individuals or habitat, but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.	
Management indicator species: pileated woodpecker, marten, white-tail deer	May impact individuals and habitat, but would not likely indicate a local or regional change in habitat quality or population status	May impact individuals and habitat, but would not likely indicate a local or regional change in habitat quality or population status.	
Species of special interest Forestland birds	May impact individuals and habitat, but would not indicate a local or regional change in habitat quality or population status	May impact individuals and habitat, but would not indicate a local or regional change in habitat quality or population status.	
T&E plant species: water howellia, Spalding's catchfly	No effect, no suitable habitat	No effect, no suitable habitat	
Sensitive plant species	Threat of severe wildfires have potential of low, moderate or high impacts on sensitive plants or habitat suitability	By reducing the risk of severe wildfire potential effects are very low, low or moderate; and may be beneficial to pine broomrape habitat	
Noxious weeds	No change in present low levels of weed infestation. Possible severe wildfire could spread existing and introduce new weeds	Possible spread of weeds from logging and road building. Current weed suppression program and project design features expected to minimize spread of weeds	
Aquatic resources	No effect	RHCAs prevent logging-caused sediment delivery to any stream. Road construction and use could deliver <1/10 ton/yr to intermittent streams with no effects to downstream fisheries. No effects to mass failure potential or water yield.	
Visual quality	No change	Visual changes from logging meet Forest Plan visual quality standards.	

Design Features and Mitigation Measures

Design features and mitigation measures provide specific instructions for project implementation to best achieve objectives and protect resources that could be potentially impacted by proposed activities. See **Appendix A** for a complete list of design features and mitigation measures.

Monitoring

The Forest Plan documents a system to monitor and evaluate activities on the forest. Monitoring and evaluation each have distinctly different purposes and scope. Monitoring is designed to gather the data necessary for project evaluation. During evaluation of project effectiveness, data gathered are analyzed and interpreted. This process provides periodic data necessary to determine if implementation is within the bounds of the project design (Forest Plan, page IV-7). For the South Grouse Hazardous Fuels Reduction Project, the proposed action would comply with specific monitoring requirements identified by the Forest Plan (Chapter IV). The length of time that monitoring is needed would 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.

For authorized hazardous fuel reduction projects, HFRA stresses "monitoring the need for maintenance of treated areas, over time, in order to preserve the forest health benefits achieved" (HFRA 2003 sec. 102(g)(8)). For this project and the Grouse Mountain area in general, this would be achieved by monitoring the effectiveness of fuel treatments and levels of insect and disease activity throughout time to determine when the next treatment and what type of treatment would occur (see fuels treatment and forest vegetation discussions below).

Not all monitoring is considered mandatory and its implementation is not a consideration in the determination of environmental effects. The monitoring projects listed below are designed to be accomplished during project activities but are dependent upon the availability of funds and other resources.

Forest Plan Monitoring

Noxious Weeds: According to the Forest Plan, "many noxious weed species (knapweed, goatweed, thistle, tansy, etc.) are widespread, and…major programs to eradicate such species are not possible within expected budget levels." Idaho Panhandle National Forests direction is to give priority to small infestations of "species new to an area, where moderate control actions have a good chance of preventing the establishment of new problems." Noxious weed control will be based on an integrated pest management approach.

TES Plants: Idaho Panhandle National Forests direction is to inventory and manage sensitive plants so that no new species have to be listed as threatened or endangered. Suitable sensitive plant habitat in project areas is surveyed and projects modified as necessary to achieve this objective. Sensitive Plants are protected according to site-specific management plans developed by Forest and District Botanists.

Project Monitoring (Implementation and Effectiveness)

Project implementation generally involves the efforts of a variety of individuals with both specialized and general skills and training. Employees are accustomed to working together to achieve the desired project objectives. For example, it is common for a sale preparation forester or sale administrator to discuss specific project conditions with the wildlife biologist or hydrologist to apply the best practices on the ground. Joint field reviews are conducted as needed. This steady, informal communication allows for

incremental adjustments throughout layout and project implementation to achieve the desired results. In addition to these less formal monitoring procedures, the following monitoring items would be conducted:

Noxious Weeds
Pretreatment of roads and equipment as proposed (Appendix A) would be documented on sale inspection reports. The effectiveness of seeding disturbed areas would be evaluated upon completion of the activity by the timber sale administrator and/or botanist. Treated areas would be surveyed and monitored according to treatment priorities established in the Sandpoint Noxious Weed Control Project FEIS (USDA Forest Service 1998a).

Disturbed sites would be monitored, and weed treatment would be accomplished as necessary. An Integrated Pest Management approach (including biological, mechanical, cultural and chemical control) would be used. This would decrease the chance of existing infestations becoming established in new areas, and would reduce the risk of new invaders becoming established.

TES Plants
Monitoring of sensitive plant populations where the proposed activity was modified by buffering to avoid adverse effects would be conducted to validate the effectiveness of mitigation measures during and following the activity.

Forest Vegetation
Each active harvest unit would be visited by a sale administrator at a frequency necessary to assure compliance with the contract. All regeneration cutting units would be monitored for regeneration success the first, third (and fifth year if necessary) following planting; as required under NFMA. Levels of insect and disease activity will also be monitored.

Fuel Treatments
Each unit would be visited at a frequency necessary to ensure compliance with the contract and that the fuel management and downed coarse woody debris objectives were met. Baseline fuel inventories have been completed in the proposed treatment areas. Following implementation of the fuel treatments, these treatment areas would be re-inventoried to measure the effectiveness of fuel treatments. Fuel treatments will be monitored throughout time to determine when the next treatment and what type of treatment will occur.

Best Management Practices
BMPs would be incorporated into many phases of the project. A hydrologist would review the planned design of all road maintenance to ensure compliance with BMPs. The engineering representative and the hydrologist would monitor all temporary road construction and permanent road maintenance to ensure that specifications are met. Road use, maintenance, and closure structures would also be monitored by the sale administrator during project activities.

A sale administrator would visit each active cutting unit at a frequency necessary to ensure 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.

Soils
Levels of soil compaction would be monitored by the forest soil scientist following completion of project activities to ensure the compliance with soil quality guidelines and to validate the spreadsheet model.

Water Quality and Fisheries
Buffer widths for RHCAs in the project area will be monitored prior, during, and following implementation by the project hydrologist and fish biologist to ensure their implementation. Project activities occurring within RHCAs will be monitored by the contract administrator to ensure proper BMPs are being followed.

Air Quality
Air quality is monitored by the North Idaho and Montana Airshed Groups during the fall and spring burning seasons and yearlong by the Idaho Department of Environmental Quality. When burning timber harvest residues (slash), smoke management guidelines will be followed in compliance with the Clean Air Act.

Visuals
The project would be reviewed by the District visual resource specialist before, during and after cutting operations are complete to assess whether visual quality objectives were met.

Heritage Resources
Special provisions are utilized in all contracts to provide for protection of all existing recorded heritage resources. They also require that the contractor promptly notify the Forest Service upon discovery of a previously unidentified cultural resource.

CHAPTER 3 ♦ AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Introduction

This chapter describes the existing condition of resources analyzed, and discloses the predicted effects of the alternatives described in Chapter 2, including design criteria. Generally, the chapter is organized for each resource as follows, although some resource sections are organized differently:

- **Regulatory Framework** – describes the Forest Plan standards and goals for resource management and any other laws or policies that direct management activities.
- **Methodology for Analysis** – explains what data and models were used to determine effects, and the criteria that will be used to measure effects.
- **Affected Environment** – explains the existing condition of the resources so that changes caused by the alternatives can be measured. The resource information provided in the Affected Environment narrative includes the effects of past and ongoing actions that have influenced the existing condition of the landscape. These actions are listed in table 3-1.
- **Environmental Consequences** – discloses the predicted effects of the alternatives and their design criteria described in Chapter 2 and Appendix A. Effects are divided into Direct and Indirect Effects, and Cumulative Effects. Direct and indirect effects are those that are caused by the action. Cumulative effects are those that occur from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. A list of past, present and reasonably foreseeable actions appear in table 3-1.
- **Consistency with the Forest Plan and Other Laws and Regulation** – a finding of whether the alternatives, if implemented, would comply with the Forest Plan standards and other laws that regulate resource management described in the Regulatory Framework section.

Past, Present and Reasonably Foreseeable Actions

The effects of related past, present, and reasonably foreseeable actions are considered cumulatively with environmental effects anticipated from the proposed action. The past, present and reasonably foreseeable actions relevant to this analysis are activities and natural events known to have already occurred, are currently occurring, or are likely to occur in the vicinity of the proposed South Grouse Hazardous Fuels Reduction project (Table 3-1). This cataloging is partially to meet court direction in Lands Council v. Powell, where the U.S. Court of Appeals for the 9th Circuit held that, under the circumstances presented in the case, proper cumulative impact analysis required some cataloguing of past projects and their effect on the current project area. Past timber harvest is shown in Figure 3-1.

The Council on Environmental Quality (CEQ), whose responsibility is, in part, to coordinate federal environmental efforts and develop environmental policies, recently provided guidance to federal agencies regarding past actions in cumulative effects analysis[1]. CEQ stated that "generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historic details of individual past actions" (CEQ memo 2005, p. 2). Cumulative impact is defined in CEQ's NEPA regulations as the "impact on the environment that results from the

[1] CEQ Memorandum to the Heads of Federal Agencies regarding Guidance on the Consideration of Past Actions in Cumulative Effects Analysis, June 24, 2005.

incremental impact of the action when added to other past, present, and reasonably foreseeable future actions…" (40 CFR 1508.7). CEQ has interpreted this regulation as referring only to the cumulative impact of the direct and indirect effects of the proposed action and its alternatives when added to the aggregate effects of past, present, and reasonably foreseeable future actions (CEQ memo 2005, p. 2). Therefore, while we have listed past, present and reasonably foreseeable actions individually, their effects will be aggregated when the qualitative benefit of considering cumulative effects analysis of individual past, present and reasonably foreseeable actions is indistinguishable from considering them in aggregate. For example, the effects of timber harvesting prior to 1940 are considered in aggregate because they were small sales and the passage of time has made their individual effect indistinguishable.

The environmental analysis required under NEPA is forward-looking, in that it focuses on the potential impacts of the proposed action (CEQ memo 2005, p.1). The past and present activities and natural events have contributed to creating the existing condition and trends, as described in the existing condition discussions of this section. Additionally, some of these activities, as well as foreseeable activities, may continue to cause environmental effects on resources relevant to the proposal. Appropriate past, present and reasonably foreseeable action descriptions and cumulative effects analysis are developed for each resource area throughout this section as they relate to the potential effects of the proposal. The effects are analyzed and discussed individually when they may provide unique or especially pertinent ongoing and future cumulative effects relevant to the pending decision or are somehow particularly useful in illuminating or predicting the direct and indirect effects of the proposal (CEQ memo 2005, p.4).

Table 3-1. Past, present and reasonably foreseeable future actions

	Type of Activity	Description	Time-frame	Location	Scope
1	Wildfires	1910 fire	1910	Throughout project area and beyond	Stand replacing to mixed severity fire occurred, covering most of the project area.
2	Wildfires	Recent wildfires	1980 – present	Project area and surrounding lands	Several lightning and human-caused fires have been suppressed in the last 25 years.
3	Timber harvest[1]	Timber Sales. Roy Decker, J.B. Cochran, Frank Brown.	Past (1924-1925)	South end of Grouse Mtn. NW ¼ of Section 5.	Unknown harvest type
4	Timber harvest[1]	Timber Sale (Roy Decker)	Past (1928)	East half of Section 30	Unknown harvest type. Less than 20 acres
5	Timber harvest[1]	Timber Sale (Oscar Turnbull)	Past (1925)	NE ¼ of Section 30, NW ¼ of Section 29.	Unknown harvest type
6	Timber harvest[1]	Timber Sale (Ira Rogers)	Past (1924)	NW ¼ of Section 29, SW ¼ of Section 20.	Unknown harvest type
7	Timber harvest[1]	Timber Sale (Ira Rogers)	Past (1924)	NW ¼ of Section 29, SW ¼ of Section 20.	Unknown harvest type
8	Timber harvest[2]	Timber Sale (Palmer Bros.)	Past (1935-1940)	South end of Grouse Mtn. NW ¼ of Section 5.	Salvage of blowdown
9	Timber harvest and planting	Grouse Mtn. Sagle Timber Sale	Past (1987)	North end of Grouse Mtn.	61 acres of shelterwood harvest. Included site prep and planting on the regeneration harvest areas.

	Type of Activity	Description	Time-frame	Location	Scope
10	Timber harvest and planting	Big Grouse Timber Sale	Past (1997)	Grouse Mtn.	295 acres group selection 24 acres thinning 191 acres shelterwood 72 acres sanitation/salvage
11	Road construction	Timber Sale (Palmer Bros.)	Past (1935-1940)	South end of Grouse Mtn. NW ¼ of Section 5.	Construction of the 2233UZ road (0.4 miles)
12	Road construction	Grouse Mtn. Sagle Timber Sale	Past (1987)	North end of Grouse Mtn.	Construction of 1.5 miles of the 1051 road Construction of the 1051-A road (0.8 miles)
13	Road construction	Big Grouse Timber Sale	Past (1996)	Grouse Mountain	Construction of 6.4 miles of the 1051 road
14	Fire suppression	Detection and I	Past, Present and Reasonably Foreseeable	South Grouse Hazardous Fuels Reduction Project Area	Lightning or human-caused fires were initial attacked and suppressed as soon as possible following detection.
15	Firewood gathering	Salvage of individual dead trees by members of the public for personal use.	Past, Present and Reasonably Foreseeable	Along the existing road system during the late summer and early fall	Activity regulated via gated access
16	Hunting	Individuals on foot, bicycle or horses as well as motorized handicapped hunting with appropriate permits	Past, Present and Reasonably Foreseeable	South Grouse Hazardous Fuels Reduction Project Area	A maximum of 12 disabled hunting permits are issued annually
17	General motor vehicle and off –road vehicle use on roads	When gates are open for firewood cutting	Past, Present and Reasonably Foreseeable	South Grouse Hazardous Fuels Reduction Project Area	Activity regulated via gated access
18	Road Maintenance Activities	Consist of basic brushing, blading and cleaning of drainage structures	Past, Present and Reasonably Foreseeable	South Grouse Hazardous Fuels Reduction Project Area	FS road 1051 requires little maintenance due to its design and the regulation of motorized use
19	Noxious Weeds Monitoring and Treatment		Past, Present and Reasonably Foreseeable	South Grouse Hazardous Fuels Reduction Project Area	Conducted under the guidelines established under the Sandpoint Ranger District Noxious Weed Control Project EIS
20	Timber Stand Improvement	Thinning and pruning in plantations	Reasonably Foreseeable (2006+)	South Grouse Hazardous Fuels Reduction Project Area	Grouse Mountain Sagle and Big Grouse Sale Areas

	Type of Activity	Description	Time-frame	Location	Scope
21	East South Grouse Project	Hazardous Fuels Reduction Project	Reasonably Foreseeable (2006+)	East Side of Grouse Mountain	Proposal not yet developed
22	Private land development	Subdivision and homebuilding	Ongoing	Private lands adjacent to project area	Details are unknown but activity is reasonably foreseeable because of history of past development in this area

1 – John Barton (1936)
2 – Keene and Gunter (pers. comm. 2005)

Vegetation

Regulatory Framework

The legal and regulatory framework for the management of forest vegetation resources in the Idaho Panhandle National Forests includes:

- Idaho and Washington Forest Practices Acts
- Multiple-Use Sustained Yield Act of 1960
- Forest and Rangeland Renewable Resources Planning Act of 1974
- National Forest Management Act (NFMA) of 1976
- National Environmental Policy Act (NEPA) of 1969
- Idaho Panhandle National Forests 1987 Land and Resource Management Plan (Forest Plan)

Forest Service Regulations and Policies
The Forest and Rangeland Renewable Resources Planning Act (RPA) as amended, states, “It is the policy of Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans” (RPA 1974, sec. 3 (d)(1); NFMA 1976, sec. 4).

It also states that prior to harvest, stands of trees shall generally have reached culmination of mean annual increment of growth (RPA and NFMA sec. 6 (m)(l). This does not preclude the use of sound silvicultural systems such as thinning and other stand improvement measures, and allows salvage or sanitation harvest following fire, wind throw, or other catastrophe or within stands in imminent danger of insect and disease attack.

Forest Service policy (Forest Service Manual 2470) and Regional guidelines (Forest Service Handbook 2409.17) provide specific direction to land managers to manage vegetation. Regarding regeneration treatments, the Forest handbook directs that stands to be managed for timber production must be adequately restocked within five years of final harvest.

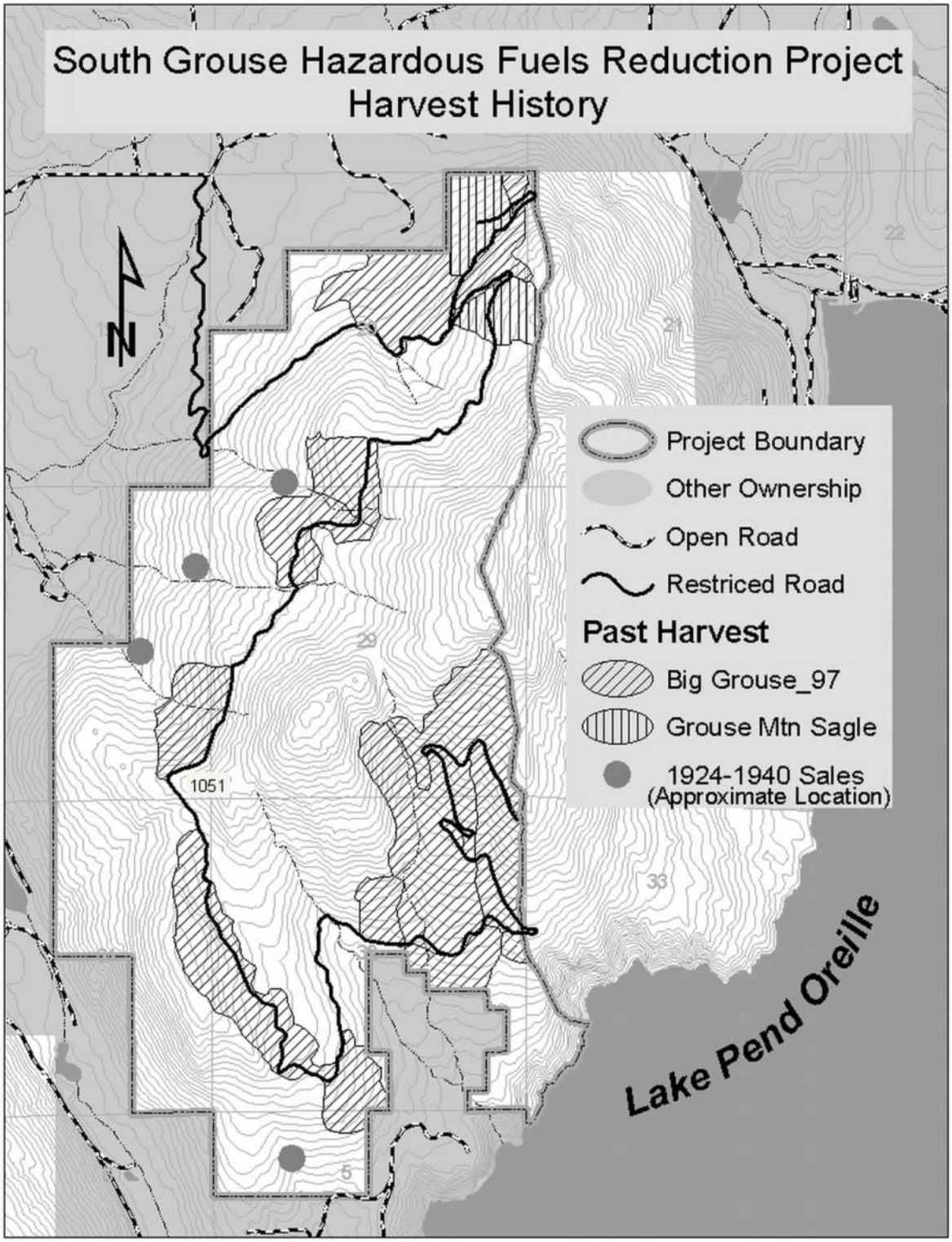

Figure 3-1. Map of past harvest in the project area

Forest Plan Direction

The IPNF Forest Plan embodied the provisions of the National Forest Management Act (NFMA) of 1976 and its implementation regulations, as well as those of other guiding documents. Forest Plan management area (MA) direction for the project area includes MAs 1, 4 and 9. These management areas emphasize timber production (MA1), timber management while enhancing big game winter range (MA4), and lands typically unsuited for timber production (MA9). However, stand 655-01-013, currently designated as unsuitable for timber production, was found to be suitable based on recent field reconnaissance. Documentation of the recommendation to change this classification is located in the project file.

Management direction for riparian areas is guided by the Inland Native Fish Strategy (INFS; USDA Forest Service 1995). This direction replaced previous forest plan direction for managing riparian areas using standards and guidelines described for Management Area 16 (Refer to Hydrology and Fisheries project files for more details on INFS). More information on the regulatory framework for the vegetation resource can be found in the project file.

Methodology for Analysis

The existing conditions of forest vegetation provided a baseline for comparing differences in environmental effects between alternatives.

Direct and indirect effects of management activities were measured by analyzing changes to species composition and stand structure. The time frame for the estimated direct and indirect effects analysis of all alternatives is 10 years, because it is expected that most effects would be apparent within this period. Some discussion refers to the general progression of structural stages over time, which could occur over a span of up to 200 years. Table 3-2 displays the forest cover type and structure changes of forest vegetation for both Alternative 1 (No Action) and Alternative 2 (Proposed Action). The existing condition information represents the cumulative effects of past disturbances and activities including past harvest, fire suppression, disease and insect attack, and vegetation growth to the present.

Existing and historic vegetation conditions for the project area were determined using aerial photos (1935 to present, photos are on file at the Sandpoint District office), stand exam data (stand files and Forest Timber Stand Management Record System (TSMRS) database at the Sandpoint District office) field surveys and observations (District stand files and project file), historic information (project file), the Interior Columbia Basin Ecosystem Management Project (ICBEMP) Scientific Assessment (Quigley and Arbelbide 1997), the Northern Region Overview (USDA Forest Service 1998) and data from the Pend Oreille Geographic Assessment (USDA Forest Service, unpublished report). More information on the methodology for the vegetation analysis can be found in the project file.

Affected Environment

Existing Condition

The majority of forest stands in the South Grouse project area became established following a fire in 1910. Prior to 1910, fire had a major influence on forest vegetation in the project area (Interior Columbia Basin Ecosystem Management Project (ICBEMP) Scientific Assessment (Quigley and Arbelbide 1997), the Northern Region Overview (USDA Forest Service 1998) and data from the Pend Oreille Geographic Assessment (USDA Forest Service, unpublished report). On drier sites, short-interval, underburning fires maintained stand structures as large, open-grown ponderosa pine, western larch, and Douglas-fir. On moister sites, mixed-severity fires favored tree species like western larch, which are adapted to survive fire, and western white pine, which are adapted to reproduce and compete following fire.

The Grouse Mountain Sagle timber sale (1987), and the Big Grouse timber sale (1997) have influenced the existing condition of the forest vegetation on Grouse Mountain (see vegetation cumulative effects section). These timber sales had positive effects on both species composition and forest structure. Abundant overstory structure, generally of preferred species, was retained in treated areas. These trees are likely to continue contributing to both the structure and species diversity of the treated areas. Additionally, areas treated with regeneration harvesting were planted with western white pine, ponderosa pine, and larch. These planted trees are now sapling size and will provide resilient, sustainable forest cover as they grow.

Historic logging consisting of small sales that occurred between 1924 and 1940 likely removed both sound snags and fire-surviving trees that had high economic value. This logging removed trees that likely could have contributed both structural and species diversity to the stands that exist today.

On dry sites in the project area, a lack of fire has allowed thick stands of trees to develop (Figure 3-2). Natural openings that were historically kept open by fire have become smaller or absent. Most dry sites are now homogenous, high-density, closed canopy stands dominated by Douglas-fir (Table 3-2). These trees are crowding the once open-grown ponderosa pine that survived the 1910 fire. This competition for limited resources is predisposing these relic trees to western pine beetle attack (Samman, et al. 2000). Without the influence of fire or other disturbance, Douglas-fir is also out-competing the younger ponderosa pine in these stands. Additionally, intense competition in these dense stands for limited resources is causing competition-based mortality as these stands self-thin.

Figure 3-2. Typical dry site conditions (stand 655-01-003)

This preponderance of Douglas-fir (and in places, grand fir) facilitates the extensive spread of root disease-caused mortality (James 2005). All of these factors contribute to increased fuel loading and a decreased likelihood that a fire could be quickly and easily suppressed (see Fire and Fuels Section).

On moister sites, lack of disturbance (primarily mixed-severity fire) and white pine blister rust have resulted in homogenous; high-density stands dominated by grand fir, Douglas-fir, and western redcedar with negligible amounts of white pine and healthy western larch (Figure 3-3).

As on dry sites, root diseases and bark beetles are causing extensive mortality of Douglas-fir and grand fir. White pine blister rust continues to kill white pine. Western larch are generally “whippy or spindly” with poor height-to-diameter ratios and small crowns due to intense competition and dwarf mistletoe infestation.

Figure 3-3. Typical moist site conditions (stand 655-01-059)

There is an increased proportion of western redcedar and grand fir on moderately-moist, mid and upper slope sites relative to their historic landscape distribution. The presence of these shade-tolerant species on these sites creates fuel ladders, increases crown densities, increases the risk of crown fire, and reduces the chance of successful fire suppression.

Widespread mortality and fuel ladders would result in fire behavior best described by a fuel model 10 (Anderson 1982; also see Fire and Fuels Section). The distribution of these conditions across the project area has set the stage for an intense, stand-replacing fire.

Desired Future Condition

To maintain healthy, sustainable ecosystems, species and forest structures must be adapted to disturbances such as insects and disease, fire, and climatic variability. To achieve these conditions, western larch, western white pine, and ponderosa pine should be well represented across the project area. These long-lived seral species are adapted to the disturbances described above. This species mix with lesser amounts of Douglas-fir, grand fir and western redcedar would better represent the historic species mix (USDA Forest Service, unpublished report).

Ideally, forest structures would have scattered, discontinuous ladder fuels and light fuel loading. This condition would minimize fire damage and risk to people, private property, and natural resources values (see Fire and Fuels Section of this document).

Relative to existing forest conditions, stands on moist sites would contain more western white pine, western larch and ponderosa pine and less Douglas-fir and grand fir. These vegetation conditions would

be similar to those that occurred prior to European settlement and the introduction of white pine blister rust. White pine cover types once occupied 24% of forestland in the Pend Oreille basin of north Idaho (USDA Forest Service, unpublished report). Two percent of the Pend Oreille basin and less than one percent of the South Grouse project area are currently classified as white pine forest type. Clearly, the desired future condition includes establishing blister rust resistant western white pine and developing this species into a significant forest type component. Similarly, western larch cover types once occupied approximately 17 percent of the Pend Oreille basin of north Idaho (USDA Forest Service, unpublished report). This cover type accounts for five percent of the South Grouse project area. It would be desirable to increase the preponderance of healthy western larch in the project area.

Stand conditions on drier sites would resemble those found historically in the Pend Oreille subbasin when frequent, light, ground fires maintained open-grown stand structures dominated by large ponderosa pine, western larch and Douglas-fir. Large, open-grown trees, with fewer young understory trees, would typify dry sites (USDA Forest Service, unpublished report). Desired stands would have fewer trees, fewer snags and less down woody fuels compared to now. More information on the existing condition of the vegetation resource can be found in the project file.

Environmental Consequences

Alternative 1 - No Action

Direct and Indirect Effects

Under the no action alternative, there would be no treatment of fuels, cutting of trees, or reforestation of desired species. Therefore, there would be no direct effects from this alternative.

Indirect effects would result from lack of treatment. According to forest pathologist field notes (James 2005), insect and disease-caused mortality would continue to occur throughout the project area. Hagle (2000) found average annual mortality rates of 3.8% per year in root disease monitoring plots on similar habitat types in the Coeur d'Alene National Forest. This mortality would free growing space within stands. Shade-tolerant and fire-intolerant tree species and brush would occupy this newly available growing space. This ingrowth would act as ladder fuels, making fire suppression more difficult and costly (see Fire and Fuels section of this document).

Douglas-fir and grand fir presently compete with ponderosa pine or western larch. As root disease-related mortality continues in the fir, more growing space becomes available for remnant pine and larch. However, without disturbance, regeneration of brush and shade-tolerant grand fir and Douglas-fir will proliferate (James 2005). Douglas-fir and grand fir trees, being highly susceptible to insects and disease, are likely to die before reaching old growth structural stages (USDA Forest Service, unpublished report and Rockwell 1917). This, with high fuel accumulations from continued mortality, would make firefighting difficult and lead to a higher risk of stand-replacing fire that would kill most trees including fire resistant species (see Fire and Fuels section of this document).

Cumulative Effects

Timber Sales Prior to 1940 - While little information about these activities exists, it is known that the Palmer Brothers' sale of 1935 to 1940 involved the salvage of blowdown. It is likely that these small sales removed both sound snags, and valuable remnant large trees. If they hadn't been removed, these trees and snags would likely have contributed to stand structural and species diversity in the project area today. Over time, without any vegetative treatments, continued mortality would add to the amount of snags within the project area. However, this mortality will also cause the loss of more remnant large trees.

Grouse Mountain Sagle and Big Grouse Timber Sales - The Grouse Mountain Sagle and Big Grouse timber sales had positive restorative effects on vegetation composition and structure, and reduced fuel hazard on approximately 643 acres. Regeneration harvests in these sales, followed by planting western larch, western white pine, and ponderosa pine improved stand resistance to root disease. These planted trees will likely develop into a resilient, sustainable forest cover. The large trees remaining in these harvest units contribute to stand structure in the form of large-diameter green trees and future snag replacements. Also, prescribed burning and piling of slash effectively reduced hazardous fuels. Alternative 1 would add more snags within the project area and more remnant trees in untreated areas would be lost.

Fire Suppression - Fire suppression has caused stands to become crowded and overstocked with shade-tolerant species. Continued suppression will advance many untreated stands toward domination by shade-tolerant, climax vegetation. The existing long-lived seral species would be shaded out and replaced by species such as grand fir and cedar on more moist sites, and Douglas-fir on dry sites. Alternative 1 would add to the effects of past, present, and reasonably foreseeable fire suppression as fuel loading would continue to increase and fire suppression activities would continue to become more difficult.

Firewood Gathering - This activity has the potential to reduce coarse down woody material, snags, and fuels along open roads, but effects at the project area scale would be negligible because only a small portion of the area is accessible from roads.

Monitoring and Treatment of Noxious Weeds - Noxious weed treatment, as conducted under the guidelines established under the Sandpoint Ranger District Noxious Weed Control Project EIS (USDA Forest Service 1998b), would have little effect on forest tree vegetation. Under the guidelines of the EIS, chemical treatments are used with restrictive protective measures to minimize damage to other native vegetation. Therefore, there would be no cumulative effects of these activities with Alternative 1.

Timber Stand Improvement (TSI) - TSI includes thinning and pruning in plantations. Thinning small-diameter trees reduces stand densities, promoting tree growth and favoring the healthiest trees. Promoting healthy, growing trees that are adaptable to disturbance would reduce the risk of insect and disease epidemic while providing land managers a variety of options for future management. Pruning white pine could reduce susceptibility to blister rust infection. No TSI activities have occurred in the project area. Future TSI activities are likely to occur in the Big Grouse and Grouse Mountain Sagle sale areas and are expected to have the effects described above.

Alternative 2 - Proposed Action

Direct and Indirect Effects

The proposed combination of thinning, regeneration harvest, reforestation, and mixed treatments in Alternative 2 would increase the area dominated by long-lived, seral tree species (Table 3-2). Areas dominated by ponderosa pine would increase five-fold; the western larch cover-types would increase by 68%. Regeneration harvest and planting on moist-sites would almost quadruple the amount of blister-rust-resistant western white pine type. These changes would move the project area towards the desired future condition.

Table 3-2. Acres of existing forest cover type and change in cover type under the proposed action

Forest Cover Type	Existing Condition (acres)	Alternative 2	Proposed Change (Acres)	Proposed Change From Existing (%)
Birch/Hardwoods	40	40	0	0%
Western redcedar	267	149	-118	-44%
Douglas-fir	1,340	853	-487	-36%
Grand fir	159	97	-62	-39%
Western larch	112	188	76	+68%
Nonforest (rock outcrops)	168	168	0	0%
Ponderosa pine	97	587	490	+506%
White pine	28	129	101	+365%
Project Area Total	2,211	2,211		

All acres shown are approximate.

While Alternative 2 wouldn't affect the measured amount of hardwood forest cover types, limited amounts of hardwood species such as aspen and birch would likely become re-established in some areas of regeneration harvest. Proposed natural fuels treatments (burn-only) would likely rejuvenate existing hardwood species in those treatment areas.

Increased vegetative diversity would improve resistance to insect and disease pathogens, fire, and climatic variability. It would also enhance wildlife habitat variety (see wildlife section).

Blister-rust-resistant western white pine seedlings would be planted in regeneration harvest treatment areas. Planting of larch and ponderosa pine seedlings, which are more resistant to root disease and tolerant of fire than Douglas-fir and grand fir forest cover types, would enhance forest diversity and increase management options, moving forest cover types towards the historic condition.

Harvesting would remove trees competing with fire-surviving relics. Natural openings would be restored to approximately their historic size. Treatments would increase protection of remnant trees and stands from fire.

Stand structures resulting from the 965 acres of proposed treatments (thinning, regeneration, piling, and prescribed fire use) would reduce fuel loading, lower canopy density, and reduce horizontal and vertical fuel continuity. These changes in fuel characteristics would result in less intense fire behavior and make a fire easier to control (see Fire and Fuels Section).

Cumulative Effects

The boundary of cumulative effects analysis is where the effects are no longer apparent. The effects of the proposed vegetation treatments are expected to be localized and do not individually or cumulatively affect vegetation outside of the project area. For this reason, the cumulative effects analysis area boundary considered for the forest vegetation resource is the same as the project area boundary. No private, state, or other federal lands are in the project area. Acreages shown for existing condition in table 3-2 include the cumulative effects area since the effects from the alternatives are additive to the effects which have led to the existing condition.

The level of effects of each type of activity has the potential to vary due to location and implementation standards that were in place at the time. The following discussions describe the effects each activity had

and/or is having on forest vegetation. Actions listed in Table 3-1 that are not mentioned in the cumulative effects analysis are not anticipated to have effects on the health of forest vegetation.

Timber Sales Prior to 1940 - While little information about these activities exists, it is known that the Palmer Brothers' sale of 1935 to 1940 involved the salvage of blowdown. It is likely that these small sales removed both sound snags and valuable remnant large trees. If they hadn't been removed, these trees and snags would likely have contributed to stand structural and species diversity in the project area today. The vegetation treatments proposed in the South Grouse Hazardous Fuels Reduction Project would not add to any lingering structural or compositional effect of these historic sales because they would retain large trees and snags. Except for the likely loss of snags and large remnant trees, the aggregate effect to vegetation of these sales is inconsequential because the 65-80 years of forest growth since those sales more than replaced the trees and stands harvested.

Grouse Mountain Sagle and Big Grouse Timber Sales - The Grouse Mountain Sagle and Big Grouse timber sales and reforestation activities helped move the landscape back to early successional stages, favored longer-lived seral species and reduced hazardous fuel accumulations.

Regeneration harvests in these sales, followed by planting western larch, western white pine, and ponderosa pine improved stand resistance to root disease. These planted trees will likely develop into a resilient, sustainable forest cover. The large trees remaining in these harvest units contribute to stand structure in the form of large-diameter green trees and future snag replacements. Also, prescribed burning and piling of slash effectively reduced hazardous fuels.

The regeneration harvest proposed under the South Grouse Project would be similar to these past sales in that underburning and reforestation activities would move the project area back to early successional stages of stand development, regenerate longer-lived seral species, and control accumulation of hazardous fuels.

Commercial thinning in the Big Grouse timber sale promoted and maintained long-lived ponderosa pine and western larch (Figure 3-4).

The Grouse Mountain Sagle and Big Grouse timber sales had positive restorative effects on vegetation composition and structure, and reduced fuel hazard on approximately 643 acres. The proposed activities would have similar effects on approximately 965 acres. In combination, the effects in keeping with the project purpose and need would have been accomplished on about three quarters of the analysis area in the last 20 years.

Figure 3-4. Stand thinned in Big Grouse Timber Sale area in 2004 (Stand 655-01-015)

Road Construction - Past construction of system roads has removed a minor amount of land from the productive forest land base. Road construction resulted in minimal direct effects to forest vegetation with regard to stand species composition or structure. Road construction in the project area has and would continue to facilitate recent management of forest vegetation that favors desirable forest cover types and structures. Roads also create better access for potential future wildfire suppression. The proposed 1.7 miles of temporary road construction would not permanently remove productive land from the forest base.

Fire Suppression – Past fire suppression has caused stands to become crowded and overstocked with shade-tolerant species throughout the project area. Within treated areas the proposed activities would counteract the effects of past fire suppression on forest structure and species composition and in some areas allow the ecologic role of fire to be restored. The proposed activities would also increase the likelihood of a fire being successfully suppressed. To prevent the detrimental effects of fire suppression from occurring again in treated stands, maintenance activities (thinning, pruning, prescribed burning, etc.) would need to occur in the future. With continued suppression the few stands not treated by Alternative 2 will advance toward domination by shade-tolerant vegetation. The existing long-lived seral species would be shaded out and replaced by species such as grand fir and cedar on more moist sites, and Douglas-fir on dry sites. With current mortality levels, however, the grand fir and Douglas-fir would likely not reach a climax stage. In these areas fuel loading would increase. However, due to the small area these stands encompass and their juxtaposition with treated stands, this is not expected to measurably detract from the stated effects of the proposed action. Consequently, the effects of the proposed activities are not expected to add to the effects of past, present, and reasonably foreseeable fire suppression, but would lessen the risk of severe fire behavior.

Firewood Gathering - This activity has the potential to reduce coarse down woody material, snags, and fuels along open roads, but effects at the project area scale would be negligible because only a small portion of the area is accessible from roads. The proposed road construction is either temporary in nature, or the proposed system road construction would be restricted and put into storage following the project. Given this, the amount of the project area available for firewood gathering would remain relatively the same. As the proposed activities are not expected to increase firewood gathered in the project area, they are also not expected to have an incremental impact on the environment when added to other past, present, and reasonably foreseeable firewood gathering.

Monitoring and Treatment of Noxious Weeds - Noxious weed treatment, as conducted under the guidelines established under the Sandpoint Ranger District Noxious Weed Control Project EIS (USDA Forest Service 1998a), would have little effect on forest tree vegetation. Under the guidelines of the EIS, chemical treatments are used with restrictive protective measures to minimize damage to other native vegetation. Therefore, there would be no cumulative effects of these activities with the proposed action.

Timber Stand Improvement (TSI) - TSI includes thinning and pruning in plantations. Thinning small-diameter trees reduces stand densities promoting tree growth and favoring the healthiest trees. Promoting healthy, growing trees that are adaptable to disturbance would reduce the risk of insect and disease epidemic while providing land managers a variety of options for future management. Pruning white pine could reduce susceptibility to blister rust infection. No TSI has occurred in the project area. Future TSI activities are likely to occur in the Big Grouse and Grouse Mountain Sagle sale areas; therefore, the expected cumulative effects of the proposed action and reasonably foreseeable TSI activities would be beneficial.

Cumulatively, proposed activities of Alternative 2 would reverse the effects of succession and fire suppression since the 1910 fire, and would complement stand improvements of past, recent timber sales. Past road construction has permanently removed a small amount of acreage from the productive forest

base, but has provided management access to the project area. The proposed temporary road construction would not permanently remove productive land from the forest base.

Consistency with the Forest Plan and Other Regulatory Direction

Alternative 1 (No Action) would not be consistent with Forest Plan objectives for promoting stand structures and species mix which reduce susceptibility to insects and diseases (USDA Forest Service 1987, p. II-32, (4)). Alternative 2 is consistent with Forest Plan direction. The specific standards are referenced below.

Proposed regeneration cutting followed by planting of seral tree species less susceptible to insect and disease damage including rust-resistant western white pine, is consistent with Forest Plan direction that "reforestation will normally feature seral tree species" (p. II-32). All stands proposed for regeneration cutting are on lands suitable for timber production that can be adequately restocked within five years of the final cut. As directed by the Forest Plan, stands would be regenerated with trees from seed that is well adapted to the specific site condition, and would be regenerated with a variety of species (p. II-32).

Site-specific silvicultural prescriptions are compatible with management area goals, and preferred species management has considered both biological and economic criteria (p. II-32). Silvicultural practices including cutting, site preparation and planting with seral species are designed to reduce the perpetuation of pest problems (pp. II-37 and II-38). Management of competing understory vegetation would be accomplished, where necessary, as a consequence of fuels reduction/site preparation treatments (p. II-38). More information concerning consistency with Forest Plan and other regulatory direction can be found in the project file.

Compliance with Old Growth Standards

Stand 655-01-044 (17.34 acres) is the only allocated old growth located in the South Grouse project area. No treatments are proposed in this stand. Appendix B details how the South Grouse project complies with Forest Plan old growth standards.

Fire and Fuels

Regulatory Framework

Key guiding documents providing the framework for fire management goals, standards, and objectives for implementing a fire management program are the IPNF Forest Plan and the National Fire Plan.

Idaho Panhandle Forest Plan

The fire protection standards for MAs 1 and 4 within the project area use the most appropriate fire management response (confine, contain, or 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 of the management area (USDA Forest Service 1987, pp. III-4, III-20, III-41).

National Fire Plan

The National Fire Plan (www.fireplan.gov; USDA and USDI 2001, p. 9) provides national direction for hazardous fuels reduction, restoration, rehabilitation, monitoring, applied research, and technology transfer, and it establishes the framework for a 10-Year Comprehensive Strategy.

Table 3-3 describes the four principle goals and implementation outcomes of the 10-year comprehensive strategy pertaining to the National Fire Plan. The proposed activities would improve our ability to suppress unwanted fires in the Wildland Urban Interface (WUI) by restoring and maintaining desired forest cover**.** The project would conform to the principles from guiding documents including the National Fire Plan strategies to reduce fire intensities in the WUI and restore fire-adapted ecosystems. More information on the regulatory framework for the fire fuels analysis can be found in the project file.

Table 3-3. Principle National Fire Plan goals and outcomes.

Goals	Implementation Outcomes
1. Improve Fire Prevention and Suppression	Losses of life are eliminated, and firefighter injuries and damage to communities and the environment from severe, unplanned and unwanted wildland fire are reduced.
2. Reduce Hazardous Fuels	Hazardous fuels are treated, using appropriate tools, to reduce the risk of unplanned and unwanted wildland fire to communities and to the environment
3. Restore Fire -Adapted Ecosystems	Fire-adapted ecosystems are restored, rehabilitated and maintained, using appropriate tools, in a manner that will provide sustainable environmental, social, and economical benefits.
4. Promote Community Assistance	Communities at risk have increased capacity to prevent losses from wildfire and the potential to seek economic opportunities resulting from treatments and services.

Methodology for Analysis

Given that a wildfire could threaten or destroy adjacent homes, the primary concern to fuels management in the project area is the potential for high fire intensities and rapid spread rates, which make suppression efforts difficult or ineffective. Fire history information was used to determine impacts from past events for the cumulative effects analysis. Historic fire occurrence and the existing fuel conditions were obtained through fire archives, research, and modeling.

Sources of information for this analysis include: stand exam plot data; Hayden Lake, Priest Lake, and the Bonners Ferry Remote Automated Weather Station data; 1935 and 2003 aerial photos, walk-through exams, and diagnosis conducted by A.J. Helgenberg and Jim Barrett, project forester and silviculturist (respectively) in fall 2004 and spring 2005. Detailed information from these sources is located in the project record.

A map of the recorded fire history for the South Grouse area was used to make assumptions as to when effective fire suppression began (project file). Records of fire ignitions were obtained from a national database (Northern Region National Fire Plan Cohesive Strategy, Geospatial Dataset) containing information submitted by the Forest Service, other federal agencies, state libraries, or universities.

The typical fire season for northern Idaho is the months of July, August, and September. Analysis used weather data from Hayden Lake, Priest Lake, and Bonners Ferry weather station observations from July 1 through September 30 during the years 1989-2004 (USDA Forest Service 2004). Trends were identified through use of a computer model that depicted a reasonable worse case scenario based on the information used for modeling. Weather data used from the three weather stations was combined to identify the 97th percentile weather conditions (Project File).

> A percentile is a value on a scale that indicates the percentage of a distribution that is equal to it or below it. For example, a temperature at the 97th percentile is equal to or higher than 97 percent of the observed temperatures.

Use of BEHAVE Model
Fire spread rates and intensities were predicted using the BehavePlus 3.0.1 model (USDA Forest Service 2005). BEHAVE is an interactive computer system developed over several years that is designed to predict fire behavior characteristics for various fuel types. It simulates fire, associated fuel, and environmental parameters. Fire behavior depends on stand structure, composition, amount of surface fuel, its arrangement, moisture content, prevailing weather, and physical setting on the landscape. Surface fire behavior is characterized by 13 fuel models that describe the fuel complex, loading, depth, and moisture of extinction (upper limits of fuel moisture beyond which a fire would no longer spread with a uniform burning front) for all sizes of fuels and slash (Anderson 1982). These models, along with dead and live fuel moisture content, slope, and wind speed, predict fire spread rate and fireline intensity (Anderson 1982).

The BehavePlus 3.0.1 model assumes that fire is no longer affected by the source of ignition and the fire is not being affected by suppression action. Fire behavior is heavily weighted toward fine fuels, due to fuels larger than one inch having little effect on rate of spread and fuels larger than three inch having no effect. The model assumes that fuels are continuous and uniform, the more uniform the fuel bed, the better the model will predict the fire behavior that occurs. The model predicts fire behavior quite accurately in grass fuel types (Fuel Model 2) and under predicts fire behavior in timber fuel types (Fuel Model 10) that are mixed with scattered down and dead. Uniform weather and topography are also assumed, changes in slope and weather parameters require new calculations.

There are several ways of expressing fire intensity. Fireline intensity is widely used as a means to relate visible fire characteristics and interpret general suppression strategies. A visual indicator of fireline intensity is flame length (Debano et al. 1998, p.56, 57). Table 3-4 compares fireline intensity, flame length, and fire suppression difficulty. More information concerning the methodology used for the fire fuels analysis can be found in the project file.

Table 3-4. Fireline intensity interpretations*

Intensity	Flame Length	BTU/Ft/Sec	Interpretation
Low	<4 feet	< 100	Direct attack at head and flanks with hand crews, hand lines should stop spread of fire
Low-Moderate	4-8 feet	100-500	Employment of engines, dozers, and aircraft needed for direct attack, too intense for people with hand tools
Moderate	8-11 feet	500-1000	Control problems, torching, crowning, spotting; control efforts at the head are likely to be ineffective
High	> 11 feet	> 1000	Control problems, torching, crowning, spotting; control efforts at the head are ineffective

*Based on Rothermel (1983) page 161 and National Wildfire Coordination Group (1993).

Affected Environment

Existing Condition
The types of fires that occur in forested ecosystems (Zack and Morgan 1994; p.19-22) 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.

In 1994 Zack and Morgan completed a fire history study on two forested landscapes in northern Idaho, one in the Coeur d' Alene River basin and the other north of Bonners Ferry. Due to the proximity to the project and similar habitat types this study was used to make assumptions on historic fire frequency and severity within the South Grouse project. The number of lightning fires regularly experienced in northern Idaho accounts for a disturbance regime that includes regular major wildfires (Zack and Morgan 1994). Fire suppression has effectively excluded most wildland fires since the 1930s. This has eliminated the underburns and mixed-severity fires, which served as the thinning agents that favored dry habitat type legacy trees (larch and ponderosa pine). The changes to western warm dry forests have been well documented (Keane et al. 1990, p.190; Harvey 1994, p.87; see Fire and Fuels project file.

The South Grouse area includes the following habitat type groups for this analysis:

- **Dry habitat types** (778 acres) consist primarily of ponderosa pine, western larch, Douglas-fir, and grand fir. Prior to the 20th 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 year), they were mostly non-lethal. Stands comprising all age structures were the result of non-lethal fire regimes, even-aged 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).

- **Moist habitat types** (224 acres) 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 living plants 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). Because pre-settlement intervals between severe fires were generally long in these forests 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, p 15-16).

South Grouse Area Fire History and Occurrence

Lightning and humans are the source of fire starts in the Sandpoint Ranger District. The location of fires in the Sandpoint Ranger District have been recorded and mapped for approximately 130 years. The last major fire to burn within the South Grouse project area occurred in 1910. Forest Service records show that at least two fires have been suppressed within the last fifteen years in the project area (Figure 3-5). Several other fires have been suppressed near the project area.

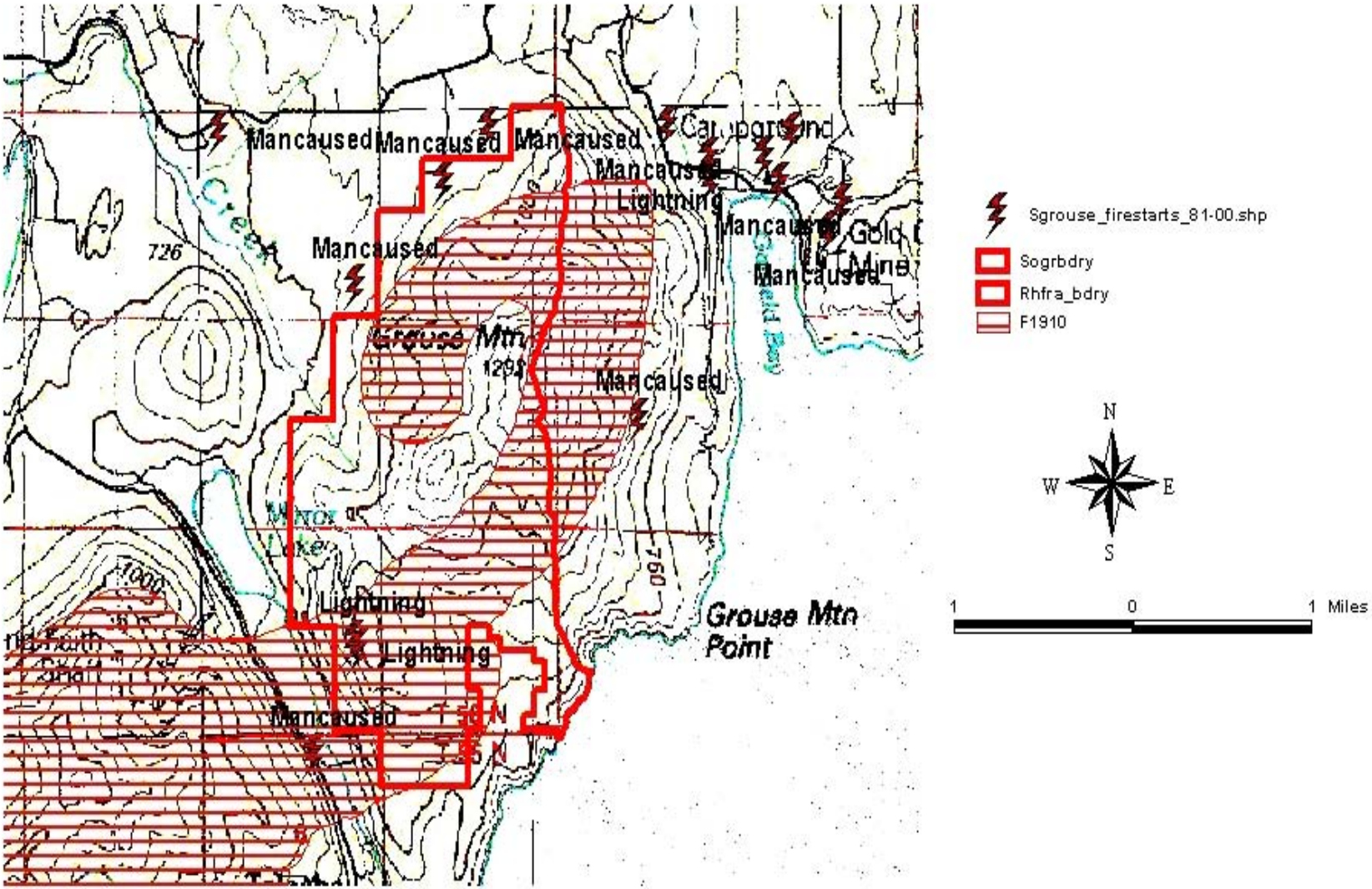

Figure 3-5. Fire history of the South Grouse project area

Today the risk of lethal stand-replacement fire in the South Grouse project area is increasing due to accumulating fuel loads. At the same time, adjacent development has increased, and with it the risk of human-caused ignitions also increases. In the absence of nonlethal fires, both ground and ladder fuels are increasing due to tree growth, normal tree mortality, excessive root disease, and beetle-caused mortality. These factors are affecting moist and dry forest habitat types.

Existing Fire Hazard and Fire Behavior

Goals of the National Fire Plan are to change trends in Condition Classes defined by Schmidt et al. (2002, p. 8) from Condition Class 3 to Condition Class 1. An analysis of the Fire Regimes Condition Class (FRCC) was completed for the South Grouse Project area. Fire regimes in the South Grouse Project area were determined using VRU's (Vegetation Response Units). The VRU's were grouped into two broad habitat type groups: dry and moist (USDA Forest Service. 2005). Fire Regime Condition Class is a classification of the amount of departure from the natural regime (Hann and Bunnell 2001). FRCC includes three condition classes for each fire regime. The classification is based on a relative measure describing the degree of departure from the historic natural fire regime (Table 3-5). This departure results in changes to one (or more) of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and disease mortality, grazing, and drought). The three classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.

Table 3-5. Description of Fire Regime Condition Classes

Fire Regime Condition Class	Description	Potential Risks
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate; Risk of loss of key ecosystem components is moderate.
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components is high.

Fire regimes in the South Grouse Project area were determined using two habitat type groups, dry and moist. Dry habitats are primarily south aspects where ponderosa pine or Douglas fir is the climax species. Dry habitats fall into Fire Regime I. Moist habitats are

Habitat Type	Fire Regime	FRCC	Acres	%
Dry	I	2	505	52
Moist	III	3	461	48

generally more northerly aspects or draws, and host a variety of species such as western larch, white pine, grand fir, Douglas fir, and western redcedar. The most dominant climax species on moist sites in the South Grouse Project area is western redcedar. The moist habitats fall into Fire Regime III.

The Fire Regime Condition Class Analysis for the South Grouse Project area showed that the landscape as a whole is in Condition Class 2, and is in need of restoration of fire effects, vegetation composition/structure and fuel characteristics. The departure from natural fire frequency and severity and the departure from natural vegetation composition/structure, and fuel characteristics influenced the dry and moist habitat types. Fire exclusion, white pine blister rust, and timber harvest not mimicking the natural fire regime are primary factors pushing the Condition Class rating into Condition Class 3 in localized moist habitats.

Fire Regime Definitions:

I – 0-35 year frequency and low surface fire most common to mixed severity (less than 75% of the dominant overstory vegetation replaced).
II – 0-35 year frequency and high severity (greater than 75% of the dominant overstory vegetation replaced).
III – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced).
IV – 35-100+ year frequency and high stand replacement severity (greater than 75% or overstory vegetation replaced).
V – 200+ year frequency and high stand replacement severity.

The BehavePlus 3.0 surface fire model was used to estimate the potential fire intensity of the South Grouse project area, given the existing stand structure and reasonable environmental conditions.

Table 3-6 compares the different fuel models by acreage.

Table 3-6. Acres of South Grouse project area by fuel model

Fuel Model	Acres of Treatment	Percent of Treatment Area
8	317	**33%**
10	528	**55%**
2	120	**12%**
Totals	965	**100%**

Table 3-7 shows the potential range of existing fire behavior characteristics generalized by vegetative cover type within the project area.

Table 3-7. Existing potential fire behavior

Fuel Model	Surface Fire Flame Length (feet)	Rate of Spread*	Fireline Intensity Surface**
8	2.2	7.7	32
10	10.2	32.4	881
2	15	206	2134

* Chains per hour, (66 feet equals a chain).
**BTUs/ft/sec.

Under the existing condition, fire behavior modeling suggests that, should a wildfire occur during extreme fire danger conditions (97th percentile weather), high-intensity fires would take place in Fuel Models 2 and 10 (Table 3-7). Control problems would exceed the capability of hand crews, resulting in the need for indirect suppression strategies to be employed, resulting in a greater area burned.

Compared to surface fires, crown fires exhibit higher spread rates and flame lengths. A crown fire increases the threat to firefighters, public safety, and increases the threat of property loss (Scott and Reinhardt. 2001, p. 1). BehavePlus 3.0.1 was also used to model crown fire initiation. Flame lengths are indicators of potential fire intensities, but cannot be used alone to determine the effectiveness of the proposed treatment. The less distance between the base of the tree canopy and the ground surface, the less surface flame length is required to initiate and sustain a crown fire (Figure 3-6). This is referred to as Canopy Base Height. Canopy Base Height is used along with flame lengths to determine the potential for a surface fire to spread into the tree crowns. As the potential for a crown fire to occur increases suppression efforts become more difficult or ineffective.

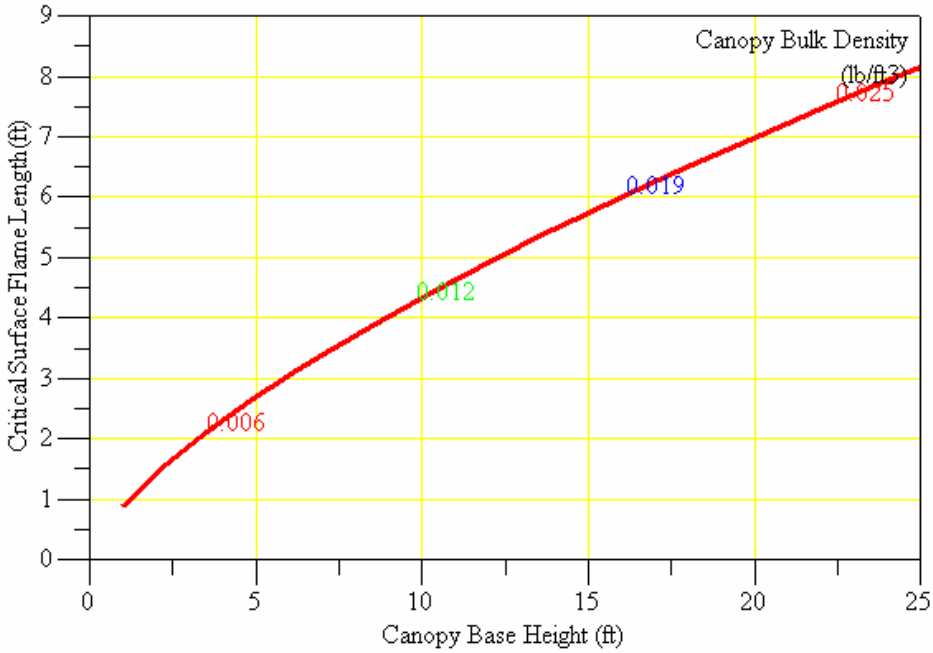

Figure 3-6. Existing canopy base height at 3- to 5-foot potential flame lengths

Fire exclusion in fire adapted ecosystems can cause many changes in vegetation and potential fire behavior, which are well documented. Large, stand destroying, lethal 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). 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 South Grouse project area is adjacent to private lands and homes, and a large, uncontrolled fire could be a threat.

Desired Future Conditions

The desired vegetative structure would typically only support low fire intensity. After the proposed treatments, heavy concentrations of dead and down fuels would be removed through prescribed fire and piling. Modifying fuels would change potential fire behavior so effective, rapid, and safer fire suppression could occur, minimizing loss of key habitat and large trees. Direct fire suppression action could be used in treated areas, with the potential reduction in costs and the reduction of resource damage caused by a severe fire.

After treatments, fuel would ideally be maintained in a fuel model 8 condition (Table 3-7). The effectiveness of maintenance after treatments has been well documented in the USDA Forest Service publication "*Influence of Forest Structures on Wildfire Behavior and the Severity of Its Effects*" (USDA Forest Service 2003, p.4).

Aerial fuels separated from surface fuels by large gaps are more difficult to ignite because of the distance above the surface fire, thus requiring higher intensity surface fires and a longer duration fire to dry out the canopy (USDA Forest Service 2004, p.11). After treatments the canopy would be less dense and the potential for high intensity surface fire would be reduced, resulting in less likelihood of a sustained crown fire.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

Alternative 1 would not result in any direct effect or change to forest fuels. No fuels reduction treatments would be implemented.

In the absence of any kind of human-caused or natural disturbance, indirect effects would occur from the natural progression of forest growth and change. Vegetative conditions, fire behavior, and fireline intensity as described in the existing condition section would persist.

Over time more fuels would accumulate as trees continue to succumb to insects and disease, increasing the continuity of surface fuels, increasing ladder fuels, and thus lowering the gap between surface fuels and the canopy. The shade intolerant understory would continue to grow and replace the overstory as it falls to the forest floor, increasing the continuity of the canopy. The rate of spread and flame lengths in this situation would increase: combined with the ladder fuels, lowered canopies, and the continuity and densities of the canopy, the potential for sustained crown fire would be increased. High Flame lengths and fireline intensities directly affect our ability and strategies to suppress wildfires.

Cumulative Effects

The cumulative effects analysis area encompasses all of the federal, private, and other lands that could burn into or out of the project area in any single fire event. This area is not definable on a map, because determining how large or how far a fire would travel is dependent on a number of variables including fuel conditions, temperature, relative humidity, wind, topography, and many others that cannot be determined until an ignition occurs. An example of this is the Sundance Fire of 1967, which traveled more than 16 miles and engulfed more than 50,000 acres, mostly within a nine-hour time frame (USDA Forest Service 1968).

Under the No Action Alternative, wildfires in the analysis area would continue to be suppressed. Therefore, fuels would continue to accumulate and fire behavior would maintain its trend away from historic conditions, creating an increasing challenge to fire suppression forces. Fires would tend to burn with more intensity over time, potentially becoming more dangerous and destructive. Forests where root disease is an increasing problem would 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).

Because of the private property values and public infrastructure like utility lines, wildfires would continue to be suppressed in the project area. By allowing fuels to continue accumulating, the No Action

Alternative would contradict the goals of the National Fire Plan (USDA & USDI, 2001, pg. 9) to reduce hazardous fuels and restore fire-adapted ecosystems.

Several timber harvests prior to 1940 are listed in Table 3-1. While little is known about them, harvests likely removed desirable, large, fire-resistant species like ponderosa pine and western larch. Over a half-century later, the fuel reduction benefits that may have occurred have been long since overshadowed by natural vegetative growth, mortality, and subsequent fuels accumulation.

Sixty-one acres of shelterwood harvest and 2.3 miles of road construction were completed in 1987 during the Grouse Mountain Sagle timber sale. In 1997, 582 acres were harvested and 6.4 miles of roads were constructed during the Big Grouse timber sale. The fuels were treated and the majority of harvested acres were planted with ponderosa pine, western white pine, and western larch. Today the majority of harvested acres are sapling stands with low fire-intensity and rate- of spread potential. Within a few years, these young stands would likely be precommercially thinned. This combination of harvest, slash treatment, planting and subsequent thinning are taking these stands toward historic conditions when wildfires tended to have lower intensity fires. The roads constructed for these projects will continue to provide quick-response access to wildland fires started in or near these project areas.

The East South Grouse project is being considered for the area between the proposed South Grouse project and Lake Pend Oreille. Little is known about the project since actual planning has not begun.

Adjacent private forestland is a mixture of heavily harvested areas with follow-up fuel treatments, to houses surrounded by dense untreated forest. This spectrum of fuel conditions suggests some private property values are relatively safe from potential wildfire damage while others are very vulnerable.

By pursuing Alternative 1, no action:

- fuel accumulation would continue in the proposed project area
- nearby young plantations would be somewhat vulnerable to damage from wildfire spreading from the proposed project area into the plantations
- fire access in the proposed project area and along private property boundaries would remain unchanged
- nearby private property values would experience increasing susceptibility to damage from wildfires spreading onto private land from the proposed project area as fuels continue to accumulate

Alternative 2 – Proposed Action

Carrying out this alternative would effectively reduce flame lengths, lower existing fuel concentrations, decrease ladder fuels (brush and small trees), and increase the chance of successfully suppressing wildfires should they occur. Any fire starting in the project area or entering the project area would be confined to the ground, affording a high probability of control using engines, hand crews, and air tactical resources. A wildfire would be substantially less severe, of lower intensity, less expensive and safer to suppress than under current conditions.

Potential loss or damage of private property and resources from a fire burning in the project area, and then spreading into adjacent private lands would be reduced.

Direct and Indirect Effects

Modeling was conducted to determine potential fire behavior characteristics before and after treatment. Table 3-8 provides estimated potential wildfire behavior outputs for the three fuels models represented in

the project area, and the analyzed change in fire behavior characteristics related to the desired condition. After treatment, those areas represented by fuel models 10 and 2 would be better characterized by fuel model 8; a fuel model more conducive to fire suppression. Not all acres would be converted due to untreated riparian and sensitive areas within the stands.

In areas of prescribed fire without harvest, the fire would be allowed to burn in a mosaic pattern, replicating historic fire. This would leave some unburned areas within those boundaries depending on burning conditions.

Table 3-8. Post-treatment fire potential

Fuel Model	Surface Fire Flame Length (feet)	Rate of Spread*	Fireline Intensity Surface**	Acres By Fuel Model Before Treatments	Acres By Fuel Model After Treatments
8	2.2	7.7	32	317	901
10	10.2	32.4	881	528	52
2	15	206	2134	120	12

* Chains per hour, (66 feet equals a chain).
**BTUs/ft/sec.

Proposed treatments would change the quantity and continuity of fuels. Within the treated areas, fire behavior modeling indicates that fireline intensity and flame length would be reduced. Essentially, treatments would transition areas that would currently burn as Fuel Models 2 or 10 to burning as more like Fuel Model 8. Thinning from below would reduce stand density. Removal of dead and dying trees would reduce actual and potential surface fuels available to burn under high-intensity fires. Treatments would also increase stand vigor by making the soil, water, and nutrients available to fewer trees left in the residual stand (Graham 1999, p. 20). This would result in healthier trees and less future mortality from insects, disease, and wildfire, which contribute to future high fuel loadings.

Depending on the size, number, spacing, and species of reserve trees, stands that are treated with regeneration methods can have similar effects on wildfire as does the thinning of a stand. After harvest, the regeneration units will have fuels reduction activities to dispose of the slash, either prescribed fire or machine piling.

In the short term (up to five years), logging slash created would increase the fire hazard until it was properly treated according to fuel mitigations listed above, or it naturally abated. The unmerchantable branches and other fuels that are left after harvest can substantially increase fuel load, increasing fire hazard until the fuel on site is treated with underburning or piling (USDA Forest Service 2003, p 3). The increased hazard from slash is somewhat offset by stand density reduction. The removal of logs reduces fuels, and opening stands up would tend to force wildfires to burn on the ground and not in the tree crowns.

During harvesting operations, the potential of man-caused fire ignition increases. Common ignition sources include: equipment and vehicle operation, smoking, and arson. Standard timber sale contract provisions would require a timber purchaser to have fire suppression equipment on site and to take necessary fire precautions to prevent accidental wildfire ignitions. In the event of extreme fire conditions, harvest activities would be regulated or suspended until conditions improve. A timber sale administrator closely monitors the fire prevention requirements of the timber contract throughout the timber harvest operations.

The proposed alternative would remove part of the forest canopy, which would reduce 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, pp. 31-32).

Agee has also stated that when activities are followed by sufficient treatment of surface fuels, the overall reduction of fire behavior and severity outweighs the increased winds and consequently the reduction in fuel moistures (Agee 2005, p4).

Lower flame lengths are indicators of reduced potential fire intensities, but cannot be used alone to determine the effectiveness of the proposed treatments. The spatial continuity and density of tree canopies in combination with wind and physical setting provide the conditions required for rapidly moving fires that typically consume the crowns (needles and small branches) of large forest areas (USDA Forest Service 2004. p.15). Through thinning (reducing the canopy density) and other mixed treatments (breaking up of the canopy spatial continuity), causing a mosaic or patchiness, the spread of fire through a canopy will be reduced (Figure 3-7). Further treatments, both prescribed fire and mechanical, will reduce the surface fire intensities, thus further reducing potential sustained crown fire. As Canopy Base Height is raised and surface flame lengths are reduced the potential of fire moving into the canopy is lessened and the effectiveness of suppression efforts is increased.

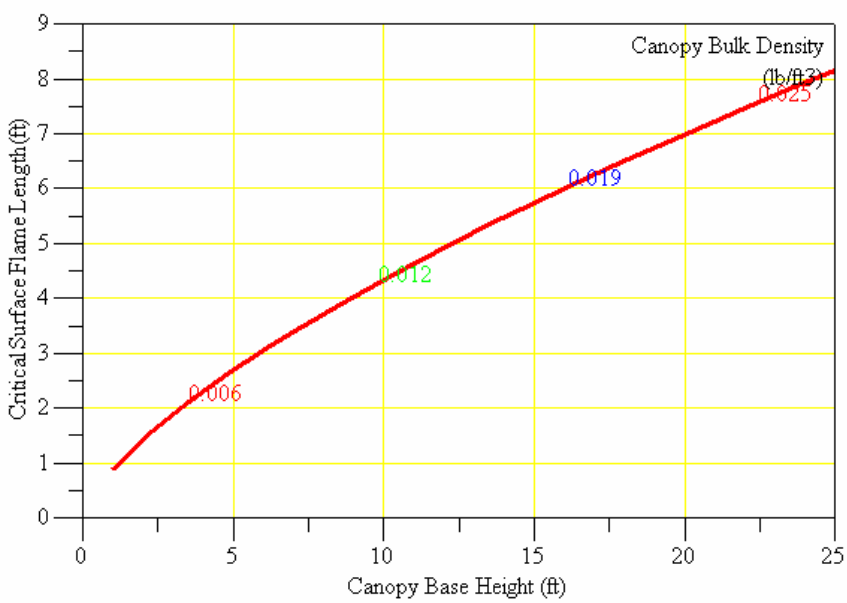

Figure 3-7. Post treatment transitions Fuel Model 10 to an 8, flame lengths are reduced and canopy base heights raised.

Cumulative Effects

The cumulative effects analysis area, and the past, present and foreseeable future actions considered are described in the No Action Alternative cumulative effects section of this report.

Past timber harvest can affect fire activity, thus fire risk. The effects of past harvest on Forest Service-administered lands within the South Grouse project area are varied, from the removal of selected individual trees to regeneration cuts. The effects on fire from timber harvest are also variable, depending on the amount of canopy removed, the subsequent fuel treatment, and the time since harvest. Timber harvest without subsequent fuel treatment may have the same effect as fire suppression, by causing an

increase in surface fuels. The Grouse Mountain Sagle and Big Grouse timber sales harvested timber and applied prescribed fire to reduce the surface fuels in the harvest units. In combination with the past timber harvests, the proposed action would effectively reduce fire intensity potential in the project area and reduce crown fire sustainability.

In the report "Influence of Forest Structure on Wildfire Behavior and the Severity of Its Effects" it is stated that:

> *"A combination of new treatments and maintenance treatments arrayed across a landscape can effectively disrupt fire growth and change fire behavior at the landscape scale, even though some stands within the landscape have not been treated recently."*(USDA Forest Service 2003).

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 species such as Douglas-fir and grand fir, over early-seral species such as ponderosa pine and western larch. With increased values for private timber, and historic harvest practices on private lands, historic vegetation patterns may never be reestablished on private lands near the project area.

Slash treatments on private lands are controlled by the Idaho Department of Lands. Currently, there are fuel reduction efforts focused on private lands, primarily around structures within the resource area (1 mile from project area). These efforts are part of the Bonner County Urban Interface Fire Mitigation Committee (BONFIRE), an interagency partnership that works collaboratively to reduce hazardous fuels in the urban interface across all ownerships. These activities would complement the South Grouse proposed project by progressing towards a landscape approach of reducing fire intensities in the wildland urban interface.

Future timber stand improvement (TSI) thinnings will break crown to crown fuel continuity as it develops in regenerated stands. Thinning could occur in Grouse Sagle, Big Grouse and the proposed project areas. Wherever these treatments occur, slash would create a fuel hazard until it was disposed of or naturally abated. The long-term benefit would be dispersed thinned stands characterized by low fuel loads and relatively low hazard risk. This positive fuel situation could endure for decades until an understory develops under these young stands. These low risk stands would be scattered throughout the larger area encompassing the three projects.

Hunter access and firewood gathering would not be changed by the proposed project or by the combination of past, proposed and future projects. Therefore, threat of hunters igniting fires would not be diminished. However, with fuel hazards reduced in the project area and adjacent past project areas, the likelihood of damage from human-caused fires would be effectively reduced.

Summary: Fire intensities and flame lengths would be reduced by the proposed fuels reduction activities of Alternative 2. Canopy densities would be reduced and fuel continuity would be disrupted. With reduced fire behavior, the effectiveness of suppression efforts would increase and risk of large, fast moving landscape fires and smaller, local fires would decrease within the project area. However, the fuel treatments within the project area alone would not reduce the risk of a wildfire initiating on adjoining lands. Successful fire suppression has contributed to a substantial change in forest vegetation and fuel loading. Given the close proximity of the project area to private property, resource values at risk, and continued private land development and human activity fire suppression will continue at least into the foreseeable future. Cumulatively, past management including road construction and ongoing private land hazard reduction efforts, would act with Alternative 2 to reduce fire risk and intensity in the cumulative

effects area. This would effectively reduce the risks to life, property, and natural resources in the Grouse Mountain area.

Air Quality

Regulatory Framework

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

- Clean Air Act amendments of 1977, 1990, 1999 (42 U.S.C. 7401-7626); the Clean Air Act (Section 110) requires each State to develop a State Implementation Plan (SIP) to identify how the State will attain and maintain national air quality standards. The EPA has established National Ambient Air Quality Standards (NAAQS) for smoke and other particulate matter. Idaho Department of Environmental Quality (DEQ) ensures compliance with the NAAQS through regulations and air quality permits which are contained in the Idaho State Implementation Plan (SIP). Conditions of the air quality permits ensure that emissions from permitted industrial sources would not cause or contribute to a violation of the NAAQS.

Page II-34 of the IPNF Forest Plan (Forest-wide standards) says:

- Participate with the State and others in the development and implementation of State Implementation Plans (SIP) that are compatible with management objectives for the IPNF
- All projects, contracts, and permits must comply with procedural and substantive requirements of the Clean Air Act, State Implementation Plans and State Smoke Management Plans
- Develop and use alternative slash (biomass) disposal methods that are practical and biologically sound
- Encourage utilization of forest products to reduce biomass, which must be disposed of otherwise

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/Idaho State Airshed Group (2004). The procedures used by the Airshed 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 March through November, they work in collaboration with the DEQ, assisting with any recommendations. During the winter months (December through February), the Idaho Panhandle National Forests voluntarily collaborate with the airshed group. This unit monitors meteorological data, air quality data, and planned prescribed burning and decides daily on whether to issue recommendations on burning for the following day.

Historically, prescribed burning has occurred in the spring and fall seasons, within 45 to 60 days during each season. Each year, a list of all prescribed burning (understory and pile burning) planned for the Sandpoint Ranger District is entered into a database administered by the monitoring unit before March 1. Before 11:00 a.m., proposed burns for the next day are entered into the database. By 3:00 p.m. the same day, the monitoring unit posts, on a website, any recommendations concerning the next day’s burns.

Environmental Consequences

Direct and Indirect Effects

Alternative 1 (no action) would not have any direct effects on air quality because no burning would occur. However, without abating fuels in the project area, indirect effects could result if a wildfire were to occur. Smoke from a wildfire could impact air quality in northeastern Idaho and northwestern Montana, posing a health risk during the fire. However, it is impossible to predict the extent and duration of smoke produced from a wildfire. Smoke would likely quickly dissipate when the fire was controlled.

Alternative 2 (proposed action) would have a direct, short-term effect on air quality in the project area. Under this proposed action, approximately 150 acres would be burned in its natural state without other treatments, 191 acres would be piled and burned, and 601 acres would be underburned. The implementation of this proposal would mean that some fuel would be harvested and taken off site for the purposes of lumber, pulp, and miscellaneous firewood cutting. By taking this fuel off-site, it reduces the amount of emissions going into the atmosphere through prescribed burning.

It is expected that residents near the actual burn area might see or smell smoke; however, it is expected that most impacts will be in the form of “nuisance” smoke and/or smell but would meet all the ambient air quality standards established by the Environmental Protection Agency. During the evening hours following a prescribed burn, some smoke would be expected to settle into the lower draws and drainages surrounding the South Grouse project area. Smoke trapped in these low lying areas would be expected to dissipate once morning temperatures rose and the nighttime inversion lifted. To limit the potential effects of inversions, the Montana/Idaho State Airshed Group would only allow burns to be conducted when good or excellent dispersion conditions are indicated. Compliance with burning regulations established by the North Idaho Smoke Management Group would assure that standards are met.

Air quality impacts from the proposed project would result primarily from burning. Logging equipment would produce temporary emissions of engine exhaust and dust emissions from vehicle traffic on and off roads.

An indirect effect of this proposal is a reduction in the emissions that would be released from potential wildfires in the area. By removing the small-diameter surface fuels with controlled low-intensity prescribed fire, the potential of a high-intensity fire developing within the stands would be reduced.

Cumulative Effects

The cumulative effects analysis area for smoke, road dust, and other related effects is difficult to tie to a specific geographic area. The distance that smoke and dust will travel is dependent on numerous factors, including the prevailing winds, local winds, inversions, the amount of smoke generated from a burn, the amount of fuel to consume, the stability of the atmosphere, and others. However, since the project area is located in northern Idaho, only a short distance from Montana, it is reasonable to consider the cumulative effects area to be northeastern Idaho and northwestern Montana.

Past, present and reasonably foreseeable activities and their impacts on air quality are difficult to address in terms of cumulative effects. Several large fires have occurred near the project area over the past century, as referenced in South Grouse Area Fire History and Occurrence; however, those effects on air quality are gone and cannot be viewed cumulatively.

Cumulative foreseeable activities that produce pollutants include, but are not limited to, burning on private lands and public lands, use of fireplaces, dust from unsurfaced roads, wildfires, and so on. Because of the coordination of prescribed burning in North Idaho and the collaboration with the DEQ, overlapping effects to air quality are minimized.

Alternative 1 (no action) –If a large wildfire were to occur, the Forest Service and the DEQ would probably restrict all regulated burning. However, effects of smoke from a large wildfire could become cumulative with unregulated pollutants in the area, such as smoke from fireplaces, dust from roads, etc. These types of cumulative effects are difficult to measure and predict.

Alternative 2 (proposed action) - Smoke from prescribed burning is transitory in nature. The effects of the proposed action from smoke are not likely to have cumulative effects with other activities in the airshed given the oversight by the DEQ. The district's burn-day determinations only allow burning when criteria are met that allow for good smoke dispersion. Daily regulation of amount of burning is managed to reduce impacts and negative effects of smoke. The number of days to accomplish prescribed burning in this project would compete with other burning in the airshed on any given day. It will be up to the Forest Service to establish burn priorities and the responsibility of the Air Quality Management District to manage all the burning on a given day. If air quality is exceeding thresholds when proposed activities are scheduled to occur, Alternative 2 may result in some delays in burning as a result of this increased demand for "air space." Given these circumstances, there would likely be little to no cumulative effects from Alternative 2.

Consistency with the Forest Plan and Other Regulatory Direction

Since Alternative 1 does not directly create any air quality impacts, it would be consistent with Forest Plan Standards and the Clean Air Act. If a large wildfire were to occur, air quality standards would likely be exceed until the fire were controlled.

Burning in Alternative 2 would be performed in accordance with smoke management practices, which are designed to prevent the smoke from causing a violation of the NAAQS. As stated above, there is little risk that a violation of any ambient air quality standard would occur as a result of the proposed action. Alternative 2 would be consistent with Forest Plan Standards and the Clean Air Act.

Wildlife

Regulatory Framework

Specific regulatory direction applicable to the management of wildlife resources include:

- Endangered Species Act (ESA) of 1973 (as amended)
- National Forest Management Act (NMFA) of 1976 (as amended)
- Executive Order 13186 (Migratory Bird Treaty Act)
- Idaho Panhandle National Forests Forest Plan (USDA Forest Service 1987)
- Forest Service policy regarding wildlife (FSM 2600)

Forest Plan Direction

The following forest plan goals and management area direction pertain to wildlife species or habitats known to occur in the South Grouse project area.

Forest Plan Goals (Forest Plan p. II-1)**:**

- provide for a diversity of plant and animal communities,
- manage vertebrate wildlife habitat to maintain populations of all species,
- manage big game habitat to achieve goals of Idaho Department of Fish and Game,
- and manage habitat for threatened, endangered and sensitive wildlife species.

Management Area Direction - Portions of the project area are designated as MA 4, which consists of timberlands located within big game winter range. Management goals are aimed at providing adequate forage to support big game habitat needs through scheduled timber harvest and permanent forage areas. Up to 20% of these areas may be managed for forage production while retaining areas for thermal cover. Within white-tailed deer winter range, smaller units will be emphasized. Roads may be closed to meet wildlife needs (Forest Plan p. III-18).

Methodology for Analysis

Field reviews were conducted in the fall of 2004 and spring 2005 (Project File-Wildlife and Vegetation Sections). In preparation of this document, a review was performed of District and Forest wildlife records including:

- U.S Fish and Wildlife Service (USFWS; USDI Fish and Wildlife Service 2005) list of federally threatened and endangered species in the Idaho Panhandle National Forests
- Region 1 Sensitive Species list
- IPNF Management Indicator Species (MIS) list
- Idaho Department of Fish and Game website

Timber Stand Management Record System (TSMRS) data bases and aerial photos of the analysis areas were used, initially, as the basis for analysis. Field reviews and walk-through exams were conducted to validate, and where necessary, update this information. This information was then compiled into a spreadsheet and evaluated to determine habitat suitability following modeling rules described in the document “Interpretation of Key Habitat Components for Determining Habitat Suitability” (Project File-Wildlife Section).

The species evaluated for analysis include at-risk species (threatened, endangered, and sensitive species), MIS and others identified through the scoping process. Some of these species either do not occur in the project area or their habitat would not be affected by the proposed actions.

The South Grouse Fuels Reduction Project was developed to bring the area back into the historic range of variability, which would benefit species dependent on frequent fire intervals and more open forest conditions. District personnel, including two wildlife biologists and two wildlife technicians, have made numerous field visits to the project area and vicinity. No evidence of threatened, endangered, proposed, or sensitive species has been documented in the area. The pileated woodpecker and white-tailed deer are the only MIS documented to reside in the project area.

The project is associated with several blocks of public land that are surrounded by water and highly developed rural properties, which are disconnected from the larger, contiguous span of National Forest lands. Therefore, it is not large enough and too isolated for population dependence or to be source habitat for any of the species considered. None of the project area is critical or what is considered primary habitat for any threatened, endangered, or sensitive wildlife species, or MIS. Consequently, species viability and extent of their distribution is not dependent on the integrity of these isolated parcels.

Timeframes considered in the analysis are short-term effects (within next 5 years) and long-term effects (more than 10 years following completion of the project).

In general, the project area is of adequate size to assess cumulative impacts for most wildlife species unless otherwise mentioned. Activities considered in the cumulative effects analysis include those Forest Service projects and natural events known to have occurred in the project area, as well as those listed on the Forest's Schedule of Proposed Actions (SOPA). Dispersed recreation and hunting also occur on Forest Service lands. Activities occurring on adjacent private lands can also affect wildlife in the project area. Known activities on adjacent private lands include timber cutting, residential development, recreation, and road building. However, actual estimates of these activities are not available.

Issue Indicators
Table 3-9 lists the issue indicators that have been identified to measure potential impacts of alternatives on relevant wildlife species. Habitat associations provide the foundation for assessing habitat suitability and predicting effects. Specific vegetation data was assembled and evaluated to determine its application to key habitat components that define suitable conditions. The project file has an interpretation of key components for determining habitat suitability.

Table 3-9. Issue indicators used to measure effects

Species	Indicator
Bald Eagle	Proximity to known nest sites and large bodies of water
Flammulated Owl	Changes in habitat suitability (i.e. late forest structure)
Pygmy Nuthatch	Same as flammulated owl
Northern Goshawk	Changes in habitat suitability (i.e. late forest structure)
Black-backed Woodpecker	Changes in quality, abundance, and distribution of snag habitat
Pileated Woodpecker	Changes in nesting habitat including quality and abundance of large diameter trees and snags
White-tailed Deer	Changes to critical winter range
Forest Land Birds	Changes in forest health, stand structure, and habitat diversity

Affected Environment and Environmental Consequences

This section is organized to present individual species one at a time, therefore, affected environment and environmental consequences discussions are combined.

Wildlife Species Not Analyzed in Detail - A preliminary analysis was conducted for each potentially affected wildlife species and their habitat to determine the scope of analysis. The species listed below would not likely be affected by proposed activities because they do not have suitable habitat, are not regularly present, or are not expected to be in or near the project area. For these reasons, these species were not analyzed in detail (Project File-Wildlife Section).

Threatened and Endangered Species

Northern Gray Wolf (*Canis lupus*)

Grizzly Bear (*Ursus arctos horribilis*)

Woodland Caribou *Rangifer tarandus caribou*)

Canada Lynx (*Lynx Canadensis*)

Sensitive and MIS Species

Boreal Toad (*Bufo boreas*)
Fringed Myotis (*Myotis thysanodes*)
Townsend's Big-eared Bat *(Plecotus townsendii)*
Coeur d'Alene Salamander *(Plethodon vandykei idahoensis)*
Fisher *(Martes pennanti)*
Wolverine *(Gulo gulo)*
Northern Bog Lemming *(Synaptomys borealis)*
Peregrine Falcon *(Falco peregrinus anatum)*
Common Loon *(Gavia immmer)*
Harlequin Duck *(Histrionicus histrionicus)*
Black Swift *(Cypseloides niger)*
American Marten *(Martes americana)*

Wildlife Species Identified During Scoping

One bird species, the barred owl, was identified as a concern during scoping. In September of 2005, Dave Roberts (North Zone Wildlife Biologist) and A.J. Helgenberg (Forester) met with Dennis and Lynn Florea on their property to discuss the potential effects of the project on barred owl nesting and foraging habitat. Dave Roberts told the Floreas that while the Idaho Panhandle National Foresta does not manage specifically for barred owls, the habitat needs for these woodland creatures would likely be met by managing for the historic range of vegetation variability. Additionally, the project is designed to protect draws, leave patches untreated areas of forest, and retain potential nest and/or roost trees regardless of what type of treatment is proposed for a given area. Therefore, barred owls are not discussed further because nesting habitat would be protected through project design features and foraging habitat would be retained by managing for the historic range of vegetative variability.

Wildlife Species Analyzed in Detail - This section describes the status and distribution of wildlife species analyzed in detail because they have potential habitat in the project area and could be affected by the proposed activities. It also describes the environmental baseline and relevant habitat components that may or may not be affected by the alternatives. Information presented here is based on scientific literature, wildlife databases, professional judgment, recent field surveys, and habitat evaluations.

Threatened and Endangered Species

The only federally listed threatened, endangered, or proposed (TEP) species expected to occur within the area of potential effect is the bald eagle, a threatened species. See the biological assessment for further information on other TEP species.

Bald Eagle

The potential effects on bald eagle and its habitat were derived from Forest Service yearly bald eagle nest surveys and monitoring as well as information obtained from Idaho Bald Eagle Nest Monitoring Report for 2004 (Sallabanks 2005), and the Montana Bald Eagle Management Plan (Montana Bald Eagle Working Group 1994) to determine the predicted change in habitat suitability resulting from each alternative.

Lake Pend Oreille adjoins a small portion of a southeast corner of the project area. However, the closest area of activity associated with the project is about ¼-mile from Lake Pend Oreille, beyond high relief

slopes that drop into the lake and are obscured from a direct line-of-sight to the water. Bald eagles have been documented and regularly nest and use various locations along the shoreline areas of Lake Pend Oreille. It can be assumed they may be present within the vicinity of the South Grouse Fuels Reduction project area. However, there is no documentation of regular use by bald eagles within the project area or in close proximity to it during the nesting season. The closest active bald eagle nest is the Talache nest site, which is over one mile south of the project area. The next closest nest is over 2.5 miles to the south.

Winter bald eagle surveys document fairly common use along the shoreline areas of Lake Pend Oreille, though none has been documented close to the project area. The project area does provide potential secondary foraging habitat such as carrion. Based on the observed use of bald eagles in prior years, the project area is outside of any bald eagle primary use area and nest site area.

Human use on Lake Pend Oreille occurs year-round. This includes road traffic, residential use, and recreational use on the lake (boating, camping, fishing, swimming, and floating). However, human use within the project area and the adjacent portion of the lake is limited due to gated roads and steep terrain above the lake.

Direct and Indirect Effects

Alternative 1 (no action) - No project activities would take place under Alternative 1. No direct or indirect effects are expected.

Alternative 2 (proposed action) - There are no known nests within one mile of the project area. There are no roost sites within several miles of the project area. Proposed management activities would include: access to the site, use and fueling of equipment, earthwork, blading, grading, culvert replacement, regeneration harvest, thinning, mixed-treatment harvesting, felling trees, log loading and hauling, burning of piles, broadcast burning, seeding, fertilizing and subsoiling. Project specifications would retain large live trees and snags for perching within the project area. The USFWS defines perching habitat as trees greater than 18 inches DBH within a riparian zone or within 50 m of a fish-bearing water or waterfowl concentration area. No trees within 50 m of the lake would be impacted by this project. There are no fish-bearing streams within the project area. Access to the project would be by vehicles on existing roads.

The proposed treatment units would not negatively impact bald eagle habitat. While the proposed treatments are outside recognized zone for active bald eagle territories, treatments would open the canopy in many stands that now have >75% canopy closure and possibly facilitate incidental foraging by eagles. The proposed treatments would leave the largest trees intact and retain the largest snags (unless there was a safety concern) suitable for perches. The proposed treatments would maintain the trees that would most likely be used by bald eagles and over the long term, would enhance potential habitat by promoting development of larger diameter trees and snags in the future. The proposed treatments would also create a more fire resistant stand structure, which would help to retain these trees in the future. No active bald eagle nest territories would be affected by the proposed project activities.

Primary bald eagle habitat will not be negatively affected by the proposed treatments. The proposed project activities are not expected to preclude eagles from incidentally foraging in the area (bald eagles are not known to regularly hunt in the project area). In addition, the size of the project area that would be impacted at any one time would be small.

This proposal is not expected to cause increased recreational use because the roads will be closed to public use during the project and restricted to public use after the project. After the project, the roads will remain available to permitted disabled hunters and occasionally for fuelwood gathering. No increased impacts from recreation are expected.

Cumulative Effects

Alternative 1 (no action) - Since no direct or indirect effects are expected, there would be no cumulative effects.

Alternative 2 (proposed action) - The private lands located in the vicinity of the South Grouse project are ranked from high to low for values at risk. It is uncertain how many acres of private lands adjacent to the project area might be treated. But generally, the treatments would consist of clearing trees and brush from within 200 feet of residences.

Other activities occurring on nearby private lands include logging, recreation, and residential development. Most of these activities are ongoing and may have affected the locations used by eagles for nesting and foraging.

The 1910 fire had a substantial impact on the vegetation and habitat today. It set the landscape vegetation back to early succession. Fire suppression has allowed the vegetation to progress to a somewhat unnatural state. Fire was a natural part of the ecosystem and would likely have kept tree spacing more open on the dry sites. Had fire been allowed to enter this system naturally there would likely be more large trees and snags available for bald eagle nesting and perching. In addition, past logging and roading has reduced the number of large diameter trees available for bald eagle use.

The East South Grouse project is being considered between the South Grouse project area and Lake Pend Oreille. While there are no known active bald eagle nests in the East South Grouse project area, there is a historic nest located on adjacent private land, next to Land Pend Oreille.

Because the project area is not nesting habitat and only marginal foraging habitat, the past, present and foreseeable future actions acting cumulatively with the Alternative 2 proposal would be expected to have no effect on bald eagles.

Determination of Effects

No known nesting sites or roost sites exist in or within ½-mile of the project area. Project activity areas are greater than ¼ mile from the shoreline and over one mile from any known nest territory. The project will have **no effect** on eagle nesting habitat or other primary habitat. Project activities are not expected to prevent eagles from incidentally foraging in the area. The determination for this project's proposed activities is "no effect" on the bald eagle.

Sensitive Species

Flammulated Owl and Pygmy Nuthatch

The effects to pygmy nuthatches are represented by the effects analysis for flammulated owls because they share similar habitat requirements.

Flammulated owls prefer mature ponderosa pine and Douglas-fir with low stand densities and moderately open canopies for nesting; however, they sometimes nest in spruce/fir, lodgepole pine, and aspen. Flammulated owls are secondary cavity nesters and favor cavities excavated by pileated woodpeckers and northern flickers (Hayward and Verner 1994).

The **pygmy nuthatch** is a sedentary, year-round resident of ponderosa pine forests (Ghalambor 2003). It relies heavily on the foliage of live, larger ponderosa pines as foraging habitat and on larger ponderosa

pine snags for nesting and roosting cavities (McEllin 1979). Pygmy nuthatch abundance is directly correlated with snag density and foliage volume (Ghalambor 2003). The main threats to pygmy nuthatches are the loss of ponderosa pine-dominated forests and low snag densities (Ghalambor 2003).

While no population numbers exist for the historic presence of flammulated owls and pygmy nuthatches, inferences can be made when comparing the historical occurrence of ponderosa pine with current levels. Based on historic vegetation estimates, ponderosa pine comprised 11 percent of the National Forest System lands within the Pend Oreille subbasin. Today, only two percent of these lands consist of sites that are predominately ponderosa pine. This is an 80 percent change from historic conditions (Quigley and Arbelbide 1997). Therefore, flammulated owls and pygmy nuthatches were probably more abundant in the past than they are today.

The South Grouse Fuels Reduction project area, the area used to evaluate possible effects, encompasses about 2,211 acres of which approximately 890 acres or 40 percent represents drier forest habitats associated with capable habitat for flammulated owls. Of capable habitat, about 146 acres (7 % of the evaluation area) are currently functioning as suitable nesting habitat (Project File-Wildlife Section).

Direct and Indirect Effects

The South Grouse Fuels Reduction project area is of adequate size to represent the direct, indirect, and cumulative effects analysis area that may occur for flammulated owls and pygmy nuthatches. The average size home range for flammulated owls has been found to be approximately 40 acres (Hayward and Verner 1994). Territory size for pygmy nuthatches appears to vary as a function of the density of pines, cavity availability, and the presence or absence of helpers. Estimates of territory size from different studies vary from 0.2 to 3.3 acres (Norris 1958, Balda 1967, Storer 1977).

Alternative 1 would result in no direct impacts to flammulated owls and pygmy nuthatches; however, there would be indirect effects. As the current trend continues, the forest stands would continue to decline in health and vigor, become increasingly crowded with immature, shade-tolerant trees, and have increased mortality of small- to medium-sized Douglas-fir/grand fir. As a result, shade-tolerant Douglas-fir/grand fir would continue to replace ponderosa pine, western larch and white pine, further decreasing habitat for flammulated owls and pygmy nuthatches. Disease would continue thinning stands naturally. Eventually wildfire would dramatically thin or replace the forest.

Alternative 1 would not result in an immediate change in snags or suitable habitat. However, there would be a continued shift toward shade-tolerant species in most stands. Forest encroachment that historically would have been held in check by fire would continue to proliferate and crowd out remaining open stands of ponderosa pine and Douglas-fir trees. Habitat suitability for flammulated owls would continue to decline.

Definitions for Capable and Suitable Habitat

Capable habitat refers to the inherent potential of a site to produce essential habitat requirements of a species. The vegetative structure and composition on the site may not currently provide the necessary attributes (e.g. stand age, cover type or stand density) to support a species, but the site has the fixed attributes that would enable it to provide those variables under appropriate conditions. Some examples of fixed attributes are slope, aspect, soil or elevation.

Suitable habitat refers to wildlife habitat that currently has both the fixed and variable stand attributes for a given species' habitat requirements. Variable attributes change over time and may include stand age, cover type, stand density, tree size, or canopy cover.

Alternative 2 treatments proposed in flammulated owl habitat are shown in Table 3-10. Alternative 2 would treat approximately 259 acres or 29 percent of the capable habitat within the project area using a

thinning prescription. Another 79 acres of capable habitat would be treated using a combination of thinning and regeneration harvest (mixed treatment). Regeneration harvest **only** would affect 17 acres of capable habitat. No harvest treatments are planned in stands that are currently in suitable habitat.

The thinning prescription would improve flammulated owl habitat by managing for an older age class of ponderosa pine and Douglas-fir trees. Thinning would also result from opening up the existing canopy and providing for understory shrub development, thereby improving flammulated owl foraging habitat. Conversion and maintenance of seral species in harvested stands would provide for long-term maintenance of forest habitats preferred by these species.

Table 3-10. Flammulated owl habitat in areas proposed for treatment.

Capable Nesting Habitat*		
Currently Suitable	Thinning Rx	0 acres
	Regeneration Rx	0 acres
	Prescribed burning Rx	56 acres
Not Suitable	Thinning Rx	259 acres
	Regeneration Rx	17 acres
	Mixed Rx	79 acres
	Prescribed burning Rx	52 acres

The 17 acres associated with regeneration harvest include portions of stands that are showing signs of root disease and insect damage. These mortality agents will continue to reduce suitable habitat conditions for flammulated owls. Therefore, a regeneration prescription would reestablish a stand that is more resilient to insect and disease, leading to long-term habitat stability for flammulated owls, as well as pygmy nuthatches.

The mixed treatment would result in a combination of thinning and regeneration harvest, depending on stand condition and expected results. Leave areas or areas of no harvest would occur in all treatment areas where harvesting is deemed unnecessary to accomplish the desired conditions (see vegetation section).

Underburning only within suitable and capable flammulated owl habitat is designed to reduce fuels and help maintain suitable forest structure. It would also encourage an understory shrub response for flammulated owl foraging.

Some harvest of existing snags may be necessary for safety or logging system requirements. A reduction in snag densities over the short-term may impact nesting habitat for flammulated owls. However, this impact would only apply to those acres that are currently considered suitable for nesting. Design features (Appendix A) would focus on the protection and retention of large-diameter snags, especially ponderosa pine, thereby minimizing these impacts. Over the long term, implementation of Alternative 2 would result in high-quality, large-diameter snags that would provide nesting habitat for flammulated owls, northern flickers (primary excavators of cavities used by flammulated owls), and pygmy nuthatches.

The proposed temporary road construction would not enter any suitable flammulated owl nesting habitat. Road construction could potentially remove existing large-diameter live trees and snags. However, project design features state that whenever practical, veteran and relic survivor trees and snags would not be removed during construction. Prescribed burning would be accomplished over a period of years within

the project area. These burns would be short duration, low to moderate intensity, and limited in size. They are not expected to impact potential flammulated owl or pygmy nuthatch individuals or habitat.

Other proposed management activities include: access to the site, use/fueling of equipment, earthwork, blading, grading, culvert replacement, felling trees, log loading and hauling, burning of piles, broadcast burning, seeding, fertilizing and subsoiling. The main impacts would be the noise, equipment and human presence associated with the above activities. However, these activities would be short in duration and have minimal impacts to either bird species or their habitat.

Cumulative Effects

The 1910 fire had a substantial impact on the current habitat. It set back the landscape to an early succession stage and removed stands that would have been potential flammulated owl and pygmy nuthatch habitat. Since the 1910 fire, forest succession and fire suppression first improved but now have degraded habitat because most stands have dense, closed canopies. Insect outbreaks and diseases are creating some openings, but mostly the forest canopy remains closed and dense.

Past timber harvest, road construction and firewood gathering likely removed trees that would have contributed to quality snag habitat over time. The past planting of ponderosa pine and Douglas fir in the project area will improve potential habitat for both species over time. Other activities such as noxious weed monitoring, road maintenance, hunting, and recreational activities, will have minimal impacts due to their limited frequency and duration.

Future projects foreseen in this area include: thinning and pruning plantations within the project area and possibly implementing another hazardous fuels reduction project on the east side of Grouse Mountain. Both these projects have the potential to improve nesting and foraging habitat for flammulated owls and pygmy nuthatches by opening up the stands on dry sites and creating favorable conditions for growing large-diameter ponderosa pine and Douglas-fir.

Alternative 1 - Combined with the indirect effects on snags described for this alternative, not treating the stands would have a cumulative effect with past harvest and road construction on decreasing quality snag habitat for flammulated owls and pygmy nuthatches. Cumulatively, fire suppression and ongoing forest succession will continue to degrade habitat for these species.

Alternative 2 - Alternative 2 would reverse the effects of forest succession and fire suppression on flammulated owl and pygmy nuthatch habitat. However, these processes would continue to occur in untreated stands. Potential removal of snags would have a slight, short-term effect on habitat.

Proposed road construction and timber harvest combined with past road construction, harvest and firewood gathering cumulatively may contribute to a slight decrease in snag habitat in the short term. However, habitat associated with the temporary road construction would be recaptured over time. Design features to retain and recruit snags would minimize these negative effects. The Grouse Mountain Sagle and Big Grouse timber sales, combined with the proposed action would contribute to a shift in species composition that would favor longer-lived species, ultimately benefiting foraging and nesting habitat for flammulated owls and pygmy nuthatches.

Determination of Effects

Cumulatively, implementing the proposed action would not jeopardize populations of flammulated owls or pygmy nuthatches. This is based on maintaining existing suitable habitat, advancing dependable or stable habitat, rejuvenating degraded habitat, and no changes to acres irretrievably lost. Therefore,

implementation of proposed actions may impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.

Samson (2006) has concluded that short-term viability is not an issue in Region 1 for the flammulated owl; that habitat is abundant and widespread in the Northern Region, including the Idaho Panhandle National Forests. Viable populations for this species will be maintained because 1) there is no scientific evidence exists that the flammulated owl is decreasing in numbers, 2) there have been substantial increases in the extent and connectivity of forested habitat since European settlement, 3) well-distributed and abundant flammulated owl habitat exists on today's landscape, and 4) the level of timber harvest of forested landscapes in the Northern Region is insignificant.

Northern Goshawk

The northern goshawk uses a wide variety of forest age classes, structural conditions, and successional stages, inhabiting mixed coniferous forests in much of the northern hemisphere (Reynolds et al. 1991). Nesting habitat is the most critical and limiting factor for goshawks. Foraging habitat entails a general relaxation of habitat requirements involving a wider range of forest age classes and structures that provide a relatively open forest environment for unimpeded movement or flight through the understory. Nest sites have consistently been associated with the later stages of succession (mature and old growth trees) having moderate to high tree densities and occurring on the lower one-third or bottom of the slope (Haward and Escano 1989, Warren 1990; Reynolds and others 1992; Graham and others 1999).

Capable nesting habitat for northern goshawks includes stands of moderately dry Douglas-fir or grand fir, moist grand fir, western red cedar and western hemlock (habitat type groups 3-6), with 40 percent slope or less (Hayward and Escano 1989, Warren 1990, Reynolds et al. 1992, and Graham et al. 1999a). Suitable habitat generally consists of stands in the later stages of succession (mature and old growth trees) having moderate to high tree densities (canopy cover of 50 percent or more).

While all forested stands in the project area are considered capable goshawk habitat, nesting habitat is the most critical and limiting feature. Consequently, the habitat suitability analysis focuses on nesting habitat because foraging habitat occurs in a broader, less-constraining spectrum of forest structural conditions, including a mosaic of vegetation structure stages.

The project area contains approximately 1,080 acres that are characterized as capable nesting habitat (49 percent of the project area). Currently, 101 of these acres (less than 8% of the project area) are functioning as suitable nesting habitat (Project File-Wildlife Section). While there can be minor variations of forest structure within stands that provide nesting possibilities, the prevalence of immature trees leads to mostly non-suitable nesting conditions.

Goshawk surveys conducted by Forest Service personnel in this area in the past and most recently during the spring of both 2004 and 2005 have not found goshawks within the project area or vicinity (see project files). Nor were any active nesting territories detected in the vicinity of the project area. Goshawks also often prefer to nest in close proximity to riparian areas. The project is relatively dry without year-long streams. While this is not a parameter used in determining habitat suitability, this condition makes it less favorable and marginal for goshawk presence.

The South Grouse project area is of adequate size to represent direct, indirect, and cumulative effects analysis for the northern goshawk. It is bound by a topography feature (watershed boundary) that can influence how a species moves and utilizes the area and is of adequate size to accommodate several nesting pairs with overlapping territories.

Direct and Indirect Effects

Alternative 1 would have no direct impacts on goshawks or their habitat. However, there would be indirect effects as forest stands continue to increase in stem densities and understory congestion, thereby detracting from the attractiveness to goshawks in some areas. Stands in the project area would continue to decline in health and vigor and would become increasingly crowded with immature trees, ultimately resulting in increased risk of severe wildfire that could remove forest stands used by goshawks.

Alternative 2 would treat approximately 412 acres or 38 percent of capable goshawk nesting habitat within the project area. Of those, approximately 50 acres are suitable nesting habitat (Table 3-11). Trees would be harvested using thinning, regeneration or a mix of these two treatments prescriptions.

Table 3-11. Summary of capable goshawk nesting habitat proposed for treatment

Capable Nesting Habitat*		
Currently Suitable	Thinning Rx	18 acres
	Regeneration Rx	32 acres
Not suitable	Thinning Rx	159 acres
	Regeneration Rx	127 acres
	Mixed Rx	76 acres
Total:		412 capable acres

Proposed thinning treatments would initially reduce canopy cover. However, in most areas the change in canopy cover would not fall below acceptable levels for goshawks (50-70 percent) (Reynolds et al. 1991). Stands that are currently suitable nesting habitat and are prescribed for thinning would be thinned to about 60 percent canopy cover. These stands would still provide suitable nesting habitat following treatment.

Regeneration harvesting of 32 acres of suitable nesting habitat and 127 acres of non-suitable habitat, including root disease pockets or other forest health problems, would not adversely affect habitat suitability for goshawks over the long term. The high level of disease and insect outbreaks within some stands has affected their capacity to maintain sufficient structure and contribute to future habitat suitability. Regenerating these stands to disease resistant species that are ecologically more compatible with historic vegetative patterns would help stabilize nesting habitat in the future.

This alternative would tend to move approximately 412 acres toward more suitable goshawk nesting habitat and result in the development of long-lived, seral forest habitat. Design features would be effective in identifying and protecting nest sites, and the selection harvest treatments would result in an increase in nesting and foraging habitat. Design features (Appendix A) and silvicultural prescriptions would also strive to exceed the minimum live tree replacement and snag retention protocol, where opportunities exist in treatment units. These measures, as well as retaining and promoting hardwood trees, would ultimately improve habitat conditions for goshawk.

Prescribed burning would be accomplished over a period of years within the project area. These burns would be short duration, low to moderate intensity and limited in size. They are not expected to measurably impact potential goshawk individuals or habitat.

The proposed construction of new road would enter two small sections of suitable goshawk nesting habitat and some non-suitable nesting habitat. Road construction could potentially remove existing, large-diameter live trees and snags. However, project design features (Appendix A) state that whenever

practical, veteran and relic survivor trees and snags would not be removed during construction. While small portions of habitat would be affected by road construction, habitat would be recaptured over time because the new road would be decommissioned after use.

In addition, if any goshawk nests were located mitigation measures would be implemented to help ensure the nest site and post-fledgling area received minimal disturbance (see Appendix A for the complete list of design features related to goshawk protection).

Cumulative Effects

Past activities that have occurred within National Forest System lands that are relevant to the goshawk cumulative effects analysis include logging, fire suppression, road development, and recreation. The 1910 fire had a large impact on goshawk habitat when it set back forest vegetation to an early seral stage. Forest succession and fire suppression continue to impact goshawk habitat. Insect and disease outbreaks have degraded goshawk habitat causing a change in forest structure and reduced canopy closure.

Predominant past activities on the adjacent private lands include road development, residential development, recreation and timber harvest. Past timber harvest, road construction, and firewood gathering have removed trees that could have contributed to goshawk habitat. Past tree planting has the potential to improve habitat for goshawk in the future by developing large diameter trees. Logging and residential development are the activities occurring in the analysis area with the greatest impact to goshawks. Many logging treatments on private lands can help maintain goshawk habitat. However, most private land harvesting and development reduces habitat.

Future projects foreseen in the area include thinning and pruning plantations within the project area, and possibly a project on the east side of Grouse Mountain. These projects have the potential to improve nesting and foraging habitat for goshawks in the future as larger trees develop and canopy cover increases. The landscape would also be more insect, disease and fire resistant.

Under Alternative 1, forest succession and fire suppression would cause stands to continue to deteriorate decreasing favorable habitat features for goshawk, and increasing the risk of severe fire. Combined with the effects of other actions described above, the cumulative impacts of Alternative 1 may result in some degradation of goshawk habitat.

Under Alternative 2, cumulative effects with other actions would be beneficial in the long term. The proposed project fuel treatments and timber harvesting under Alternative 2 would change the ecology, tree species, and forest density back toward what it was before settlers developed the region. This would facilitate bringing goshawk habitat in the project area more in line with historical levels. Forest succession and fire suppression would continue to slowly degrade habitat quality in untreated stands.

Cumulatively, past, present and foreseeable future projects acting with alternative 2 would have a mixed effect on goshawk habitat. While private land activities adjacent to project area may have negative impacts on goshawks due to loss of habitat from home development and the associated activities, implementation of Alternative 2 would ultimately provide nesting and foraging habitat for goshawk on national forest lands. Alternative 2 would eventually create more stable, diverse forest habitat that is less prone to stand-replacement fire and would generate habitat for goshawk nesting. In the long term, like the recent past Grouse Mountain Sagle and Big Grouse timber sales, Alternative 2 will also contribute to desirable, large-tree habitat.

Determination of Effects

Cumulatively, implementation the alternatives would not jeopardize populations of northern goshawks. This is based on maintaining/improving existing suitable habitat, advancing dependable or stable habitat, rejuvenating degraded habitat and not affecting allocated old growth associated with goshawk nesting habitat. Therefore, implementation of the proposed action may impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.

Samson (2006) has concluded that short-term viability is not an issue in Region 1 for the northern goshawk, including the Idaho Panhandle National Forests. Viable populations for this species will be maintained because 1) there is no scientific evidence exists that the northern goshawk is decreasing in numbers, 2) there have been substantial increases in the extent and connectivity of forested habitat since European settlement, 3) well-distributed and abundant goshawk habitat exists on today's landscape, 4) suppression of natural ecological processes has increased and continues to increase amounts of northern goshawk habitat, and 5) the level of timber harvest of forested landscapes in the Northern Region is insignificant.

Black-Backed Woodpecker

The project area is of adequate size to represent direct, indirect, and cumulative effects analysis area that may occur for black-backed woodpeckers. Research suggests that typical home range size for black-backed woodpeckers is approximately 870 acres (Dudley and Saab 2003, Montana Partners in Flight 2000).

The black-backed woodpecker is a year-round resident that occurs in various forest types over a wide elevation range. It is regarded as a narrow endemic (a species ecologically restricted to very specialized habitats), responding positively to fires and other large-scale disturbances. A Wyoming/Montana study conducted by Hutto (1995) revealed that black-backed woodpeckers are nearly restricted to early post-fire habitats. While populations are irruptive in response to beetle outbreaks connected to recent fires, source habitats include late-seral forests (Wisdom et al. 2000). Forests that contain patches of beetle-infested trees may provide adequate habitat to support baseline populations of black-backed woodpeckers when burned areas are not available (Montana Partners in Flight 2000). Black-backed woodpeckers tend to move from area to area as suitable habitat develops (recent fires, insect infestations).

The project area currently provides some suitable habitat. It is possible that black-backed woodpeckers have capitalized on the higher amounts of tree mortality that occur in random patches scattered through the project area. However, their presence is more uncertain or questionable because habitat is limited to small patches of snags created primarily by root disease, not insects (snag densities and subsequent insect populations are not as high as those that occur in post-fire or other bark beetle epidemic areas).

Direct and Indirect Effects

Alternative 1 would not result in an immediate change in snags or suitable habitat for black-backed woodpeckers. If management techniques were not implemented, forest stands would continue to decline in health and vigor, resulting in high levels of tree mortality favorable to black-backed woodpeckers. The available snags would eventually shift to dense stands of smaller diameter snags desired by black-backed woodpeckers. As species such as ponderosa pine, western larch and white pine are replaced by shade-tolerant species, the stands would accumulate high fuel loads and an unhealthy condition, putting them more at risk for intense fire and continued disease outbreaks. Disease outbreak or fire would result in increased black-backed woodpecker habitat.

Alternative 2 would result in a reduction in snag potential in the project area over the short term by reducing the number of densely spaced, small and intermediate trees and snags as well as excess fuels on about 790 acres. Indirect impacts associated with the implementation of Alternative 2 would be improved health of the forest stands. This would result in fewer snags in the future by depressing disease levels and reducing the potential for high-intensity fires. This would indirectly reduce the probability of a fire-induced surge of snag habitat for black-backed woodpeckers. However, historically potential habitat for black-backed woodpeckers was probably limited on the more open, dry sites within the project area. This project would create habitat conditions more consistent with historic vegetation patterns.

Thus, the project would reduce the quality and quantity of black-backed woodpecker habitat over both the short and long term. Alternative 2 would develop more open, fire-resistant stands with larger diameter trees. However, Alternative 2 would incorporate wildlife tree retention measures to mitigate the impacts to snag habitat (Appendix A). In addition, prescribed burning would likely create “new” snags by fire-killing residual green trees to help offset losses that would occur through tree harvesting.

Cumulative Effects

The primary process ongoing in the project area with the potential to create black-backed woodpecker habitat is forest succession. The 1910 fire created high-quality preferred black-backed woodpecker habitat. Though little burned habitat has been created in the project area since then because of successful fire suppression, recent large fires throughout the region have created more new post-fire habitat for black-backed woodpeckers than has been available in modern times. In the decades that followed the 1910 fire, habitat quality decreased as the project area recovered to an early successional landscape of young healthy tree stands. As forest succession progressed, black-backed woodpecker habitat improved. Today some habitat, though not preferred, exists because insects and diseases have created extensive small-diameter snags. This current habitat is marginal because black-backed woodpeckers prefer post-fire dead stands.

Past timber harvest, road construction and firewood gathering removed trees and snags that would have contributed to black-backed woodpecker habitat. Past harvesting has reduced the potential for widespread insect and disease mortality on about 645 acres or 32 percent of the forested habitat within the analysis area. While tree mortality will continue to be a factor in these residual stands, harvesting has reduced to potential for high snag densities resulting from insect and disease. About 605 acres or 30 percent of the area would remain unaffected following implementation of the proposed action. Therefore, potential black-backed woodpecker habitat would not change on the unaffected acres, with a reduced contribution from past and proposed actions.

Logging in some areas on adjacent ownerships has temporarily precluded the opportunities for high densities of snag recruitment (source habitat) that would result from high severity fires. However, despite attempts to reduce insects and disease in forested stands and the likelihood of wildfire, these events cannot be entirely eliminated. Some level of snag habitat will persist on both National Forest lands and adjacent private lands, providing some suitable habitat for this species.

Future projects foreseen in this area include thinning and pruning plantations within the project area and possibly a project on the east side of Grouse Mountain. Thinning and pruning would decrease nesting and foraging habitat for black-backed woodpeckers by opening up the stands and reducing dense stands of smaller diameter trees and snags. Effects of the eastside Grouse Mountain project are unknown since project details have not been developed.

Under Alternative 1, the project area would retain much of the habitat characteristics that black-backed woodpeckers prefer. Combined with other actions, there would be little to no cumulative effects.

Under Alternative 2, opening stands, favoring large-diameter trees, and planting longer-lived species would reduce black-backed woodpecker habitat in treated stands within the project area. Also reducing risk of damaging wildfire, further reduces future potential habitat. However, untreated stands within and outside of the project area would continue to provide some black-backed habitat. Furthermore, in a broader regional context, black-backed woodpecker habitat is increasing due to small-diameter tree mortality and vast tree mortality from recent wildfires. Therefore, the cumulative effects from proposed activities combined with past, present and foreseeable activities are considered inconsequential.

Determination of Effects

Cumulatively, the proposed action would not jeopardize populations of black-backed woodpeckers because foraging habitat is considered marginal, there general lack of source habitats, and area is not large enough or too isolated for population dependence. Therefore, implementation of proposed actions may impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.

Samson (2006) has concluded that short-term viability is not an issue in Region 1 for the black-backed woodpecker, including the Idaho Panhandle National Forests (IPNF). The IPNF has experienced substantial increases in the amounts of insect-infected habitat (Samson 2006). Viable populations for this species will be maintained because 1) there is no scientific evidence exists that the black-backed woodpecker is decreasing in numbers, 2) there have been increases in the extent and connectivity of forested habitat since European settlement, 3) increases in amounts of small and mid-size trees have increased since European settlement, 4) well-distributed and abundant black-backed woodpecker habitat exists on today's landscape, and 5) the level of salvage timber harvest or overall timber harvest of forested landscapes in the Northern Region is insignificant.

Management Indicator Species and Others

Pileated Woodpecker

Potential effects on pileated woodpecker and other snag-dependent species were determined by estimating the changes to nesting habitat and the quality and abundance of large diameter tree and snag habitat that could result from the implementation of the alternatives. Pileated woodpeckers typically nest in areas of 50 to100 acres of continuous forest; therefore, the project area will be of adequate size to evaluate the direct, indirect, and cumulative effects.

Pileated woodpeckers are year-round residents preferring forests with tall, large-diameter dead or defective trees for nesting. Pileated woodpeckers feed primarily on carpenter ants and other insects excavated from deep within dead and decaying wood (Bull 1989, Warren 1990).

Nesting habitat for pileated woodpeckers in the northern Rocky Mountains most commonly occurs in forest stands with live or dead western larch, Douglas-fir, ponderosa pine, and black cottonwoods greater than 18 inches in diameter with moderate canopy cover. New nest cavities are excavated each year in stands of 50 to 100 continuous acres, generally below 5,000 feet in elevation with basal areas of 100-125 square feet per acre and a relatively closed canopy (Warren 1990). Nest trees typically are large diameter, dead trees at least 30 feet high (Bull 1989). Snag abundance and large-diameter trees are critical components of pileated woodpecker habitat. Bull (1989) observed average dispersal distances by juveniles of about two miles. Suitable habitat areas should be spaced at two mile intervals, or at a density of one per 2,500 acres to allow for re-colonization of unoccupied habitat.

There is approximately 423 acres of potential pileated woodpecker nesting habitat within the project area, which translates into five potential nesting territories (areas ≥ 50 acres of contiguous mature habitat) within a 2,211 acre analysis area.

Since the 1930s, much of the project area has become dominated by 80- to 90-year-old trees. White pine blister rust has eliminated many large trees and fire exclusion has created stands with smaller and younger size classes. Consequently, there are a small to moderate number of mature forest pockets and a limited number of large-diameter snags. Snag production is shifting from larger, longer-lived species to smaller, shorter-lived species, reducing habitat quality for pileated woodpeckers and other snag-dependent species. Recent and old pileated woodpecker sign in various locations is evidence that habitat is available but limited.

Direct and Indirect Effects

Alternative 1 would result in no direct impacts to pileated woodpeckers; however, there would be indirect effects. Stands would continue to decline in health and vigor and may become increasingly crowded with immature trees. This would result in increasing risk of insect/disease and wildfire that could damage or destroy forest stands and trees now utilized by pileated woodpeckers, thereby, reducing canopy closure to below preferred levels.

Alternative 1 would not result in an immediate change in snags or suitable habitat. However, as the stand becomes crowded with immature trees, snags would eventually shift to small diameter snags that are not suitable for pileated woodpecker nesting.

Under **Alternative 2**, most of the fuels reduction treatments would target smaller-diameter trees not utilized by pileated woodpeckers. However, harvest activities would reduce canopy cover on 277 acres within four of the five potential blocks of nesting habitat, including 138 acres of thinning treatment, 79 acres of mixed treatment, and 60 acres of regeneration treatment (146 acres would remain unaffected). Thinning would temporarily reduce some canopy but retain canopy cover above 50 percent. However, as the residual stands respond to increased space and sunlight, canopy would recover to pre-treatment levels. Mixed treatment would be a combination of thinning and regeneration harvest. Regeneration harvest would focus on areas experiencing high levels of disease where sufficient forest structure cannot be sustained.

While harvesting activities would likely reduce the effective block size of nesting habitat, all but one nesting territory would maintain their suitability (blocks ≥ 50 acres). Regarding the insufficient territory, suitability would not be maintained regardless of whether or not harvesting occurred because of the deteriorating forest condition.

Removal of some large-diameter snags is possible due to safety issues or other logging system requirements. However, design features for snag retention (Appendix A) would mitigate these short-term impacts. The harvest prescriptions would provide for long-term maintenance of seral species such as white pine, ponderosa pine, and western larch. Such stands with large-diameter snags are considered high-quality habitat for this species. The implementation of Alternative 2 would provide long-term pileated woodpecker nesting habitat within the project area by increasing high quality, large-diameter snags and reducing the likelihood of stand-replacement fire.

The proposed road construction is mostly located outside nesting territories. It could potentially remove some existing large-diameter trees and snags important to pileated woodpeckers and other wildlife species. However, project design features (Appendix A) state that whenever practical, veteran and relic

survivor trees and snags would not be removed during construction. Consequently, the road construction effects on pileated woodpecker habitat would be inconsequential.

The number of large-diameter snags or down logs created or lost through prescribed burning is not expected to be enough to have a notable impact on pileated woodpecker habitat.

Cumulative Effects

The 1910 fire set much of this area back to early seral stages and thus fundamentally influenced the present day habitat. Forest succession and fire suppression continue to impact pileated woodpecker habitat within the project area. The lack of fire and limited fuel treatments and timber harvesting has changed the ecology, tree species, and forest density from what it was before settlers developed the lower Clark Fork region.

Past activities that have occurred within National Forest System lands include timber harvest, fire suppression, road development, and recreation (most notably firewood gathering). These activities have removed trees that could have contributed to pileated woodpecker habitat. Past tree planting of long-lived white pine, western larch and ponderosa pine has the potential to improve habitat for pileated woodpeckers in the future by developing large diameter trees.

Future pre-commercial thinning of young, small diameter trees and pruning plantations have the potential to improve nesting and foraging habitat for pileated woodpeckers in the future by increasing the overall health and vigor of the stands. Additionally, thinnings would improve species composition, resulting in stands that are more ecologically stable in the face of potential disturbances.

Combined with the indirect effects described, **Alternative 1** would have a cumulative effect with the 1910 fire, past roading, firewood gathering, and past harvest of decreasing quality of habitat for pileated woodpeckers.

Alternative 2 would facilitate bringing pileated woodpecker habitat in the project area more in line with historical levels. However, forest succession and fire suppression would continue to slowly degrade habitat quality in untreated stands. This alternative may also remove some trees and snags that contribute to pileated woodpecker habitat. However, Alternative 2 includes protective design features to retain as many high quality snags as practical. In the long-term, like the recent past Grouse Mountain-Sagle and Big Grouse timber sales, Alternative 2 would also contribute to desirable, large-tree habitat. Alternative 2 acting cumulatively with past, present and foreseeable future projects discussed would have a long-term effect on pileated woodpecker habitat by developing more large-tree stands in the future. Alternative 2 would exceed Forest Plan standards to retain snags and large trees to recruit as future snags.

Determination of Effects

Cumulatively, the proposed action would not jeopardize local populations of pileated woodpeckers because it maintains the spatial arrangement of habitat (at least one nesting territory per 2,500 acres), advancing dependable or stable habitat, rejuvenating degraded habitat and not adversely affecting allocated old growth habitat. Therefore, none of the alternatives would likely result in any perceptible change in local or regional pileated woodpecker populations.

Samson (2006) has concluded that short-term viability is not an issue in Region 1 for the pileated woodpecker. Habitat estimates show that nest site habitat is abundant and well distributed across the Northern Region by National Forest (Samson 2006). Viable populations for this species will be maintained because 1) there is no scientific evidence exists that the pileated woodpecker is decreasing in

numbers, 2) there have been increases in the extent and connectivity of forested habitat since European settlement, 3) well-distributed and abundant pileated woodpecker habitat exists on today's landscape, and 4) the level of timber harvest of forested landscapes in the Northern Region is insignificant.

White-tailed Deer

Effects on white-tailed were determined by predicting the changes to critical winter range for each alternative. Critical winter range is the most limiting aspect of white-tailed deer habitat. Key components of critical winter range lower elevations including stands with medium to larger trees having least 60 percent canopy cover (thermal cover).

The direct, indirect, and cumulative effects analysis area for white-tailed deer critical winter range is identified as the Grouse Mountain area, including lands to the east of the project boundary to the shoreline of Lake Pend Oreille. This area (3,323 acres) contains only about 343 acres of white-tailed deer winter range (Project File-Wildlife Section). Deer populations in this game management unit are considered high (IDFG 2004).

Traditionally associated with a mixture of seral stages of vegetation, white-tailed deer are well distributed throughout the Idaho Panhandle National Forests. Winter range is the most critical feature with animals forced by winter conditions to concentrate on smaller, restricted winter ranges. Conversely, during summer habitat has a broad elevation range. During winter, white-tailed deer are generally found on the valley bottoms and lower benches. Dense tree cover is probably the most critical component of critical winter range. As winter temperatures decrease and snow depths increase, animals select habitats to minimize energy expenditure and maintain a positive energy balance. Closed-canopy stands are critical because it reduces animal heat loss and intercepts snow, reducing snow depth and increases foraging opportunities.

Approximately 184 acres or 8 percent of the project area falls within critical winter range, mostly in lower blocks along the periphery of the project area. Adjacent private land provides fragmented forest cover, varying from seedling and sapling stands to mixed-age, open-canopy stands created by recent timber harvest. Of the approximately 184 acres of critical winter range that occur in the project area, only 38 acres reside in proposed treatment units (Project File-Wildlife).

Direct and Indirect Effects

Alternative 1 would not result in any direct impacts to white-tailed deer winter range. An Indirect change to forest stand structure would be increasing canopy cover improving thermal cover. However, as the stands decreased in health and vigor, the area would become more susceptible to fire, disease and insect outbreaks causing more open canopies and decreasing thermal cover value. Long-term effects would be similar to Alternative 2 except that changes would occur naturally over a longer time frame.

Through mostly thinning treatments, **Alternative 2** would affect approximately 38 acres of suitable winter habitat, which represents 2 percent of the project area or 21 percent of the project area's critical winter range habitat. Of those treated acres, about 9 acres would remain as functioning thermal cover (>60% canopy cover). The remaining 29 acres would be converted to an unsuitable condition, due to canopy reduction.

Most of the critical winter range would be thinned, resulting in some form of canopy reduction. As trees within the treated stands are released from competition with dense understory trees, canopy cover would recover over time and the stand would provide improved winter range conditions. The thinning would

have the benefit of providing more diversity in the understory and improving forage availability on winter range.

While logging during winter can disturb wintering animals, deer are known to habituate to predictable activities and to eat lichen and needles off felled timber. Roads would remain closed to the general public during the timber sale, which helps to maintain security for big game.

Prescribed burning would help improve vigor and nutrient content of forage for ungulates. Forage production in treatment units has been impeded by the proliferation of shade-tolerant tree species and a slight increase in tall, less palatable shrub species. By opening up the stands to increased sunlight and prescribed burning, the proposed action would improve the quality of big game habitat within the project area by enhancing production of forage species. In addition, the maintenance and enhancement of hardwoods would improve the diversity of habitat available for ungulates.

Other proposed management activities include: access to the site, use/fueling of equipment, earthwork, blading, grading, culvert replacement, felling trees, log loading and hauling, burning of piles, seeding, fertilizing and subsoiling. The main impacts would be the noise, equipment and human presence associated with the above activities, which would be short duration and have minimal impacts to white-tailed deer (ungulates) or their habitat. These activities may cause big game utilizing the immediate area to leave temporarily.

Cumulative Effects

Although the fire of 1910 removed elements of critical winter range, those features have since recovered. Past logging in the project area did not have a measurable effect on winter range. Activities on adjacent private lands have modified big game use patterns and winter range through removal of overstory vegetation, resulting in reduced thermal cover. In some areas, residential development has also diminished availability of winter range adjacent to the project area. Forest roads are closed except for administrative use, access for disabled hunters and occasionally firewood gathering. Hunting does occur in the project area. Idaho Fish and Game manages deer populations through licensed hunting. Hunting levels are set based on population levels. White-tailed deer population numbers are currently up and no assessable adverse cumulative effects are expected to white-tailed deer populations.

Cumulative effects from **Alternative 1** may occur over the long term as the vegetation structure changes; however, given the relatively small area that would be affected by this alternative, impacts to white-tailed deer critical winter range would be insignificant regionally and would not result in a significant change on habitat quality or populations on a regional level.

Ongoing activities that could contribute to cumulative effects under Alternative 1 include timber harvest on private lands, hunting, residential development, road construction, and recreational activities. Since white-tailed deer populations have prospered despite these activities, it is reasonable to assume that continuation of these activities will have inconsequential effects; and in the case of hunting, beneficial effects.

Proposed management activities of **Alternative 2**, combined with recent past and foreseeable logging and new home construction could cause local reduction of white-tailed deer habitat. However, the additive effects of Alternative 2 would likely be inconsequential and short term. Given the relatively small area that would be affected by Alternative 2 and the foreseeable projects, a short-term reduction would be negligible or minor. Consequently, Alternative 2 may impact portions of white-tailed deer critical winter range, but would not contribute to a local or regional change in habitat quality or population status.

Forest Land Birds

Bird species differ in habitat requirements and their responses to management activities. Due to the sizable number of species that can occur in a forested landscape, it is impractical and nearly impossible to take a species-by-species approach. Rather, this analysis looks at the avian community as a whole, in the context with the surrounding landscape. It addresses priority habitats identified by Idaho Partners in Flight (2000) and discusses how management activities, or even a lack of management activities, can affect bird species composition and richness.

The direct, indirect, and cumulative effects analysis area is defined as the project area. Many forest land birds have relatively small home ranges and the project area is of adequate size to evaluate the impacts on these species.

Neotropical migrant birds and resident songbirds are a diverse group of birds not addressed separately by species. Many are insectivorous, while others mainly eat seeds. Their habitat requirements vary from dry, rocky slopes to open meadows and other early stages of vegetation growth, to densely forested areas.

A diversity of vegetation and topography results in a diversity of bird species. Vegetation structure is important to determining habitat use by forest bird populations. Bird communities change as vegetation changes. Any treatment, including no action, affects some species in this group at the expense of others. Idaho Partners in Flight has identified and prioritized four habitats that represent species of moderate to high vulnerability, and species with declining or uncertain population trends. These prioritized habitats include riparian habitat, non-riverine wetlands, sagebrush shrub, and dry ponderosa pine/Douglas-fir/grand fir forests (Idaho Partners in Flight 2000). The project area contains only the dry ponderosa pine/Douglas-fir/grand fir forest type.

Hejl (1994) identified the following principles to help maintain habitat and healthy forests for a variety of bird species:

- encourage old-growth characteristics
- leave snags and replacement trees
- leave or plant the natural diversity of trees found in the area
- burn and allow fires to happen in a manner similar to natural fire regimes
- mimic natural landscape patterns

Providing a mosaic of habitat conditions and age classes will capitalize on habitat values for many forest birds.

The fire of 1910, in combination with fire suppression and the introduction of blister rust, and other diseases has led to the present vegetation conditions. Past timber harvest activities removed some large trees in the dry ponderosa pine/Douglas-fir community, affecting the availability of snags. Currently the majority of the project area is dominated by Douglas-fir. Due to this uniform setting and lack of perennial water other than the lake, the landscape lacks the vegetative species and structural diversity to attract a wide array of forest birds.

One priority habitat occurs in the project area, which is a dry ponderosa pine/Douglas-fir/grand fir forest. Due to fire suppression and declining health and vigor, dry ponderosa pine/Douglas-fir/grand fir forest habitats are declining within the project area.

Direct and Indirect Effects

Alternative 1 would result in no direct impacts to forest land birds; however, there would be indirect effects. As current trends continue, stands would decline in health and vigor, and become increasingly crowded with immature trees. This trend would result in decreased vegetative diversity and, ultimately, decreased habitat for many forestland birds. Fuel loads would increase and the probability for a high-intensity fire would increase, resulting in a reduction in forest land bird habitat.

One of the objectives of **Alternative 2** would restore dry ponderosa pine/Douglas-fir forests and encourage the long-term stability of dry habitats by altering species composition and treating overcrowded conditions of shade-tolerant trees. Such restoration would increase the vegetative and habitat diversity for forest land birds.

Temporary disturbance from underburning, tree removal and road construction would cause short-term direct impacts to forest land birds. Spring underburning may cause a short-term loss in the productivity of nesting birds. However, over the long term, this would be offset by increased vegetative diversity, thus providing more niches for a greater abundance and diversity of birds. In addition, the maintenance and enhancement of hardwoods would enrich the diversity of habitat for land birds.

For bird species that use snag habitat, there would be a reduction in snag densities over the short-term; however, design features for snag retention (Appendix A) would minimize impacts. Over the long term, implementation of Alternative 2 would result in high quality, large-diameter snags that would provide habitat for those species.

The proposed road construction would remove some bird habitat. However, the number of acres is small in relation to the project area and would not measurably impact population numbers. Access would be limited to handicapped hunters and agency administrative access. New road and spurs would be obliterated after treatments, eventually provide habitat for certain bird species.

Other proposed management activities include: access to the site, use/fueling of equipment, earthwork, blading, grading, culvert replacement, felling trees, log loading and hauling, burning of piles, seeding, fertilizing and subsoiling. The main impacts would be the noise, equipment, and human presence associated with the above activities. The activities would take place in a short period of time and have minimal impacts to birds utilizing the area. While an activity is taking place certain birds may temporarily leave the area, but would likely return with the cessation of management activities.

Cumulative Effects

The 1910 fire set this area back to early seral stages and was important because it profoundly influenced the present day habitat. Forest succession and fire suppression continue to impact land bird habitat within the project area by influencing the ecology, tree species, and forest density.

Cumulative effects associated with **Alternative 1** would be the decline of diversity, health and vigor in forest stands within the project area combined with development and harvesting of private lands. However, the magnitude of the changes associated with this project area would not change composition and structure on a large enough scale to have substantial effects unless a large fire were to burn through the project area.

Past activities that have occurred within National Forest System lands include timber harvest, fire suppression, road development, firewood gathering, and recreation (including firewood gathering). These

activities have removed structure and vegetation that impact land bird habitat. Past tree planting has the potential to improve habitat for certain land bird species in the future.

Future projects foreseen in the project area include: thinning and pruning plantations within the project area and possibly implementing another hazardous fuels reduction project on the east side of Grouse Mountain. These projects have the potential to provide nesting and foraging habitat for various land birds in the future by diversifying the landscape.

Because the individual effects discussed are considered minimal and in some cases potential habitat improvements, cumulatively **Alternative 1** may impact individuals and habitat within the project area, but would not contribute to a local or regional change in habitat quality or population status.

Because the implementation of **Alternative 2** would ultimately provide forest land bird habitat by increasing vegetative diversity and restoring dry ponderosa pine/Douglas-fir/grand fir forests, cumulative impacts would be positive. However, these activities will not change composition and structure on a large enough area to have substantial effects.

Any treatment, including no action, affects some species in this group at the expense of others. Species likely to be affected by activities are represented by other habitat elements and species addressed in this screen and/or analyzed further, including: general forest species (white-tailed deer), dry site species (flammulated owl), late successional species (flammulated owl, pileated woodpecker and northern goshawk), and snag dependent species (pileated and black-backed woodpeckers). The potential impacts on this group of species are reflected in the impacts on the various components of terrestrial wildlife habitat. Consequently, Alternative 2 may impact individual forestland birds and habitat, but would not contribute to a local or regional change in habitat quality or population status.

Consistency with the Forest Plan and Other Regulatory Direction

The Forest Plan and the NFMA (36 CFR 219.19) require that fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species. Species viability is not a concern for the South Grouse Fuels Reduction Project. The project would treat approximately 793 acres of Forest land on an isolated piece of National Forest land. On a landscape scale and wildlife habitat scale, 793 acres is minuscule. The project area and isolated piece of National Forest lands are not large enough for population dependence or to be source habitat for any of the species considered. None of the project area is critical or what is considered primary habitat for any threatened, endangered, proposed and sensitive wildlife species or MIS or wildlife species of special interest. The project area has no perennial streams, seeps, or ponds. Lake Pend Oreille adjoins a small portion of the southeast corner of the project area. However, the closest area of project activity is about ¼-mile from Lake Pend Oreille, beyond high relief slopes that drop into the lake and are obscured from a direct line-of-sight to the water.

Threatened and Endangered Species

Both alternatives comply with the Endangered Species Act (ESA) and Forest Plan direction to manage the habitat of TES species to prevent declines in populations across the Forest. Neither alternative would result in any change in populations of bald eagles.

Sensitive Species

Both alternatives comply with the Forest Plan direction to manage the habitat of species listed in the Regional Sensitive Species Lists to prevent further declines in populations across the Forest. Proposed activities would meet the Forest Plan and objectives for managing snag habitat. Neither alternative is likely to result in any perceptible change in populations of pygmy nuthatches, flammulated owls, northern

goshawks, or black-backed woodpeckers. This project not adversely impact inventoried old growth stands.

Management Indicator Species
The Forest Plan requires that habitat must be maintained to protect and maintain viable populations. Both alternatives would meet the Forest Plan and objectives for managing snag habitat. The proposed activities would not impact viable populations of pileated woodpeckers and would ultimately improve the site for pileated woodpeckers. This project would not adversely impact inventoried old growth stands.

Both alternatives comply with the Forest Plan regarding big game management. Forage would be provided on winter range. White-tailed deer critical winter range would be maintained.

Forest Land Birds
While the Forest Plan does not address specific standards or guidelines for managing forest land birds, it does provide guidance for managing snag habitat and old growth. This project would exceed Forest Plan standards for snag management and would not adversely impact inventoried old growth stands.

Threatened, Endangered, and Sensitive (TES) Plants and Forest Species of Concern (Rare Plants)

Regulatory Framework

Federal legislation, regulations, policy, and direction require protection of species and population viability, evaluation and planning-process consideration of threatened, endangered, and other rare plant species. The regulatory framework for these plants includes the Endangered Species Act (1973) as amended; the National Forest Management Act (1976); the National Environmental Policy Act (1969); Forest Service Manual (2672.1-2672.43); Idaho Panhandle National Forests (IPNF) Forest Plan (1987); and direction from the Regional Watershed, Wildlife, Fisheries and Rare Plants (WWFRP) program and Washington Office.

Introduction

No federally listed endangered plant species are suspected to occur in the Idaho Panhandle National Forests. The US Fish and Wildlife Service (USDI 2006) currently lists no Threatened plant species as suspected to occur in Bonner County, Idaho, in which the South Grouse project area occurs.

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 habitat capability that would reduce the species' existing distribution. Several Forest species of concern are also considered; while they are generally not at risk on a range wide, region wide or state level, they may be imperiled at the National Forest level. Seventy-seven sensitive plant species and Forest species of concern are known or suspected to occur in the Kaniksu portion of the IPNF, which encompasses the South Grouse project area.

Rare plants may be assigned to one or more habitat guilds. These guilds are artificial assemblages based on similar habitat requirements and are used to streamline analysis. A list of rare plant species by habitat guild and descriptions of the guilds are included in the rare plants section of the project file.

Affected Environment

Methodology and Prefield Review

Assessment of rare plants and suitable habitat occurrence was accomplished through review of Idaho Department of Fish and Game Conservation Data Center element occurrence records (ICDC 2005), National Wetlands Inventory maps, queries of the timber stand data base (TSMRS), aerial photographs and topographical maps, rare plant surveys completed for this project, personal knowledge and professional judgment of the North Zone Botanist.

Based on the prefield review, no suitable aquatic, peatland, deciduous riparian, cold forest or subalpine guild habitat occurs in the project area. Although the coarse filter query did not identify any wet forest habitat, such habitat likely occurs in riparian areas that are not proposed for any activities. The coarse filter query identified moist forest guild habitat as occurring in some units proposed for harvest activities. Suitable habitat for clustered lady's slipper (*Cypripedium fasciculatum* Kell.) and pine broomrape (*Orobanche pinorum* Geyer) was also identified in proposed treatment areas.

Review of aerial photographs revealed the presence of open, grassy habitats in the project area that could support least bladdery milkvetch (*Astragalus microcystis* Gray).

Field Survey Results

Field surveys for rare plants were conducted in 1999, 2004 and 2005. The surveys targeted all proposed treatment units in the South Grouse project area. During the 2005 surveys, occurrences of the Forest species of concern pine broomrape (*Orobanche pinorum* Geyer) were discovered in two areas proposed for activities. No other rare plants were identified, although several proposed activity areas were found to contain suitable habitat for clustered lady's slipper and least bladdery milkvetch.

Areas that would be buffered from harvest activities (e.g. riparian zones and benches with large, old western redcedar) have high potential to support rare moonworts. Some proposed treatment areas have only marginal potential to support these species and green bug-on-a-stick moss.

Species Screen

The Council on Environmental Quality (40 CFR 1502.2) directs that impacts be discussed in proportion to their significance. Table 3.12 displays the level of analysis for rare plants.

Rare plant species and habitats not found in the project area will not be discussed in this EA. These include the aquatic, peatland, deciduous riparian, subalpine habitat and cold forest guilds.

Table 3.12. Rare plant species and habitats analyzed in the project area.

	No detailed discussion and analysis is necessary for species or habitat not present within the affected area. Rationale for no further analysis for these species is in the project file.	Supporting rationale is presented in this section for those species and/or habitat present but not affected by the proposed actions. No detailed discussion and analysis is necessary.	Species and/or habitat considered present and potentially affected by the proposed actions are carried forward into a detailed discussion and analysis.
Region 1 Sensitive Species /Forest Species of Concern			
Aquatic guild species	✓		

	No detailed discussion and analysis is necessary for species or habitat not present within the affected area. Rationale for no further analysis for these species is in the project file.	**Supporting rationale is presented in this section for those species and/or habitat present but not affected by the proposed actions. No detailed discussion and analysis is necessary.**	**Species and/or habitat considered present and potentially affected by the proposed actions are carried forward into a detailed discussion and analysis.**
Deciduous riparian guild species	✓		
Peatland guild species	✓		
Cold forest guild species	✓		
Subalpine guild species	✓		
Wet forest guild habitat		✓	
Moist forest guild habitat		✓	
Moonworts (*Botrychium* spp.)			✓
Green bug-on-a-stick moss (*Buxbaumia viridis*)			✓
Clustered lady's slipper (*Cypripedium fasciculatum*)			✓
Pine broomrape (*Orobanche pinorum*)			✓
Least bladdery milkvetch (*Astragalus microcystis*)			✓

Suitable wet forest guild habitat in the project area occurs in riparian zones that would be buffered from all project activities. Moist forest guild habitat outside of riparian zones was determined to have low potential to support moist forest rare species other than moonworts and green bug-on-a-stick moss. These species and habitats will not be discussed further.

Species or habitat considered present and potentially affected by the proposed actions are carried forward into a detailed discussion and analysis in the Environmental Consequences Section. Marginally suitable habitat for rare moonworts and green bug-on-a-stick moss has been documented in the project area and may be impacted by project activities. Suitable habitat for clustered lady's slipper occurs in the project area and may be impacted by project activities. While the documented occurrences of pine broomrape would be buffered from all project activities, unoccupied suitable habitat for the species may be impacted by project activities. Moderately suitable habitat for least bladdery milkvetch occurs in non-forested portions of some treatment areas. These species and habitats will be analyzed in detail.

Species and Habitats that May be Affected by Project Activities

Rare Moonworts (*Botrychium* Sw. species)
Although no rare moonworts were found during the surveys, some proposed units have marginal potential to support them. Moonworts are seedless vascular plants that reproduce from spores and underground rhizomes. Western goblin (*Botrychium montanum*) often occurs with other rare moonworts, usually in wet

or moist forest habitat and/or near streams and in soils with well-developed mycorrhizae[2]. Mingan moonwort (*B. minganense*) and triangle moonwort (*B. lanceolatum*) may also occur with other rare moonworts in or adjacent to wet meadows, open disturbed areas, old roads and roadside ditches. All rare moonworts are small in stature and often inconspicuous; in addition, aboveground stalks may not appear every year.

Because sensitive moonworts have a broader habitat range than other rare plants, and because they can be overlooked even during thorough floristic surveys, these species have the greatest potential for experiencing impacts from project implementation.

Green Bug-on-a-Stick Moss (*Buxbaumia viridis*)
Although no occurrences were found during the surveys, some units have suitable habitat for **green bug-on-a-stick moss** (*Buxbaumia viridis*). This inconspicuous moss usually occurs on soil or well-rotted logs in moist forest habitats to about 4,000 feet elevation (Lawton 1971). It often occurs, and can be confused with, the more common *B. piperi*. Buxbaumia viridis is a short-lived, ephemeral species. *Buxbaumia viridis* is interruptedly circumboreal in distribution. In western Washington, it is suspected to be fairly common, but is often overlooked (Harpel 2002 personal communication). Threats to the species include removal of woody debris that could provide suitable habitat and destruction of individuals by fire, tree felling and skidding operations. Loss of canopy cover is apparently not considered a threat to the species (Harpel 2002 personal communication).

Clustered Lady's Slipper (*Cypripedium fasciculatum* Kell.)
This rare orchid occurs in two disparate habitats – moist cedar/hemlock forest and dry Douglas-fir/grand fir forest. In the South Grouse project area, the highest potential habitat for the species is in Douglas-fir/grand fir forest. Although no occurrences of this sensitive species were identified during the surveys, suitable habitat does occur in some proposed treatment units under the proposed action.

Pine Broomrape (*Orobanche pinorum* Geyer)
Pine broomrape is a non-chlorophyllous member of the family Orobanchaceae. While once believed to be parasitic on the roots of various conifers (Hitchcock et al. 1959), recent research (Ellis et al. 1999) and anecdotal field observations suggest instead that the exclusive host plant is oceanspray (*Holodiscus* spp., in particular *Holodiscus discolor* [Pursh] Maxim.). Pine broomrape is endemic to western North America, where it occurs in scattered locations from northern California through Oregon, and in central and northeastern Washington and extreme north Idaho. In the IPNF, it is found in mesic to dry grand fir and Douglas-fir habitats. Little is known about the species' ecology or the mechanism of parasitism between it and its host. Two occurrences of this species were identified in the project area and would be buffered from all project activities. However, unoccupied suitable habitat occurs in proposed treatment units.

Least Bladdery Milkvetch (*Astragalus microcystis* Gray)
This tap-rooted perennial occurs in two divergent habitats. In the Olympic Mountains, the species occurs on dry gravelly soils in the alpine zone. In eastern Washington, the species occurs on gravelly to sandy areas, from riverbanks to open woods. This species is known from dry cliffs, rocky and grassy hillsides, gravelly flats, open woods, and sandy or stony lake and river shores (WHNP 2006). One historical observation of the species approximately two miles east of the project area has not been seen since 1958 (ICDC 2005). Least bladdery milkvetch shows a strong correlation with limestone-like rock (WHNP 2006). No occurrences of least bladdery milkvetch were identified during the surveys. The non-forested habitat scattered throughout the project area is considered to have moderate potential to support this

[2] Mycorrhizae are symbiotic relationships between fungi and the roots of certain plant species. Although their ecology is poorly understood, it is apparent that mycorrhizal relationships enhance uptake of nutrients by the host plant (Allen 1991).

species. Some of these non-forested areas may experience low-intensity fire during proposed spring burning under the proposed action.

Environmental Consequences

Analysis was conducted based on the results of rare plant surveys, current population distribution of rare plant species in the project area, the most current scientific literature, and professional judgment of the project botanist. Methodology for cumulative effects analysis is discussed below in the Cumulative Effects section.

The issue indicator for analysis of effects to sensitive and rare plants is the relative amount of canopy opening and/or ground disturbance in and adjacent to documented rare plant occurrences and/or suitable rare plant habitat. The issue indicator was determined based on the affinity of moist forest moonworts for relatively closed-canopy conditions (ICDC 2005) and their dependence on soil mycorrhizae, which may be destroyed during ground-disturbing activities. Canopy removal and disruption of soil mycorrhizae are also a concern for clustered lady's slipper, as is disruption of natural fire regimes in its Douglas-fir/ninebark habitat and in the open, grassy habitat that may support least bladdery milkvetch. Ground disturbance was also considered for its effects on suitable habitat for green bug-on-a-stick moss.

Direct, and Indirect Effects Common to Both Alternatives

This section discusses direct and indirect effects that are essentially the same under both alternatives.

No occurrences of **least bladdery milkvetch** or **clustered lady's slipper** were found in the project area. No impacts to populations of this species would occur under either alternative. The documented occurrences of **pine broomrape** would not be directly impacted under either alternative. Under the No Action alternative, there would be no change in current management, while under the proposed action both occurrences would be protected by site-specific buffers. The potential for indirect and cumulative impacts to pine broomrape are discussed below for each alternative.

Direct and Indirect Effects

Alternative 1 – No Action

This section describes predicted direct and indirect effects to rare plants from implementation of Alternative 1 that differ from effects expected under the proposed action.

Management activities would not change from current levels, and current vegetation trends would be expected to continue. No direct effects to any rare plants would occur from implementation of this alternative.

Indirectly, the continued increase in fuel loading could pose a threat to suitable rare plant habitat in the context of a higher risk of stand replacing fires. Such fires could extirpate the documented occurrences of pine broomrape and/or any undetected individual rare moonworts or green bug-on-a-stick moss. Habitat suitability for rare moonworts and clustered lady's slipper may be reduced if fire intensity is sufficient to destroy soil mycorrhizae on which these species depend (Allen 1991). In addition, oceanspray, the preferred host plant for pine broomrape, could be at least temporarily reduced in cover by a high-intensity fire (Crane and Fischer 1986).

Alternative 2 – Proposed Action

This section describes direct and indirect effects to rare plants expected from implementation of Alternative 2 that differ from the predicted effects of the No Action alternative. All other direct and

indirect impacts to rare plants under this alternative are described above in Direct and Indirect Effects Common to Alternatives 1 and 2.

The impacts of the proposed treatments to unoccupied suitable habitat for **pine broomrape** cannot be predicted with certainty because the species' ecology is poorly understood. However, the proposed treatments would likely enhance oceanspray, which is the preferred host species. Oceanspray is considered to be well adapted to disturbance by fire, usually responding to a low-intensity burn by root crown and rhizome sprouting (Young 1983). The beneficial effects of proposed burning to oceanspray would likely also benefit pine broomrape, at least in the long term, because the host species would be maintained.

Scattered amounts of unoccupied suitable habitat for **least bladdery milkvetch** occur in stands that would be underburned under this alternative. The proposed treatments are consistent with natural disturbance regimes in the habitats that could support this species in northern Idaho. Habitat for this species in the project area is restricted to dry, open areas with few or no trees. Frequent low-intensity fires in these habitats maintain grasses and open forest structure (Smith and Fischer 1997). Underburning is recommended to maintain the open nature of these stands (Smith and Fischer 1997). The proposed underburning in these areas would help maintain habitat for this species.
While no occurrences of **clustered lady's slipper** were found in any proposed treatment areas, suitable habitat for the species does occur. Approximately 419 acres of suitable habitat for this species would be treated under this alternative, with 15 acres of fuelbreaks, 17 acres of regeneration harvest, 259 acres of commercial thinning, 65 acres of prescribed fire and 79 acres of mixed treatments.

The proposed treatments are consistent with natural disturbance regimes in the Douglas-fir/ninebark habitats that support clustered lady's slipper in northern Idaho. Stand structure and landscape pattern in regions where the species occurs in Idaho and Montana have historically been determined by fire. In Montana, clustered lady's slipper occurs primarily in Douglas-fir/ninebark and grand fir/ninebark habitat types that historically experienced low- to moderate-intensity surface fires on an interval of ten to thirty years (Lichthardt 2003). Following fifty or more years of fire suppression, stands in these habitat types are now more densely stocked and have greater canopy closure, increasing the probability of severe, stand-replacing fires that could reduce the availability of suitable habitat, both in terms of canopy removal and adverse soil and ground-layer effects (Lichthardt 2003). The proposed action would, to some degree, reintroduce low-intensity fire to dry site ecosystems in the project area and would reduce the risk of large, stand-replacing fires (see Fire/Fuels section).

Under the proposed action, approximately 118 acres of marginally suitable habitat for moist forest **moonworts** and **green bug-on-a-stick moss** identified in the coarse filter query would be potentially affected, with 14 acres of fuelbreaks, 60 acres of regeneration harvest, 18 acres of commercial thinning and 26 acres of mixed treatments.

No rare moonworts were identified in proposed treatment areas, and potential for their occurrence is considered low overall. However, undetected individuals may be directly impacted by project activities. Ground-based harvest could disrupt soil mycorrhizae in suitable rare moonwort habitat.

Based on past monitoring (Penny 1995), moonwort populations are generally represented by at least some aboveground plants every year. Because negative survey results reduce the risk of populations going undetected, and because moonworts appear adapted to a broad range of habitats, loss of undetected individuals from project activities in marginally suitable habitat is considered incidental.

While no rare plants were identified in areas proposed for road decommissioning activities, removal of culverts at stream crossings may directly impact a small amount of suitable rare plant habitat, and undetected individuals of sensitive moonworts may be directly impacted.

Indirectly, there could be a risk of prescribed fire escaping to impact suitable moonwort habitat that was buffered from harvest activity. The extent of risk would depend on many factors, including timing of the burn, phenology of the plant species involved and occurrence of abnormally wet or droughty conditions in suitable habitat at the time of the burn.

There have been a few studies of fire disturbance in *Botrychium* populations. Johnson-Groh and Farrar (1993) found that fire affects the aboveground fronds of *B. simplex*, but the population being studied appeared to be resilient even with particularly hot fires that desiccated the soil. The loss of photosynthetic capacity the year of the fire was considered equivalent to non-emergence for a year, and the fire might be considered a minor disturbance. However, as a secondary effect with other stress disturbances, loss of population vigor or population decline may result (Johnson-Groh and Farrar 2003, Johnson-Groh and Farrar 1996). While many documented *Botrychium* occurrences show evidence of previous fire, a study of historical documentation of the type and periodicity of such fires has not been undertaken.

Prescribed fires have the potential to emulate wildfire effects but with the advantage of management considerations of scale, timing and intensity. Timing of prescribed fire is essential, with burning recommended either prior to plant emergence or after spore maturity (Weldon et al. 2001, Johnson-Groh and Farrar 1989). In the Kaniksu portion of the IPNF, rare moonworts have been found to emerge aboveground in early to mid-June at the earliest (Hammet personal observations 1991-2005). This is well after the period in which prescribed spring burning would occur (Lux personal communication 2006).

Based on the best available knowledge, the proximity of proposed underburn units to highly suitable moist forest habitat for rare moonworts that would be buffered from harvest activities, and the planned season of burning (spring), the risk of indirect impacts to undetected rare moonwort individuals from escaped fire under the proposed action would be very low.

Undetected individuals of green bug-on-a-stick moss could also be impacted during project activities. Although this species was not identified during floristic surveys, it could have been overlooked. Harvest and fuel treatments could reduce the amount of available substrate for this moss (rotted logs in moist to wet forest habitat); however, well-rotted stumps and logs are widespread in forested habitats. The extent of loss of suitable substrate from project implementation would be considered incidental and temporary.

Cumulative Effects

The cumulative effects area for rare plants is the project area. This area represents the likely limit of effects to rare plant populations from implementation of the proposed action. Those limits are largely based on the expected distance of spore or seed dispersal and potential for colonization of rare plant populations in areas of suitable habitat. While patterns of dispersal are not known with certainty for many plant species, in studies of *Botrychium virginianum* most spores fell within three meters of the source plant (Peck et al. 1990). Other sensitive species' seeds that are heavier than *Botrychium* spores might be assumed to have similar if not more restricted dispersal patterns.

Cumulative effects to rare plant species and 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 would likely be affected and/or habitat capability may over the long term be reduced below a level which could support sensitive plant species

The following past, current, ongoing and reasonably foreseeable events apply to the cumulative effects analysis for rare plants:

Past Activities and Events

- Wildfire (1910)
- Timber harvest (1924-1940, 1987, 1997)
- Road construction (1935-1940, 1987, 1996)
- Wildfire suppression

Current and Ongoing Activities

- Road maintenance
- Wildfire suppression

Reasonably Foreseeable Actions

- Noxious weeds monitoring and treatment
- Timber stand improvement (thinning and pruning in plantations)

The period for measuring cumulative effects to rare plants and suitable habitat is ten years following completion of harvest and other restoration projects, or, for the No Action alternative, ten years after signing the Decision Notice and FONSI. Beyond ten years, the likelihood of events or activities affecting rare plants and suitable habitat would be difficult to predict.

Cumulative Effects Common to Both Alternatives

The following current, ongoing and reasonably foreseeable activities result in the same cumulative effects when combined with either the proposed action or the No Action alternative:

- Current and Ongoing Activities

Road maintenance activities would occur in areas with low suitability as rare plant habitat. Therefore, no effects to rare plants or suitable habitat are expected to occur.

- Reasonably Foreseeable Actions

Weed treatment and monitoring would follow guidelines established in the Sandpoint Noxious Weeds Control Project EIS (USDA Forest Service 1998a). Effects to rare plant species were analyzed in that document and its adaptive strategy. No effects to rare plants beyond those described in that EIS are expected to occur.

Timber stand improvement activities would occur in areas with low potential to support rare plants. No effects to rare plants or suitable habitat are expected to occur.

Determination of Cumulative Effects

When combined with the above activities, the implementation of either alternative would not contribute to cumulative effects to any documented rare plant species or suitable habitat. In addition, no cumulative effects to populations of **least bladdery milkvetch** or **clustered lady's slipper** would occur, since these species were not found in the project area.

Alternative 1 – No Action

When combined with the following past, current and ongoing activities and events, the No Action alternative has potential cumulative effects to rare plants that differ from those of the proposed action. All other cumulative effects of this alternative are described above under Cumulative Effects Common to Alternatives 1 and 2.

- Past Activities and Events

Past wildfires (1910), timber harvest and road construction before 1989 may have affected rare plants and/or rare plant habitat through ground and vegetation disturbance and canopy removal. Few floristic surveys were conducted on National Forest lands before 1989, so the extent of and effect on rare plant populations of older projects is unknown.

Timber harvest and road construction after 1989 (i.e. Big Grouse Timber Sale) occurred under the Lost Grouse Environmental Assessment (EA). Sensitive plant surveys were conducted for that EA; however, at that time pine broomrape was not listed as sensitive or as a Forest species of concern. The potential for impacts to this species and suitable habitat were not addressed, and it is possible that populations of this species were directly impacted during implementation of the Big Grouse Timber Sale.

Past wildfire suppression in the project area has increased the risk of severe stand-replacing fires (see Fire/Fuels section). Implementation of the No Action alternative would not address these accumulated fuels in the project area.

- Current and Ongoing Activities

Ongoing wildfire suppression in the project area would increase the probability of severe stand-replacing fires (see Fire/Fuels section). Implementation of the No Action alternative would contribute to the continued accumulation of fuels in the project area.

Determination of Cumulative Effects

When combined with the effects of past timber harvest and road construction, past and ongoing fire suppression, implementation of the No Action alternative would further increase the risk of severe stand-replacing fires (see Fire/Fuels section). Should such a fire occur, it may reduce habitat suitability for **rare moonworts**, **green bug-on-a-stick moss**, **least bladdery milkvetch**, **pine broomrape** and **clustered lady's slipper**, at least temporarily. Such impacts would add to the effects of past timber harvest and road construction. The No Action alternative could have low, moderate, or high cumulative effects to these species and/or suitable habitat, depending on where a fire occurs and how severe it is. However, the occurrence and intensity of a future wildfire in suitable habitat for these species would be difficult to predict.

Alternative 2 – Proposed Action

With the design features detailed in Chapter 2, and based on the professional judgment of the project botanist and in consideration of the proposed activities, past, current and ongoing and reasonable foreseeable activities and events, cumulative effects to rare plants and suitable rare plant habitat from implementation of the proposed action would be as follows:

- Proposed Activities

The proposed action was determined to have the potential to impact undetected individuals of rare moonworts and green bug-on-a-stick moss, and could impact marginally suitable habitat for these species. Additionally, suitable habitat for clustered lady's slipper, pine broomrape and least bladdery milkvetch may be impacted under the proposed action. See the above discussion of direct and indirect effects for Alternative 2.

- Past Activities and Events

Past wildfires (1910), timber harvest and road construction before 1989 may have affected rare plants and/or rare plant habitat through ground and vegetation disturbance and canopy removal. Few floristic surveys were conducted on National Forest lands before 1989, so the extent of and effect on rare plant populations of older projects is unknown.

Timber harvest and road construction after 1989 (i.e. Big Grouse Timber Sale) occurred under the Lost Grouse Environmental Assessment (EA). Sensitive plant surveys were conducted for that EA; however, at that time pine broomrape was not listed as sensitive or as a Forest species of concern. The potential for impacts to this species and suitable habitat were not addressed, and it is possible that populations of this species were directly impacted during implementation of the Big Grouse Timber Sale.

Past **wildfire suppression** (1992) in the project area has increased the risk of severe stand-replacing fires. The proposed treatments would reduce the current fuel loading, thereby reducing the risk of stand-replacing fires.

- Current and Ongoing Activities

While wildfire suppression would continue in order to protect adjacent private property values, the proposed treatments would increase the ability to safely use prescribed fire, periodically reducing fuel loads, and to suppress unwanted wildfires. When combined with Alternative 2, ongoing wildfire suppression would decrease the probability of severe stand-replacing fires. There would therefore be a lower risk of severe fire effects to occurrences of and/or suitable habitat for pine broomrape, rare moonworts, green bug-on-a-stick moss, clustered lady's slipper and least bladdery milkvetch than under the No Action alternative.

Determination of Cumulative Effects

Based on the above analysis, cumulative impacts to **rare moonworts** and **green bug-on-a-stick moss** would be low (individuals, populations and/or habitat not likely affected) to 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).

While cumulative impacts to populations of **clustered lady’s slipper** and **least bladdery milkvetch** would not be expected to occur under either alternative since these species were not found in the project area, the proposed treatments are compatible with natural disturbance regimes in suitable habitat for these species. By reducing the risk of stand-replacing wildfires (see Fire/Fuels section), implementation of this alternative may have long term benefits to habitat for these species. Cumulative impacts to suitable habitat for these species would be low (habitat not likely affected) to moderate (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).

The proposed treatments would also contribute no cumulative impacts to populations of **pine broomrape** that may have been affected by past timber harvest and road construction, since the two documented occurrences would be protected by site-specific buffers. The proposed treatments would reduce the risk of a severe wildfire in stands surrounding the populations (see Fire/Fuels section). In addition, as mentioned previously, the proposed treatments are compatible with maintenance of oceanspray, the host species for pine broomrape. Cumulative impacts to suitable habitat for this species would be low to moderate.

Consistency with the Forest Plan and Other Regulatory Direction

A Forest Plan management goal is to "manage habitat to maintain populations of identified sensitive species of animals and plants" (Forest Plan, II-1). A Forest Plan standard for sensitive species is to "manage the habitat of species listed 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). This standard meets the requirements of the National Forest Management Act (NFMA) of 1976, Section 6(g)(3)(B), by providing for diversity of plant communities based on the suitability and capability of the specific land area.

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). Both alternatives would meet Forest Plan direction and provide for the viability of populations.

Across the Forest, suitable habitat for sensitive plant species appears to be well distributed. Approximately 705,000 acres have been identified as having the potential to support sensitive plant species in a wide array of plant communities. To date 98,290 acres (about 14 percent) of suitable habitat have been surveyed for sensitive plants (USDA 2004a).

In 1998, sensitive species trends across the Forest were qualitatively assessed (USDA 1998b, pp. 112-116). Of the sensitive plant species assessed, 11 species were considered to have fairly secure populations with stable trends and few observed threats; 28 species had mostly stable populations with some concerns and threats; and for 16 species there was a serious concern. Estimates for this assessment were based on the best information available, including known population size, distribution and threats. The trends for sensitive moonworts ranged from stable (*Botrychium lanceolatum* ssp. *lanceolatum* [S.G. Gmelin] Angstrom) to serious concerns for population and habitat decline over time (*B. montanum* W.H. Wagner). The trend for clustered lady's slipper (*Cypripedium fasciculatum* Kell.) was characterized as being a serious concern for population and habitat decline over time.

Since implementation of the Forest Plan in 1987, impacts to highly suitable habitat for many sensitive plant species have diminished with the implementation of laws and policies protecting riparian areas, wetland and peatland habitats and policies designed to maintain old growth forests.

A conservation assessment for sensitive moonworts in the IPNF has been prepared (Evans and Associates 2005). A conservation strategy for sensitive moonworts in the IPNF is being prepared. For clustered lady's slipper, where proposed activities in the IPNF may impact the species, formal monitoring plots have been established (USDA Forest Service 2003). A conservation strategy for the species in the Northern Region has been prepared (Lichthardt 2003).

At the project level, and in accordance with Forest Service Manual (FSM) 2672.1-2672.43 and NFMA Section 6(g)(3)(E)(ii), suitable habitat has been identified and surveyed and the appropriate level of analysis conducted. The documented occurrences of pine broomrape would be buffered from all project activities under the proposed action. Proposed activities are consistent with management recommendations in the conservation strategy for clustered lady's slipper (Lichthardt 2003). Protection

measures for the documented moonwort occurrences are consistent with the most current scientific literature (Lichthardt 1995, Vanderhorst 1997, Johnson-Groh and Farrar 2003).

There are no federally listed threatened or endangered species suspected to occur in Bonner County, Idaho (USDI 2006). Therefore, the project is consistent with the Endangered Species Act (1973) as amended.

Noxious Weeds

Regulatory Framework

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 following:

- National Forest Management Act (NFMA) (1976)
- National Environmental Policy Act (NEPA) (1969)
- Forest Service Manual (Chapter 2080, as amended) (2001)
- Executive Order #13112 (1999)
- IPNF Forest Plan (1987)
- IPNF Weed Pest Management EIS (1989)
- Sandpoint Ranger District Noxious Weed Control Project EIS (1998)

Introduction

The Forest Service Handbook (FSH 3409) 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). This strategy is termed Integrated Pest Management (IPM).

The overall IPNF strategy is to contain weeds in currently infested areas and to prevent the spread of weeds to susceptible but generally uninfested areas. The 1989 IPNF Weed Pest Management EIS describes the strategy.

Weed management activities in the district are guided by the Sandpoint Noxious Weed Control Project EIS (USDA Forest Service 1998a).

Noxious weeds are those plant species that have been officially designated as such by federal, State or county officials. In *Weeds of the West* by Whitson et al. (1991), 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).

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 statewide or countywide noxious weed (Idaho Code 24 Chapter 22).

Both federal and state laws define 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

Methodology

Information on current weed infestations and results of weed management in the project area is derived from records of previous weed treatments and from observations during field surveys for rare plants.

Documented Noxious Weed Infestations

Documented weed species in the project area include the following table:

Table 3-13. Weed species and their infestation level documented in the project area

Species	Infestation Level*
spotted knapweed (*Centaurea maculosa* Lam.)	moderate
goatweed (*Hypericum perforatum* L.)	moderate
oxeye daisy (*Leucanthemum vulgare* L.)	low
meadow hawkweed (*Hieracium pratense* Tausch.)	low
orange hawkweed (*Hieracium aurantiacum* L.)	low
common tansy (*Tanacetum vulgare* L.)	low
sulfur cinquefoil (*Potentilla recta* L.)	low
Canada thistle (*Cirsium arvense* [L.] Scop.)	low

* A description of weed infestation levels is included in the project file

These species occur along Forest roads in the project area. Spotted knapweed and goatweed also occur in natural openings in the project area, but off-road weed infestation levels are generally low overall and are scattered. Weed infestations along Forest road 1051 appear to have decreased since treatment first began (Hammet 2004 personal observation).

Because spotted knapweed and goatweed occur off-road in areas proposed for treatment, they are of greater concern than roadside infestations that are being actively controlled. These two species will be discussed in more detail.

Noxious Weed Species of Concern in the Project Area

Spotted Knapweed (*Centaurea maculosa* Lam.)

Spotted knapweed is native to Eastern Europe. It was introduced to North America, probably as a contaminant in alfalfa seed and/or ships' ballast, in the late 1800s (Maddox 1979, Ochsmann 2001, Roche et al. 1986). In 1920, its distribution was limited to the San Juan Islands in Washington. By 1980, it had spread to 48 counties in the Pacific Northwest, and by 1998 its known range included every county in Washington, Idaho, Montana and Wyoming (Sheley et al. 1998).

Spotted knapweed is a perennial species that reproduces almost entirely from seed, although some plants extend lateral shoots below the soil surface that form new rosettes. It establishes and dominates on dry, disturbed sites, especially along roads (Roche et al. 1986). It also invades relatively undisturbed perennial native plant communities in the northern intermountain region (DiTomaso 2000).

Most studies of spotted knapweed to date have focused on its dominance of native grasslands and/or prairies (Tyser and Key 1988, LeJeune and Seastedt 2001, Ridenour and Callaway 2001). Much of spotted knapweed's dominance over native species in those habitats may be attributed in part to root allelopathy (Ridenour and Callaway 2001). Increased availability of nitrogen in what were historically nitrogen-limited habitats that favored native grass species, and the resulting creation of phosphorus and other resource limitations in grassland soils, may also be a factor in spotted knapweed's success in grassland habitats (LeJeune and Seastedt 2001). LeJeune and Seastedt (2001) hypothesize that manipulation of soil resource availability with traditional techniques such as fire can affect the dominance of invasive species such as *Centaurea* in grassland habitats.

In contrast, the South Grouse project area is largely dominated by mesic to dry forested habitats with a high shrub component. Non-forested habitats comprise a small portion of the project area (see Vegetation section). While the behavior of spotted knapweed in open grassland habitats may be mostly influenced by the above biotic factors, in forested habitats tree and shrub layer canopy cover is likely a major limiting factor.

Knapweed seeds are able to germinate under full canopy, but mature plants are uncommon in shaded areas (Watson and Renney 1974); it is typically found in open canopies, sometimes up to 20 percent but most often under canopy cover of five percent or less (Allen and Hansen 1999). Both tree and shrub canopy cover have been observed to affect the abundance of spotted knapweed in forested habitats (Hammet personal observations 1999-2005).

One study considered the effects of spotted and diffuse knapweed on the growth of confer seedlings in a montane forest in southern interior British Columbia (Powell et al. 1997). The results of the study were that abundant knapweed growth did not negatively impact conifer growth and survival during the three-year study period. While Powell et al. (1997) concluded that the lack of effects to conifer seedling growth was likely due to abundant moisture levels during the study period, only the interaction between conifer seedlings and knapweed was measured - all other vegetation had been removed from the site and was cleared every season (Powell et al. 1997). Other site variables such as availability of light were therefore not considered.

The habitats in which spotted knapweed now occurs had historical fire regimes of relatively frequent, low-severity surface fires to mixed-severity fires. Spotted knapweed established in most of these habitats after fire exclusion began, so it is unclear how historical fire regimes might affect spotted knapweed or how spotted knapweed may affect these fire regimes (Fire Effects Information System 2005).

Low-severity fire typically does not kill spotted knapweed plants or seeds (Sheley and Roche 1982). According to LeJeune and Seastedt (2001), low-severity fires in grasslands may increase the availability of nutrients that would allow native species to successfully compete with spotted knapweed. Although severe burns may reduce germination of spotted knapweed seeds (Abella and MacDonald 2000), severe wildfire would probably favor expansion of knapweed by creating widespread areas of bare soil and increasing the amount of sunlight that reaches the ground surface (Arno 1999, Sheley et al. 1999). Spotted knapweed infestations have been associated with reductions in forage production (Harris and Cranston 1979), plant species richness and diversity (Tyser 1990), soil fertility (Harvey and Nowierski 1989, Olson 1999) and wildlife habitat (Bedunah and Carpenter 1989), as well as increases in surface water runoff and stream sedimentation (Lacey et al. 1989).

Goatweed (Hypericum perforatum L.)

Goatweed (also known as St. Johnswort) is native to Europe, western Asia and north Africa. It was likely introduced to North America multiple times (Maron et al. 2004). The first recorded occurrence of the

species in North America was from Pennsylvania in 1793; by the early 1900s it was established in many western states (Sampson and Parker 1930). Goatweed population levels were dramatically reduced following a successful biological control program begun in the 1940s in heavily infested regions of the western United States (Tisdale 1976).

Goatweed is a perennial species that reproduces both by seed and by often extensive lateral root growth that produces additional aerial crowns. In forested areas, it is commonly associated with disturbances such as roads, logging, grazing and fire. Where it occurs in forest zones in Idaho, it is abundant only in small, localized areas in naturally open ponderosa pine stands or where tree cover has been greatly reduced by logging, fire or other disturbance (Tisdale et al. 1959). Several studies suggest that goatweed requires abundant light for best development. In one study, plants subjected to 50 percent of full daylight almost all died after 15 days (Sampson and Parker 1930). More recent studies corroborate those findings (Parendes and Jones 2000). Both tree and shrub canopy cover have been observed to affect the abundance of goatweed in forested habitats (Hammet personal observations 1999-2005).

The historic fire regimes of habitats in which goatweed occurs range from relatively infrequent, high-severity fires in wet forest types to high-frequency, low-severity fires in ponderosa pine forests. The species established in most of these habitats after fire exclusion began, so it is unclear how historical fire regimes might affect goatweed or how goatweed may affect these fire regimes (Fire Effects Information System 2005).

While it is generally purported that fire encourages establishment, vegetative spread and increased density of goatweed patches (Campbell and Delfosse 1984), the variation in the species' response to fire from study to study may reflect differences in plant community type, fire size and severity and/or season of burning. One 1975 study in north Idaho did not show any obvious changes in goatweed infestations following spring burning of brush-covered slopes and seeding with non-native herbaceous species. Goatweed seedlings are susceptible to competition from other species; multiple stresses such as defoliation by biological control agents and fire may also cause reductions in crown density of mature plants (Briese 1996).

Goatweed is well known for its medicinal and other commodity uses. However, hypericin, a chemical constituent of goatweed, causes photosensitization in animals that consume it; the effects of poisoning can lead indirectly to death. Its impact on native plant communities may not be as great as earlier literature seems to indicate, perhaps due to the moderate success of biological control efforts over the last 60 years (Fire Effects Information System 2005). The most commonly described impacts are loss of forage production and carrying capacity on rangelands and losses from livestock poisoning (Ruggiero et al. 1991).

Current Weed Management Efforts

Forest roads in the project area were identified in the Sandpoint Noxious Weed Project FEIS as Site #31 (USDA Forest Service 1998a). The roads were first treated for noxious weeds in 1998; follow-up treatments occurred in 1999, 2000, 2001, 2002 and 2003. Treatments in 2005 consisted of 2.5 miles of spot treatment with a backpack sprayer, with the remainder of the road spot-treated by truck-mounted sprayer.

Spotted knapweed and goatweed are considered naturalized in northern Idaho and, at least to some extent, in the project area. Management of these species will emphasize reducing infestation levels and slowing their rate of spread. Biological control agents for knapweed (*Metzneria paucipunctella*, *Urophora affinis* and *U. quadrifasciata*) are established in Idaho (Rees et al. 1996) and have been identified in the project area. The goatweed biological control agent *Chrysolina quadrigemina* was first released in the United

States in 1946 and is now well-established in Idaho (Rees et al. 1996); it has been identified in the project area. Additional biological control agents for goatweed and knapweed may be released in the project area as appropriate.

Meadow and orange hawkweed, oxeye daisy, sulfur cinquefoil and Canada thistle are currently established but are not considered naturalized in the project area. They are largely confined to Forest roads in the project area. Infestations will be monitored and contained, with eradication where feasible.

Of major concern are potential new invaders (see project file) not yet documented in the project area. In accordance with guidelines in the Northern Region Overview (USDA Forest Service 1999), management priorities emphasize identification and eradication of tansy ragwort, leafy spurge and yellow starthistle. Some additional weed species listed as noxious in Bonner County and recorded as occurring there have not yet been documented in the project area. These species would be a high priority for eradication if any individuals were observed during operations or monitoring in the project area.

The inclusion of weed treatment and prevention practices in timber sale contracts since 1998 has increased the likelihood of success in containing and reducing weed infestations throughout the district.

Environmental Consequences

Analysis was conducted based on current distribution of weed species in habitats similar to those found in the proposed treatment areas and on the types of proposed project activities. The estimation of risk of weed spread and introduction of new weed invaders from the proposed activity is based on peer-reviewed literature, experience in the project area and on similar sites in the IPNF, and professional judgment.

Effects of proposed actions on noxious weed spread are based on the amount of canopy removal and on the predicted amount of soil and/or understory vegetation disturbance. Where harvest would be helicopter-based, there would be less ground disturbance than with ground-based logging. Therefore, the risk of weed spread would be lower than where ground-based logging would occur. In addition, regeneration harvests increase the risk of weed spread through significant canopy reduction, while other harvest types typically remove less canopy, with a lower risk of weed spread.

Direct and Indirect Effects

Direct and Indirect Effects Common to Both Alternatives

With implementation of either alternative, seeds from any weeds on private and Forest roads in the project area may still be transported within and out of the area by vehicles, people, birds, and wildlife. Untreated weed infestations on private lands in the project area could spread to public lands.

Alternative 1 – No Action

Under this alternative, there would be no change from current management activities in the project area. Because there would be no new road construction, timber harvest or underburning, the risk of weed spread would not change from current levels. Indirectly, however, the continued increase in fuel loading could increase the risk of weed spread in the context of a higher risk of stand-replacing fires (see Fire/Fuels section).

Alternative 2 – Proposed Action

Because the proposed action includes both timber harvest and construction of new temporary roads, there is a greater risk of weed spread than with the No Action alternative. The risks and potential for direct and indirect effects on weed spread associated with proposed activities are discussed below. All other direct

and indirect effects of this alternative are described above under Direct and Indirect Effects Common to Alternatives 1 and 2.

Risk of Weed Spread from Project Activities

Implementation of 23 acres of fuelbreaks, 189 acres of regeneration harvest, 449 acres of commercial thinning, 151 acres of prescribed fire only and 155 acres of mixed treatment would also increase the risk of weed spread to varying degrees. Approximately 288 acres would be logged by helicopter, which causes the least amount of ground disturbance and therefore carries the lowest risk of weed spread. Approximately 396 acres would be cable-logged, which creates more ground disturbance than helicopter logging and has a higher risk of weed spread. Tractor logging, which causes the most ground disturbance and thus carries a higher risk of weed spread than either helicopter or cable logging, would occur on about 109 acres.

Following timber harvest, approximately 601 acres would be underburned to treat fuels, while 191 acres would be machine piled. Underburning would produce vegetation disturbance that might lead to a spread of spotted knapweed and goatweed (but see the discussion above concerning the predicted response of native understory shrubs in shrub-dominated forest stands). Machine piling would produce ground disturbance that would be conducive to the spread of these two weed species. Required mitigation as proposed above would reduce but would not eliminate this risk.

Construction of 1.7 miles of temporary road as well as three helicopter landings would create disturbance conducive to weed introduction and spread. Required mitigation as proposed above would reduce but would not eliminate this risk. In addition, approximately 1.7 miles of existing and temporary road would be decommissioned following completion of project activities. This activity could also pose a risk of weed spread. Pre-treatment of road prisms proposed for decommissioning, with preventive seeding and monitoring after road decommissioning, would reduce but would not eliminate the risk of weed spread.

Expected Direct and Indirect Effects of Project Activities

- Existing Weed Infestations Confined to Roads in the Project Area - Oxeye daisy in particular tends to increase with expansion of canopy openings (Hammet and Klarich 1996 personal observation). However, because it occurs at low levels in the project area, is largely confined to road rights-of-way and is being actively controlled, potential for spread of this species from project activities associated with canopy removal would be low under the proposed action. For the same reasons, and given the required mitigation described above, the isolated infestations of sulfur cinquefoil, Canada thistle, common tansy and hawkweeds would also not be expected to spread.

- Existing Weed Infestations Occurring Off-Road in the Project Area - The risk of weed spread in areas proposed for underburning would vary for different plant communities. Those dry areas where shrub species are predicted to dominate may be at lower risk, while dry grass and forb-dominated communities may be at higher risk for weed invasion, depending on the season and severity of the burn in each community type. For example, ninebark sprouts vigorously following a fire and has been found to be more abundant on burned than unburned locations (Noste and Bushey 1987). Recovery of the brush component will eventually shade out many weed species, especially goatweed (Fire Effects Information System 2005).

  Goatweed and spotted knapweed occur in the project area in both previously disturbed and undisturbed habitats. Both may increase, at least temporarily, in some areas following harvest and fuels treatment activities. This may be due not to invasion from adjacent infestations but to germination from seed already present in the soil (Fire Effects Information System 2005). Harris and

Gill (1997) suggest that when a pine plantation (or forest) reaches stand closure, goatweed may disappear from aboveground vegetation, but remain as seed in the soil seed bank. When fire or other disturbance occurs in such sites, the species may establish from seed as part of the initial postfire community.

Experimental evidence suggests that spotted knapweed gains dominance in part by its ability to outcompete native grasses for nutrients (Fire Effects Information System 2005). Other evidence suggests that as succession proceeds and nutrients become less available, the competitive advantage shifts back to native plants such as bluebunch wheatgrass (*Pseudoregneria spicata*) (Fire Effects Information System 2005).

Season of burning may affect these species' response to fire. In one study of goatweed's response to burning, the native grass and forb component remained dominant in prescribed burn areas following a fall burn, because goatweed seedlings are poor competitors (Briese 1996). In a study of fall burning versus spring burning on spotted knapweed in western Montana, the knapweed volume doubled two years following a fall burn but was not recorded before or after a spring burn of lesser intensity on an adjacent site (Noste 1982).

While both species are considered naturalized in the western states and are not likely to be eradicated, their effects on other resources can be reduced by integrated practices such as biological and chemical control. The re-establishment of desired species following disturbance can also reduce the incidence of spread of goatweed and knapweed. As stated above, goatweed seedlings are poor competitors; spotted knapweed is also outcompeted by some desired non-native species such as "Durar" hard fescue (*Festuca trachyphylla*) and "Covar" sheep fescue (*Festuca ovina*) (Harrison et al. 1996). Both of these grass species are often included in seed mixes for disturbed sites.

Summary of Expected Direct and Indirect Effects

Based on past monitoring (see project file), successful weed treatment would remove the majority of new seed source for existing weed infestations, which occurs on roadsides, and would slow the spread of existing weed infestations within the project area.

Preventive seeding of native and desired nonnative species in areas of new disturbance (skid trails, landings, fuel breaks, new road construction and decommissioned roads, and underburned areas) would reduce the risk of weed spread. Treatment of existing weeds along haul routes on national forest lands would also reduce the risk of weed spread. Contract requirements to clean off-road harvest equipment prior to entry into the sale area would further reduce the risk of introduction of weeds. The risk of introduction and establishment of new weed invaders to the project area is expected to be low with implementation of the required mitigation.

Pre-treatment of existing infestations on roads proposed for decommissioning followed by preventive seeding would reduce the risk of further spread over time to current levels. In addition, newly decommissioned roads would be monitored to detect new weed invaders and to assess the success of preventive measures. Without the recurring disturbance of road maintenance and use, and with increasing canopy coverage of desired species, risk of weed spread on decommissioned roads would decline to below the level for open or gated roads.

Weed prevention and treatment measures would reduce but not eliminate the potential for spread of goatweed and knapweed within the project area.

Cumulative Effects

The cumulative effects analysis area describes the area beyond which effects of the proposed project cannot be detected. Determination of the cumulative effects area for weeds considered the extent of currently documented weed infestations and likely seed dispersal distances. While patterns of dispersal are not known with certainty for many plant species, in studies of Botrychium virginianum most spores fell within three meters of the source plant (Peck et al. 1990). Noxious weed species' seeds that are heavier than Botrychium spores might be assumed to have similar if not more restricted dispersal patterns. Transport of weed seeds out of the project area is possible, with occasional transport over long distances (such as on vehicles). However, it would be difficult to predict the extent of such long-distance dispersal. It is likely that most seeds of noxious weeds would fall close to the parent plant.

In addition, road systems and lands adjacent to the project area have noxious weed infestations similar in composition and distribution to those in the project area, so transport of weed seeds to these lands from the project area would have little additional impact. For these reasons, the cumulative effects analysis area for noxious weeds is the project area.

Cumulative effects with regard to noxious weeds from proposed activities are generally described as very low, low, moderate or high, with the following definitions:

very low = no measurable effect on existing weed infestations or susceptible habitat

low = existing weed infestations and/or susceptible habitat not likely affected

moderate = existing weed infestations or susceptible habitat affected, with the potential for expansion into uninfested areas and/or establishment of new invaders

high =weed infestations and/or susceptible habitat affected, with a high likelihood of expansion into uninfested areas and/or establishment of new invaders.

The period for measuring short-term cumulative effects to noxious weeds and susceptible habitat is ten years following completion of the proposed activities, or, in the event of selection of the No Action Alternative, ten years after the date of the signing of the Decision Notice and FONSI. The ten-year period is based on the expected recovery and/or establishment of desired species in disturbed areas. Long-term effects to noxious weeds from loss of canopy cover are addressed below.

The following past, current, ongoing and reasonably foreseeable events apply to the cumulative effects analysis for noxious weeds:

Past Activities and Events

- Wildfire (1910)
- Timber harvest (1924-1940, 1987, 1997)
- Road construction (1935-1940, 1987, 1996)

Current and Ongoing Activities

- Road maintenance
- General motor vehicle and off-road vehicle use on roads
- Hunting
- Firewood gathering

Reasonably Foreseeable Actions

- Noxious weeds monitoring and treatment
- Timber stand improvement (thinning and pruning in plantations)

Cumulative Effects Common to Both Alternatives

This section describes cumulative effects that are expected with the implementation of either alternative.

Existing Infestations

Cumulative effects with regard to existing weed infestations are expected to be low to moderate under both alternatives, considering the following:

- Past Activities and Events - Past wildfires, timber harvest and road construction provided areas of disturbance of soil, vegetation and canopy cover for invasion by non-native plant species, including noxious weeds. Because of inadequate past weed prevention and control practices, the effects of these activities on noxious weed spread are still evident.

  The loss of tree canopy cover from past timber harvest may have been a factor affecting weed spread in the project area. As the tree canopy in open stands closes, shade-intolerant weeds will, over the long term, be displaced. This process could take another 20-30 years or more. In areas with a high shrub component, recovery of the shrub canopy layer has been much quicker to affect the density of offroad noxious weed infestations in the project area (see the above discussion of the effects of canopy cover on spotted knapweed and goatweed).

- Current and Ongoing Activities - Road maintenance activities may result in ground disturbance that would be conducive to the spread of existing weed populations. Hunting, firewood gathering and general use of motor vehicles and off-road vehicles on Forest roads could also spread existing weeds. The current levels of weed treatment and monitoring by the Forest Service on roads in the project area would minimize the risk of weed spread from these activities.

- Reasonably Foreseeable Actions - Timber stand improvement activities generally cause little tree canopy removal and no ground disturbance and would not cause a measurable increase in the risk of weed spread.

New Invaders

Under both alternatives, cumulative effects with regard to new invaders are expected to be low when combined with all of the above past, current, ongoing, and reasonably foreseeable actions. Under Alternative 1, because no new disturbance would occur, and because current treatment and monitoring would continue, no new invaders would be expected to become established. Under Alternative 2, because of mitigation measures designed to detect and eradicate new invaders, no new invaders are expected to become established.

Cumulative Effects of Alternative 1 – No Action

When combined with the following past, current and ongoing activities and events, the No Action alternative has potential cumulative effects on the spread of noxious weeds that differ from those of the proposed action, as discussed below. All other cumulative effects of Alternative 1 are described above under Cumulative Effects Common to Alternatives 1 and 2.

- Past Activities and Events

  Past wildfire suppression in the project area has increased the risk of severe, stand-replacing fires. Implementation of the No Action alternative would not address these accumulated fuels in the project area. The risk of severe, stand replacing fires would be higher under this alternative than under proposed action. There would therefore be a higher risk of widespread vegetation and/or soil disturbance, which would cause an increased risk of weed spread and introduction across the project area.

- Ongoing Activities

  Ongoing wildfire suppression in the project area would increase the probability of severe stand-replacing fires. Implementation of the No Action alternative would contribute to the continued accumulation of fuels in the project area. As fuels continue to accumulate, the probability of severe stand-replacing fires, and the resulting widespread vegetation and/or soil disturbance, would lead to an increased risk of weed spread and introduction across the project area.

- Reasonably Foreseeable Actions

  Noxious weed treatment and monitoring would follow guidelines and priorities established in the Sandpoint Noxious Weeds Control Project EIS (USDA Forest Service 1998a). The risk of new invaders becoming established would be low. Treatment of Forest roads in the project area would likely continue to protect previous investments. If appropriated funding is available, biological control agents may be released in off-road knapweed and goatweed infestations in the project area. However, no Knutsen-Vandenberg (KV) funding would be available for any weed treatment.

Determination of Cumulative Effects

In the short term, the No Action alternative would contribute a low level of cumulative effects to the risk of weed spread. Over the long term, implementation of this alternative would further increase the risk of severe stand-replacing fires. Should such a fire occur, it would likely cause existing infestations to spread to previously uninfested areas. It would also provide the disturbance that would allow dormant weed seeds in the soil to germinate. However, the occurrence and intensity of a future wildfire in the project area is difficult to predict.

Cumulative Effects of Alternative 2 – Proposed Action

This section describes the cumulative effects that are expected with implementation of the proposed action. All other cumulative effects of this alternative are described under Cumulative Effects Common to Alternatives 1 and 2.

- Proposed Activities under Alternative 2

  Short-term cumulative effects regarding susceptibility to weeds would be associated with ground disturbing activities proposed under this alternative. Proposed mitigation (see Chapter 2 - Features Designed to Prevent the Spread of Noxious Weeds) would reduce but not eliminate the risk. Over the long term, the loss of tree canopy cover from implementing the proposed activities is considered temporary. As tree canopy closes, susceptibility of areas proposed for harvest and/or underburning would decrease. This process could take 40-50 years. In areas with a high shrub component, recovery of the shrub canopy layer would be much quicker. For example, Merrill (1982) found that twig densities on ninebark increased through the third postfire growing season and that shrub heights on burned and unburned sites were equal by the fourth season.

Proposed treatment of existing infestations on haul routes with approved herbicides and preventive seeding and monitoring on skid trails (see Chapter 2 - Features Designed to Prevent the Spread of Noxious Weeds), would greatly reduce the risk of transporting goatweed and spotted knapweed off-site.

Pretreatment of existing infestations on roads proposed for decommissioning followed by preventive seeding would reduce the risk of weed spread over time to current levels. In addition, newly decommissioned roads would be monitored to detect new weed invaders and to assess the success of preventive measures. With increasing canopy coverage of desired species, the risk of weed spread on decommissioned roads would decline over time to below current levels.

- Past Activities and Events

  Past wildfire suppression in the project area has increased the risk of severe stand-replacing fires (see Fire/Fuels section). The proposed treatments under Alternative 2 would to some degree reduce the current fuel loading.

- Current and Ongoing Activities

  While wildfire suppression in the project area would continue in order to protect multiple resource values, the proposed action would, to some degree, increase the ability to safely use prescribed fire and periodically reduce fuel loads and to suppress an unwanted wildfire (see Fire/Fuels section). When combined with the proposed action, ongoing wildfire suppression would decrease the probability of severe, stand-replacing fires. There may be a lower risk of widespread, severe disturbance of vegetation, soil and tree canopy than under the No Action alternative.

- Reasonably Foreseeable Actions

  Noxious weed treatment and monitoring would follow guidelines established in the Sandpoint Noxious Weeds Control Project EIS (USDA Forest Service 1998a). The risk of new invaders becoming established would be low. Mitigation measures to reduce the risk of weed spread from project activities would complement recent investments in weed management made by the Forest Service on roads in the project area. Forest roads to be used for hauling during implementation of the project would be treated as needed. In addition, Knutsen-Vandenberg (KV) funding from proceeds of the timber sale may be available to supplement appropriated funding for release of biological control agents in offroad infestations of spotted knapweed and goatweed.

  Weed treatment activities would be successful in controlling goatweed and spotted knapweed along road prisms, but in the short-term would not have a significant effect on these species where they occur away from Forest roads. These two species are considered naturalized in the project area, and would not be eradicated by weed treatment efforts.

  The short-term management goal for goatweed and spotted knapweed is to reduce the risk of seed and plant parts being transported out of the project area. The long-term goal is to reduce the size of infestations and slow the rate of spread within the project area. Based on past monitoring (see project file), continued treatment of existing infestations on roads in the project area would greatly reduce the risk of transporting these species off-site.

  Should funding allow, biological control agents for knapweed and goatweed may be released in off-road infestations and would over time reduce the incidence of those species. Treatment of

other weed species, which are mostly confined to road prisms, would be moderately to highly effective in reducing their spread within the project area.

Determination of Cumulative Effects

When combined with all of the above activities, cumulative effects under the proposed action with regard to existing weed infestations are expected to be low for oxeye daisy, meadow hawkweed and Canada thistle, based on their current levels of infestation.

Cumulative effects for spotted knapweed and goatweed would likely be moderate, given their current levels of infestation. Off-road infestations of spotted knapweed and common goatweed would be expected to persist, since these species are considered to be naturalized in the project area. Treatment of off-road infestations with biological control agents may reduce the size of the infestations but would not eliminate them.

Consistency with the Forest Plan and Other Regulatory Direction

According to the Idaho Panhandle Forest Plan (USDA Forest Service 1987) direction, infestations of many noxious weed species, including knapweed, goatweed and common tansy, are so widespread that control would require major programs that are not possible within expected budget levels (Forest Plan, p. II-7). Forest Plan direction is to "provide moderate control actions to prevent new weed species from becoming established". The No Action alternative meets Forest Plan direction by not creating disturbance conducive to new noxious weed invasions or spread of existing weed populations. Alternative 2 meets Forest Plan direction by providing moderate control actions through project design, as required by the Forest Plan, to prevent new weed species from becoming established.

It should be noted that, since the Forest Plan was implemented in 1987, the issue of weed infestations on national forest lands has evolved to encompass broader issues of native ecosystem integrity and the effects to non-commodity resources and ecosystem processes. Funding levels for noxious weeds prevention, monitoring and treatment since the mid-1990s have increased the likelihood of success of weed management efforts (see the project file). The forest plan revision process will consider the increased emphasis on weed management.

Mitigation measures described in Chapter 2 to reduce the risk of weed spread (See Features Designed to Prevent the Spread of Noxious Weeds) are as required in Forest Service Manual Chapter 2080, as amended (2001). In addition, several recommended, but not required, practices related to roads and timber harvest activities are included (see Chapter II). FSM requirements and regulations related to noxious weeds are included in the project file.

According to Executive Order #13112 (1999), "Federal agencies whose actions may affect the status of invasive species, shall, to the extent practicable and permitted by law, identify such actions; subject to the availability of appropriations and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and not authorize, fund or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species…unless…the agency has determined and made public its determination that

the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions."

At the project level, noxious weeds have been identified and weed prevention measures incorporated into the proposed action. The potential for weed spread was disclosed for the proposed action. In addition, the consequences of failure to implement the proposed action with regard to the risk of widespread weed invasion in the aftermath of a severe, stand-replacing fire were analyzed.

Soils

Regulatory Framework

The regulatory framework providing direction for protecting a site's soils and its productivity comes from the following:

- Multiple Use-Sustained Yield Act of 1960
- National Forest Management Act of 1976 (NFMA)
- Forest Plan and Regional Soil Quality Standards (FSH 2509.18)

Management direction in the Forest Plan (USDA Forest Service 1987, p. II-17) is to manage the soil resource to maintain long-term productivity. Forest Plan objectives and standards (USDA Forest Service 1987, pp. II-32 and 33) include:

- Management activities on Forest lands will not significantly impair the long-term productivity of the soil or produce unacceptable levels of sedimentation resulting from soil erosion. This will be accomplished using technical guidelines developed in conjunction with the soil survey and Best Management Practices necessary to protect soil productivity and minimize sedimentation.
- 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 as determined in the project analysis.
- Projects should strive to maintain sufficient large woody debris to maintain site productivity.
- 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 (USDA Forest Service 1999, R-1 Supplement 2500-99-1) were revised in November 1999. Manual direction recommends maintaining 85% of an activity area's soils at an acceptable productivity potential regarding detrimental impacts, including compaction, displacement, rutting, severe burning, surface erosion, loss of surface organic matter, and soil mass movement. This recommendation is based on research indicating that a measurable decline in soil productivity occurs when 15% of a site is detrimentally impacted (Powers 1990). 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 prior conditions and should move toward soil quality improvement. These standards do not apply to intensively developed sites such as permanent roads, mines, or developed recreation and administrative sites. More information on the regulatory framework for the soils resource can be found in the project file.

Methodology for Analysis

The first step of the analysis was to ascertain the "natural," or reference condition of the soil resource in the project area. The reference condition is primarily a product of physical factors such as geology and climate, though vegetation and fire also influence soil characteristics.

This information was derived from published literature, soil surveys, aerial photography, and GIS data. Natural erosion and sediment production hazards were gathered from landtype descriptions in the Idaho Panhandle National Forests Land Systems Inventory (project file). Activities and events such as road building, fertilization, fire management, timber harvest, or cultivation can cause soil conditions to deviate from their "natural" state.

Actions that could alter soil properties were located using the TSMRS data base, aerial photographs (1935-2002), historic harvest records (Barton 1936), communications with long-term local residents (project file), stand exam records and walk-thru surveys (project file).

Residual impacts from past activities were quantified using on-the-ground soil transects (the "Onsite Assessment Method" Niehoff 2002) and modeling based on monitoring of similar activities (Niehoff 2002). The spreadsheet model (Niehoff 2002) evaluates potential detrimental disturbance on proposed harvest units for each harvest method based on empirically derived coefficients calculated from numerous monitored sites throughout the IPNF. Modeling assumes that Best Management Practices (BMPs) have been implemented since 1990. The model does not account for changes in soil type or the recovery of soils over time from previous activities.

Adding the effects of past impacts to the "natural" or reference condition defined the soil resource existing condition. More information and details on the methodology used to ascertain effects on the soil resource can be found in the project file.

Affected Environment

Existing Condition

Field observations and soil transects show that the organic matter varies throughout the project area (project file). Depth of organic matter correlates to habitat type and aspect. Moister habitats and northerly aspects have more organic matter. Organic matter content is generally high on moist sites, and low to optimum on dry sites.

The amount of coarse woody debris present in the project area varies (Soils and Vegetation project file). Many stands contain high amounts of downed wood originating from mortality caused by root disease, bark beetles, and competition for resources. These amounts greatly exceed the recommendations of Graham et al. (1994) and contribute to hazardous fuel loading. Historically, fire would have moderated the amount of accumulated coarse woody debris (Smith and Fischer 1997).

The TSMRS record shows previous harvest in 14 project area stands. Two of these stands were treated in the Grouse Mountain Sagle Timber Sale (1987) and the remaining 12 were treated in the Big Grouse Timber Sale (1997). The South Grouse Hazardous Fuels Reduction Project is only proposing activities in one stand (655-01-061) with a TSMRS record of past activity. Walk-through surveys and stand records indicate that portions of this stand were thinned using a cable system in the Big Grouse timber sale. Stand 655-01-061 is proposed for re-entry to provide additional growing space around ponderosa pine followed by an underburn. Existing soil conditions were examined on the ground in this stand (project file).

Extensive walk-through surveys in proposed treatment areas, communications with local residents, and a 1936 J. Barton map indicate that harvest in the early 1900s took place in 15 stands where activities are proposed. Stumps and faint skid trails from these harvests are noted in the field notes (project file).

Sampling of soils around stumps showed little to no compaction or disturbance. The lack of deep ruts along skid trails and possible haul routes suggests that past logging occurred during dry soil conditions, on snow, and most likely with the aid of horses. Besides the presence of old burned logs and snags, the area has recovered from past fire-related impacts.

Environmental Consequences

The objective of the soils analysis is to quantify the effects of the proposed activities on the soil resource. The analysis area for direct, indirect, and cumulative effects on soils is the 2,211-acre project area. Effects of proposed activities on soil resources would be localized and not extend beyond the project area. The analysis area for soil resources was broken down into activity areas based on proposed vegetation treatment, logging system, fuel treatment, and stand number (Soils Project File, Table A-1). The effects of temporary roads and landings were considered in the activity area in which they are proposed. Existing classified National Forest system roads are considered designated lands and, as such, the loss of soil productivity due to their construction will not be considered in the cumulative effects analysis.

The timeframe for effects analysis, including cumulative effects considerations will begin with the 1910 fire and extend to the conclusion of post harvest treatments like tree planting. This would give post treatment mitigations sufficient time to take effect and allow treatment areas to recover.

Modeling based on monitoring the effects of similar activities (Niehoff 2002) was used to estimate the impacts of proposed activities.

The Forest soil scientist and/or the project forester conducted extensive on-the-ground assessments of the existing soil conditions using Niehoff's (2002) "Onsite Assessment Method". Efforts focused on areas where preliminary modeling indicated Regional soil quality standards might be exceeded (see project file for field notes and site reports).

Detrimental soil impacts found were attributed to the effects of past activities. The predicted effects of proposed activities were added to existing detrimental impacts to ascertain cumulative effects.

Direct effects on soils from proposed activities were calculated for potential soil compaction, displacement, rutting, surface erosion, severe burning, and road construction. The generally ash-capped surface soil layer is the most productive and easiest to disturb.

Helicopter and skyline logging systems tend to have between 0 and 3 percent detrimental effects (Niehoff 2002, McIver and Starr 2000, pp. 11-16). These logging systems have less impact than ground-based systems because the equipment stays on the road or in the air, and logs are partially or fully suspended over the ground. Soil impacts from skyline logging are caused when one end of a log is dragged over the ground (Krag 1991; Seyedbagheri 1996, pp.7-9).

Since 1990, improved protection measures including Best Management Practices, and advancing equipment technology have decreased detrimental impacts from ground-based yarding to an average of 13 percent (Niehoff 2002). This coefficient accounts for the effects of temporary roads associated with ground-based yarding.

Proposed broadcast burning, piling and fuel-break treatments are designed to avoid soil degradation. Broadcast burning would occur only when soil moisture content was above 25%. Monitoring has found no detectable degradation of soil when this guideline is followed. Piling and fuelbreak treatments are also not expected to notably degrade soil conditions, as machinery would operate on slash mats and on slopes less than 35 percent. These actions would not involve skidding logs.

Roads and landings that remain on the landscape for future use (system roads) are considered irretrievable effects on productivity as these lands become "dedicated" to the permanent transportation system. Temporary roads and landings (i.e., only needed for the project and planned for decommissioning) have detrimental effects initially, but rehabilitation efforts (subsoiling and/or recontouring) initiate a long-term recovery process.

Acres of detrimental disturbance (Table A-1 in Soils Project File) were calculated by multiplying the acres of activity disturbance by the disturbance coefficient derived from monitoring reports. Coefficients used for proposed logging systems and associated slash treatments are shown in Table 3-14. In activity areas where helicopter or skyline yarding is proposed, the expected impacts from temporary road construction were then added.

Table 3-14. Coefficients used to predict potential detrimental disturbance for proposed logging and slash treatment scenarios including burning and piling

Tractor Logging	Detrimental Disturbance Coefficients (%)
With broadcast burning or grapple piling	13
Skyline or Helicopter Logging	
With broadcast burning	0
With grapple piling	8
Property Fuel-break Treatments	
Piling	8

Indirect effects include the potential loss of site productivity due to removal of large woody debris and potassium. Large woody debris is essential for maintenance of sufficient microorganism populations and serves as a long-term supplier of organic material and nutrients for soils. Research has indicated that potassium is an important element in site productivity so mitigation measures were designed to meet large woody debris and organic matter guidelines contained in Graham et al. (1994). These recommendations emphasize tons/per acre and include material greater than three inches in diameter. Foliage and branches would be left over the winter to allow potassium to leach out of these materials (Garrison and Moore 1998).

Cumulative effects include the combination of direct and indirect effects with effects of past, present and reasonably foreseeable activities. The cumulative effects analysis area is the same as the "activity area" used for analysis of direct and indirect effects. No soil-disturbing activities are presently occurring or reasonably foreseeable in the project area.

Direct and Indirect Effects

Alternative 1 - No Action

Under this alternative, no new management-induced detrimental direct impacts would occur in the South Grouse Hazardous Fuels Reduction Project area. No direct effects to soils would occur in Alternative 1 as

no road construction, logging, or fuels treatment would occur. There would be no compaction or displacement beyond existing levels. On existing roads, no change in use or management would occur in the foreseeable future.

Stands currently at high risk for mortality would not be treated, which may increase the risk of stand loss due to wildfire, severe burning, and loss of soil nutrients. The introduction of weeds and unwanted flora following a fire could lead to higher competition between less desirable and native vegetation. In the absence of such a hot fire, nutrients would be retained on site.

Diseased trees would remain and infection centers would likely increase in size and concentration. The additional woody debris (fuel) would increase the probability that wildfire would damage the soil resource.

Severe deteriorating effects that wildfires have on soils usually include loss of organics and nutrients and a reduction of water infiltration (Wells et al. 1979, p. 26). Burns that create very high soil surface temperatures, particularly when soil moisture content is low, result in an almost complete loss of soil microbial populations, woody debris, and the protective duff and litter layer over mineral soil. Since erosion increases following a fire are often directly proportional to fire intensity (Megahan 1990, p. 146), the removal of ash-capped surface soils could reduce soil productivity.

Many of the nutrients present in surface organics and large woody debris can be lost to the atmosphere through volatilization and removed from the site in fly-ash (DeBano 1991, pp. 152-153; Amaranthus 1989, p. 48). Burn ashes are usually white or reddish in color, indicating that much of the carbon is oxidized by fire.

When soils turn hydrophobic, water infiltration is reduced. Though hydrophobicity is a naturally occurring phenomenon that can be found on the mineral soil surface, it is greatly amplified by increased burn severity (Huffman et al. 2001). Soil hydrophobicity usually returns to pre-burn conditions in no more than six years (DeBano 1981) and other studies have documented a much more rapid recovery of one to three years (Huffman et al. 2001). However, before infiltration improves, increased overland runoff and sediment movement can be expected.

Alternative 2 - Proposed Action

Effects of Vegetation Treatments

Proposed activities have the potential to cause detrimental soil effects. Minor disturbances would occur on areas proposed for skyline and helicopter yarding, but past monitoring shows this activity results in virtually no detrimental impacts (Forest Plan Monitoring and Evaluation Reports; USDA Forest Service 2001, 2002, 2003a, 2004a, Niehoff 2002).

Modeling based on monitoring (Niehoff 2002) shows that ground-based yarding causes detrimentally disturbed soils on 13% of an activity area (Table 3-14). Ground-based yarding is currently proposed in portions of five stands with moderate (<35%) slopes, and no evidence of past harvest. Ground-based yarding was originally proposed in portions of stand 655-01-003. However, ground truthing detected detrimental impacts attributable to historic logging. As a result, helicopter and cable yarding systems are now proposed. None of the proposed vegetation treatments are expected to exceed soil disturbance guidelines (Table A-1, Soils Project File). Ground-based yarding is proposed in a portions of stands 655-01-038 and 655-01-072. Walk-through surveys found evidence of past logging. However, soil disturbing activities were confined to skid roads and were not dispersed through the activity area. Therefore, the area of detrimentally disturbed soil was calculated (length and width of skid roads) and added to the expected

amount of disturbance (13%). Again, none of the proposed vegetation treatments are expected to exceed soil disturbance guidelines (Table A-1, Soils Project File).

Out of 45 stands proposed for treatment, 28 would have detrimental impacts between 0 and 3 percent, and three stands would have impacts between 6 and 9 percent (Table A-1, Soils Project File Appendix, Helgenberg and Rone 2005). Fourteen stands (188 activity acres) would have detrimental impacts of 11 percent or greater. Only two of these stands would temporarily exceed the 15% detrimental impacts guidelines (Table 3-15).

Table 3-15. Stands within activity areas with cumulative impacts of 11% or greater

Stand #	Total Stand Acres	Activity Area (Acres)	Existing Soil Impacts (% Activity Area)	Total Impacts from Proposed Activities (% of Activity Area)	Total of Existing and Predicted Additional Impacts (% of Activity Area)	Project Completion (Existing + Predicted Additional -Mitigation) (% of Activity Area)
65501002	40.5	23.1	3%	8%	11%	11%
65501054	28.4	28.4	3%	8%	11%	11%
65501055	10.9	4.0	3%	8%	11%	11%
65501058	63.3	3.9	3%	8%	11%	11%
65501059	75.6	37.2	3%	8%	11%	11%
65501060	24.6	10.6	3%	8%	11%	11%
65501008	51.7	5.5	0%	13%	13%	13%
65501029	18.2	2.1	0%	13%	13%	13%
65501038	46.4	8.9	0%	13%	13%	13%
65501059	75.6	19.5	0%	13%	13%	13%
65501060	24.6	7.4	0%	13%	13%	13%
65501072	100.2	26.2	0%	13%	13%	13%
65501074	30.7	11.3	13%	2.7%	15.7%	<15%
65501007	39.13	39.13	13%	3.3*%	15.8%	<15%
Total	629.83	227.23				

* Disturbance is from temporary road construction and helicopter landing on existing disturbed site. See discussion below.

Effects of Prescribed Burning, Slash Disposal and Fuelbreak Creation
No measurable negative effects on soils are anticipated from the 601 acres post-harvest burning or 150 acres of prescribed fire use if slash is allowed to over-winter on site prior to piling or burning, and if soil moisture content is ≥25% when the burning occurs. These requirements would maintain coarse woody debris, and limit the potential for hydrophobic conditions or significant nutrient loss.

Design features requiring piling machinery to operate on a slash mat and on slopes less than 35%, would prevent soil disturbance in excess of guidelines.

Effects of Constructing and Decommissioning Roads and Landings
Approximately ½-mile of temporary road construction (spurs 3 and 4) would provide access for ground-based yarding in stands 655-01-038 and 655-01-072. As described in the methodology section, the impacts of this construction are accounted for in the impacts ascribed to ground-based yarding by past monitoring and modeling (Niehoff 2002). This construction and yarding would not exceed regional guidelines (Table A-1, Soils Project File).

The remaining 1.2 miles of temporary spur construction (spurs 1, 2, 6, 7 and 8) pass through areas where vegetation and fuels would not be treated, or areas associated with cable or helicopter yarding. The impacts to the soil resource were evaluated separately in these areas, as the monitoring and associated modeling of soil impacts from cable and helicopter yarding do not consider the impacts of temporary road construction in the predicted impacts from these activities.

Less than one quarter-mile of temporary spur construction (spur 8) is proposed in part of stand 655-01-008. This stand was not previously treated and the spur is needed to position a cable yarder for use in removing merchantable logs from stands 655-01-006, 655-01-008, and 655-01-021. The amount of detrimental disturbance from the construction of this temporary road was calculated and added to the amount of disturbance expected from cable yarding in these stands (Table A-1, Soils Project File). This disturbance was calculated to be 9% and would not exceed the 15% detrimental impact guideline. In addition, the proposed temporary road would be rehabilitated by full or partial recontouring, subsoiling, ripping or scarification as appropriate. Seeding, planting, and reintroduction of coarse woody debris would occur where needed as well. These measures would aid restoration of soil productivity resulting in a net improvement in soil quality.

Less than one quarter-mile of temporary road construction (spur 7) is proposed in a previously-treated portion of stand 655-01-074. This spur is needed to position a cable yarder for use in removing merchantable logs from the untreated portion of stand 655-01-074. The first third of Spur 7 would be constructed on an existing compacted skid trail. This would limit soil impacts to the same location.

Stand 655-01-074 was tractor logged in 1996 in the Big Grouse timber sale. Soil transects found existing detrimental soil disturbance of 13% in the portion of stand where road construction activities are proposed. Disturbance (mainly compaction and displacement) detected in the soil transects was associated with skid trails and landings constructed in the Big Grouse timber sale.

During logging operations, the 15% detrimental impact guideline may be temporarily exceeded due to past impacts from the Big Grouse timber sale. However, upon completion, the proposed temporary road and helicopter landing, as well as skid trails created during the Big Grouse timber sale would be rehabilitated by full or partial recontouring, subsoiling, ripping or scarification as appropriate. Additionally, seeding, planting, and reintroduction of coarse woody debris would occur where needed. These measures would aid restoration of soil productivity resulting in a net improvement in short- and long-term soil quality.

One quarter-mile of temporary spur construction (spur 6) and helicopter landing construction are proposed in part of stand 655-01-007, previously tractor logged in 1996 during the Big Grouse timber sale. This spur is needed to position a cable yarder for use in removing merchantable logs from stands 655-01-073, 655-01-025, and 655-01-059.

A helicopter landing would be constructed at an existing landing at the junction of this skid trail and road 1051. Locating the proposed temporary spur and helicopter landing on these previously disturbed soils would limit additional soil impacts stemming from these construction activities. The proposed spur would follow an existing skid trail. The disturbance on the existing skid trail and landing was accounted for in the soil transects.

During logging operations, the 15% detrimental impact guideline would be temporarily exceeded. However, as is proposed for stand 655-01-074, upon completion areas impacted during the Big Grouse Timber sale would be rehabilitated; and planting, seeding and CWD reintroduction would occur as needed. The expected result would be a net improvement in short- and long-term soil quality.

One third-mile of temporary spur re-construction (spur 2) is proposed in stand 655-01-001. This spur would be located on an existing road prism and is needed to position a cable yarder to remove merchantable logs from stand 655-01-011. Locating the proposed temporary spur on these previously disturbed soils would limit additional soil impacts stemming from these construction activities. The amount of detrimental disturbance from the construction of this temporary road was calculated and added to the amount of disturbance expected from cable yarding in these stands (Table A-1, Soils Project File). This disturbance was calculated to be 1% and would not exceed the 15% detrimental impact guideline. In addition, the proposed temporary road would be rehabilitated by full or partial recontouring, subsoiling, ripping or scarification as appropriate. Seeding, planting, and reintroduction of coarse woody debris would occur where needed as well. These measures would aid restoration of soil productivity resulting in a net improvement in soil quality.

One third-mile of temporary spur construction (spur 1) and helicopter landing construction are proposed in part of stand 655-01-003. This spur is needed to position a cable yarder to remove merchantable logs from stand 655-01-003 and access a suitable helicopter landing. The amount of detrimental disturbance from the construction of this temporary road and helicopter landing was calculated and added to the amount of disturbance expected from cable yarding in these stands (Table A-1, Soils Project File). This disturbance was calculated to be 6% and would not exceed the 15% detrimental impact guideline. In addition, the proposed temporary road would be rehabilitated by full or partial recontouring, subsoiling, ripping or scarification as appropriate. Seeding, planting, and reintroduction of coarse woody debris would occur where needed as well. These measures would aid restoration of soil productivity resulting in a net improvement in soil quality.

About 0.8 mile of road (~3.4 acres) of the existing 2233uz road would be decommissioned upon project completion. This would accelerate soil productivity recovery on currently disturbed soils.

Effects of Activities on Soil Productivity
Harvest is a one-point-in-time removal of nutrients that have been accumulated in the wood over time. Harvesting the tree bole would remove about 14 percent of the tree's potassium potentially indirectly affecting some plants. Following the management recommendations from the Intermountain Forest Tree Nutrition Cooperative (IFTNC) would minimize any additional loss of potassium and nutrients from treated areas.

Precipitation (Stark 1979) and weathering of rocks will continue to make additional nutrients available on site. Annual needle and twig fall, grass and shrub mortality have and will continue to contribute nutrients as well.

Effects of Activities on Coarse Woody Debris
Approximately 7 to 14 tons per acre of coarse woody debris (slash and logs) would be left on Douglas-fir/grand fir sites and 17 to 33 tons/acre on hemlock/cedar sites for coarse woody debris recruitment. This would provide a long-term source of nutrients and organic matter as well as protection against soil erosion (Graham et al. 1994).

Cumulative Effects

Alternative 1 – No Action
Since there would be no ground-disturbing activity under Alternative 1, there would be no activities contributing to cumulative effects.

Alternative 2 – Proposed Action

Timber Harvest - The project area has been influenced by past timber harvest activities. A hard look was taken at the potential cumulative impacts to the soil resource that would result from the combined effects of the proposed activities and the effects of past activities (Soils Project File, Table A-1).

Walkthrough surveys of areas proposed for treatment, communications with long-time local residents, and a 1936 J. Barton map indicate that harvest in the early 1900s occurred in parts of fourteen stands. Both stand exams and walkthroughs found old stumps in some areas indicating past harvest activities (project file). Onsite-assessments show that only minor soil disturbance remains from this historic logging. The combination of proposed activities and existing impacts of past activities are not expected to exceed soil disturbance guidelines in any activity area.

The TSMRS records of the project area show recent harvest occurring in fourteen stands. Two of these stands were treated in the Grouse Mountain Sagle Timber Sale (1987), and the remaining twelve were treated in the Big Grouse Timber Sale. The South Grouse project proposes treatment in only one stand (655-01-061) with a TSMRS record of past activity. Walkthrough surveys and stand records indicate that portions of this stand were thinned using a cable system in the Big Grouse timber sale. Stand 655-01-061 is proposed for re-entry to provide additional growing space around ponderosa pine, including large relics. After harvest, an underburn is planned to reduce fuels. The cumulative impacts of past harvesting and the proposed treatments are expected to be less than detrimental disturbance allowable by Regional Soil Quality Standards.

The effects of past activities including timber harvest on the soil resource were considered in the establishment of the existing condition in proposed activity areas. The anticipated effects of proposed activities were added to this existing condition and evaluated against the Regional Soil Quality Standards. The combination of proposed activities and existing impacts is not expected to exceed soil disturbance guidelines in any activity area at project completion (Soils Project File, Table A-1). Table 3-15 shows stands 655-01-007 and 655-01-074 as having greater than 15% detrimental disturbance; however, this effect will not be long lasting. During logging operations, the 15% detrimental impact guideline would be temporarily exceeded. Upon completion of logging, areas impacted during the Big Grouse Timber sale would be rehabilitated; and planting, seeding and Coarse Woody Debris reintroduction would occur as needed. The expected result would be a net improvement in short- and long-term soil quality. Disturbed areas would begin the process of recovering their full productivity potential. Other than the proposed activities, there is no ongoing or reasonably foreseeable timber harvest in the analysis area.

Road Construction – In the past, roads were constructed to provide access to lands on Grouse Mountain. Areas dedicated to system roads were removed from productivity when they were constructed, and have little to no additional effect on soils if they are properly maintained. Other than the proposed activities, there is no other ongoing or reasonably foreseeable road construction proposed in the project area. Upon field inspections of road drainage features, little evidence of sediment delivery to intermittent streams was found (see Hydrology section). Nor does the road surface show significant erosion deterioration. This is largely because this road system remains closed year around except for disabled hunting access, firewood gathering, and Forest Service administrative use. The road system would remain closed after completion of this project.

Fire Suppression – As a result of fire suppression during the last century, natural fire regimes do not exist in north Idaho (Smith and Fischer 1997, p. 27). Altering or removing the role of fire has produced significant changes in the ecosystem including the build-up of fuels. These elevated fuel levels have decreased chances of successful fire suppression, and increased the chance of intense, stand-replacing fires with the potential to damage soil resources. Under Alternative 2, the chances for successful fire suppression would be improved, as treated stands would provide a better environment for the successful

control and suppression of unwanted fires (see Fire and Fuels section). Successful fire suppression activities would limit the area burned and reduce detrimental fire effects to soil productivity. Wildfires in treated stands would likely be cooler, less intense and therefore pose a minor threat to soil quality and productivity. Fire suppression efforts would cause minor amounts of soil disturbance from fireline construction and other firefighting methods.

Wildfires - The 1910 fire burned through much of the analysis area. Aerial photos from 1935 reveal widely spaced stands and stringers of continuous forest, presumably in the draws. Clearly, this natural event initiated much of today's forest. Since then, wildfires have been small and suppressed before having any appreciable effect on the existing environment of the analysis area. Though the 1910 fire may have caused significant impacts on soils, the intervening 95 years has restored any such damage so that site investigations discovered no remnant effects.

Nutrients and Coarse Woody Debris - Past logging likely removed some nutrients and potential coarse woody debris from the proposed treatment areas. The proposed vegetation and fuel treatment activities in Alternative 2 are expected to remove site nutrients with the removal of tree boles. Certain nutrients, particularly potassium, are known to be critical for tree resistance to insects and disease, especially root-rotting organisms (Garrison and Moore 1998). However, nutrient management guidelines including maintenance of coarse woody debris (Graham et al. 1994) and overwintering of logging slash (Garrison and Moore 1998) would maintain as much nutrient capital on site as possible.

Given the limited amount of historic harvest, and historic logging methods that left limbs and tops on site, the loss of nutrients and coarse woody debris from these activities is not considered substantial enough to have cumulative effects when combined with the proposed action.

Firewood Gathering -The gathering of firewood within the project area will continue. This activity removes standing dead and down trees that contain little if any fine fuels, usually within 100 feet of open roads. With the minor amount of wood removed and small area impacted, this activity would have very little effect on the soil resource.

Conclusion: Having considered past, present, and foreseeable future actions in combination with potential effects of the proposed action, cumulatively no significant impacts are expected. Past harvesting combined with the proposed actions has the greatest potential for effects. Because of detrimental soil disturbance of the Big Grouse Timber Sale to proposed treatment areas, adjustments in logging methods were made, and mitigation measures were prescribed. These measures will ensure cumulative detrimental soil disturbance do not exceed the 15% Regional guideline threshold.

Consistency with the Forest Plan and Other Regulatory Direction

Alternative 2 would comply with Forest Plan standards and the Regional soil quality standards (FSM R1 Supplement 2500-99-1) relating to detrimentally disturbed soils.

Soil disturbing management practices, including system roads, would comply with the Forest Plan standard requiring >80% of an activity area to remain at an acceptable productivity potential (see Soils section of project file).

The Regional guidance to follow the coarse woody debris recommendations of Graham et al. (1994) would adhere to the Forest Plan standard to maintain sufficient microorganism populations to maintain long-term site productivity.

IFTNC nutrient management recommendations would ensure compliance with the Forest Plan standard to maintain of sufficient nutrient capital. Management area direction to implement Best Management Practices would be included in the proposed action.

Except for stands 65501074 and 65501007, detrimental disturbance would not exceed the recommended 15% in any individual activity area. In these stands detrimental disturbance would temporarily exceed the Regional soil quality standards. However, rehabilitation activities would result in a net improvement in short- and long term soil quality, and activity areas would meet the Regional soil quality standards. Fine organic matter layer thickness would be retained as appropriate for local conditions. Large woody debris would be maintained at recommended volumes (Graham et al. 1994) in each proposed activity area.

Aquatic Resources

Regulatory Framework

Direction for protecting water quality and fisheries comes from the following principal sources:

- National Forest Management Act
- Endangered Species Act
- State of Idaho's implementation of the Clean Water Act
- Rules Pertaining to the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code, 2000)
- Executive Orders 11988, 11990, 12962 (Floodplain Management, Protection of Wetlands, Recreational Fishing)
- Clean Water Act and amendments
- IPNF Forest Plan
- Inland Native Fish Strategy

The Biological Assessment for fisheries (Project File) provides details on the threatened, endangered, and sensitive fish species, and fish "species of concern." The hydrology report (Project File) provides details of each of these laws and regulations and how they apply to protecting hydrologic resources. The following discussion focuses on direction that is most specific and relevant to this project and analysis.

The Clean Water Act

The Clean Water Act is the primary federal law that protects the nation's waters, including lakes, rivers, aquifers, and coastal areas. Under the Clean Water Act 303(d) and the EPA regulation (40 CFR 130.2(J), 130.7), states are required to list which waters do not meet water quality standards. This list of impaired waters is commonly known as the "Section 303(d) list". The status of the streams affected by this project is contained in the existing conditions section of this report. State of Idaho IDAPA 58.01.02.054.04 requirements for medium and low priority waters are to use Best Management Practices to prohibit further impairment of the designated or existing beneficial uses.

The use of Best Management Practices (BMPs) is also required in the Memorandum of Understanding between the Forest Service and the states as part of our responsibility as the Designated Water Quality Management Agency on National Forest System lands. The Environmental Protection Agency (EPA) and the State of Idaho are responsible for regulating these standards.

The Forest Service has agreements with the State to implement Best Management Practices or Soil and Water Conservation Practices for all management activities. Proposed activities will comply with the

guidelines in the Soil and Water Conservation Handbook (Forest Service Manual 2509.22), which outlines Best Management Practices that meet the intent of the water quality protection elements of the Idaho Forest Practices Act.

Forest Plan

The Forest Plan provides goals, objectives and standards to protect watershed and aquatic resources. The hydrology report provides a list of this direction. The following standards are most applicable to this project:

- Riparian Areas will be managed to feature dependant resources (fish, water quality, maintenance of natural channels, certain vegetation and wildlife communities) while producing other resource outputs at levels compatible for the objective for dependent resources (p. II-6).
- Management activity 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 (p. II-33).
- Maintain concentrations of total sediment or chemical constituents within State standards (p. II-33).
- Implement project level standards and guidelines for water quality contained in the Best Management Practices including those defined by State regulation or agreement between the State and Forest Service (p. II-33).
- Activities within non-fisheries 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 (p. II-33). Best Management Practices (Appendix S of the Forest Plan), and riparian guidelines found in the Inland Native Fish Strategy (INFS 1995) will be used to accomplish this objective.
- It is the intent of the 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 (p. II-33).

On June 2, 2005, the Forest Supervisor signed a Decision Notice and Finding of No Significant Impact that amended the Forest Plan to modify or remove objectives, standards, and monitoring requirements pertaining to fry emergence success (USDA Forest Service 2005a). The amendment was implemented because the fry emergence objectives, standards and monitoring requirements in the Forest Plan did not contribute as well as Inland Native Fish Strategy (INFS) objectives, standards, guidelines, and monitoring direction towards meeting the goals of providing sufficient habitat in support of maintaining diverse and viable populations of fish species across the forest. In addition, because of the limited application of the fry emergence models and their unreliability, and the inability to determine fry emergence success in the field due to high variability affected by multiple natural and human-caused factors, the Forest Service was not able to state with any degree of certainty whether measures of fry emergence success were accurate or precise. Therefore, the aquatics analysis does not consider the effects of proposed activities on fry emergence success.

Inland Native Fish Strategy (INFS)

INFS provides direction for the management of fish habitat within the Interior West. The project area is not within a priority watershed for restoration, and it does not contain any perennial fish-bearing or non-fish bearing streams. However, all other water features categorized below that occur in the project area would be protected with Riparian Habitat Conservation Area (RHCA) measures as follows:

Seasonally flowing or intermittent streams, wetlands less than one 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:

- The extent of landslides and landslide prone areas
- The intermittent stream channel and the area to the top of the inner gorge
- The intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation
- For watersheds not identified as priority watersheds, the area from the edges of the stream channel, wetland, landslide, or landslide prone area, to the distance equal to the height of one-half site potential tree, or 50 feet slope distance, whichever is greater.

More information on the requirements, implementation and effectives of INFS can be found in Appendix D.

Methodology for Analysis

This analysis focuses on how the proposed action would affect the hydrologic function of these three drainages and whether the proposed action would meet Forest Plan and INFS standards and guidelines and other regulatory direction and laws. After considering the regulatory framework and the type and scope of the activities proposed, it was determined that this type of project had the potential to affect four elements that influence hydrologic function: mass failure, large woody debris, sediment delivery, and water yield. Therefore, the analysis focused on determining what the effects would be to these factors.

- **Mass Failure:** Ground disturbing activities and vegetation removal could contribute toward mass failures, which could deliver sediment into streams and degrade downstream fish habitat and water quality. The data for this analysis was based on Mass Failure Potential and District Landtype maps and field reviews. This analysis ties directly to water quality concerns with sediment delivery to the streams.
- **Large Woody Debris (LWD):** Vegetation removal close to streams could affect the recruitment of LWD for fish habitat complexity and stream channel stability. Existing conditions were evaluated in the field and compared to standard INFS RMOs.
- **Sediment Delivery:** Ground-disturbing activities could deliver sediment to stream channels and effect fish habitat and water quality. The data for this analysis was based on both sediment delivery maps and field reviews. The WEPP model was used to evaluate site-specific effects to sediment delivery from proposed units and road treatments (Elliot et al. 1999 and 1999a). This analysis ties directly to water quality and TMDL concerns with sediment delivery to the streams.
- **Water Yield:** Vegetation removal could increase water yield, which could affect stream bank stability and in-stream sedimentation. The analysis used existing GIS layers to review land management practices, road networks, geology, topography and climate regimes.

Other factors, such as how the project might affect stream temperature or water chemistry, were initially considered but were eliminated from detailed analysis because the project would clearly not impact these other items. Rationale for the analysis of issues is located in the project file.

Data and information for this analysis was gathered from existing GIS layers from the IPNF, landtype maps, field reconnaissance surveys of the project areas conducted in April of 2005, the district hydrologist, and water quality information from the Idaho Department of Environmental Quality- Water Quality Division. This data and information was used in conjunction with effects analysis provided in the soils report for this project (Project File), and model analyses using the WEPP erosion model.

Affected Environment

Existing Condition

Streams: There are no perennial fish-bearing or non-fish-bearing streams within the project area. There are no threatened, endangered, or sensitive fish or species of concern in the project area, and there is no habitat for these species. There are five mapped streams, all of which are classified as intermittent or ephemeral (Figure 3-8). These are all transport type streams (Montgomery and Buffington 1996), which naturally function as transport systems downstream for sediment and organic materials to lower gradient streams or other bodies of water. The typical stream flow pattern of this area is that spring runoff peaks in May. Half of the 31 inches of annual precipitation received in the area falls as snow. Northern Idaho experiences strong maritime influence with warm moist weather fronts invading in the winter from the Pacific Coast. “Rain-on-snow” events (warm rainfall on snow packs) are not uncommon in Northern Idaho and peak flows can be elevated when these weather events occur. Headwater channels within the project have formed in response to these processes and are resilient to these events.

The state of Idaho (Department of Water Resources) does not assign water quality standards to any of the ephemeral streams within the project area. Water quality standards may apply to intermittent streams during optimum flow period sufficient to support the uses for which the water body is designated (IDAPA 16.01.02.070.07). There are four intermittent tributary headwater channels to Fry Creek and Mirror Creek within the project area. Fry and Mirror Creeks have the default beneficial uses applied to undesignated surface waters of cold-water aquatic life and primary or secondary contact recreation wherever surface water is attainable (IDAPA 16.01.02.101.01.a). Because these intermittent tributaries also do not have designated uses, the beneficial uses that apply to Fry and Mirror Creeks only apply to the perennial portions of those stream, and not to its intermittent tributaries (IDEQ, 2005).

Fry Creek and Mirror Creeks are not currently listed as water quality limited, nor is there a TMDL for either waterbody (IDEQ, 2005). Seasonal runoff from the southeast portion of the project area does enter Pend Oreille Lake that has an approved TMDL for nutrients, with the nutrient of concern being phosphorous. In the TMDL potential sources for this near-shore pollutant are identified as residential development, septic tanks, and urban runoff (IDEQ, 2002). Forest practices are not considered a contributor of phosphorous to the lake. Nevertheless, the project will implement Best Management Practices to ensure that downstream water quality conditions are not degraded.

There are six stream crossings on the existing road system. During field reviews, all six crossings appeared to be stable and sediment delivery to the channels was not evident (Project File). There were a few instances where road cutslopes intercepted shallow groundwater flow causing water to run over the road tread during spring runoff, but none of these situations showed any signs that they were causing any resource damage or sediment delivery at the time of the field visits (see Hydrology Report in the Project File).

Landslides and Landslide Prone Areas: Erosion and sediment delivery occurs naturally in the project area as a result of landslides and erosion on stream and riverbanks. The mass failure potential and landtype mapping (see figure 3 in Hydrology Report) all indicate that a majority of the project area is at low hazard for landslides. There are 176 acres of moderate and 36 acres of high landslide potential within the project area. However, during field visits none of these areas showed any physical evidence of active or potential landslides (see project file).

Large Woody Debris: All areas visited had sufficient numbers of large woody debris (LWD) in stream channels to provide for stream stability. There was also an abundance of LWD recruitment potential from riparian stands.

Sediment Delivery: Current uses in the area such as roading, private timber harvest, and residential construction also contributes to stream sedimentation. Sediment routing in the Grouse Mountain area usually would occur in the springtime when peak flows have the potential to mobilize and transport sediment. However, field reconnaissance found no evidence of sediment reaching live streams within the project area (Project File).

Water Yield: Water yield increases are usually more evident at larger watershed scales (King 1994). The project is located in the ephemeral and intermittent headwaters of the affected stream channels. Although there were past timber harvesting activities in the area, and the region is susceptible to rain-on-snow events, there was no evidence that past activities or instantaneous peak flow events have negatively affected stream channel conditions within the project area.

Environmental Consequences

Direct and Indirect Effects

Since there is neither presence of important fish species nor habitat for such species in the project area, there would be no direct or indirect effects to fish under either alternative.

Alternative 1- No Action

There would be no direct effects resulting from the no action alternative on hydrologic resources. Since no project activities would occur under this alternative, there would be no immediate direct effect to water quality or stream channels.

Indirect effects are also unlikely under normal environmental conditions. In the event that a wildfire occurs, the riparian areas have the potential to burn at high and moderate burn severities. In this case, Riparian Conservation Areas may not meet or attain their Riparian Management Objectives for water quality and near-stream large woody debris (Neary et al 2005).

Alternative 2 – Proposed Action

Mass Failure: Mass failures can put large amounts of sediment into streams and degrade fish habitat and water quality. The potential for a mass failure to occur as a result of proposed vegetation treatments was evaluated on two levels: 1) the degree of risk that a mass failure would occur on a given piece of land, and 2) the ability for sediment to reach a water body if a mass failure did occur. The district landtype maps generally indicate the project area has a low risk for landslide prone areas with some small localized areas of moderate landslide hazard, and two areas (36 total acres) of high landslide hazard (project file). These high landslide areas are associated with oversteepened lands adjacent to incised stream channels and lakeface cliff areas. Field reviews found no evidence of landslide prone areas within the project boundaries, but mapped areas are treated as landslide prone. All units (with the exception of Units 10, 12, and 15) are located on relatively low to moderately sloped hillsides. Units 10, 12 and 15 all overlap a mapped landslide prone area, which is associated with the incised stream. This landslide prone area would be buffered with a RHCA as it could be susceptible to accelerated surface erosion if activities are not reduced or mitigated in this area. However, there was no evidence of instability.

Observations on the IPNF of past mass failures have indicated that management induced failures have primarily been attributed to roads (Niehoff 2002). However, no mass failures were observed along any road segments within the project area, and the tree harvesting that would occur with the proposed action would leave a substantial number of live trees adjacent to roads and roots from these trees would serve to provide strength to the soils. All temporary roads will be located in areas of low mass failure potential and the sites will be restored following use.

Large Woody Debris (LWD): LWD recruitment into streams was analyzed to determine if this project would retard the attainment of the LWD riparian management objective in any of the streams within the project area. The South Grouse fuels reduction project would not treat vegetation within the standard RHCA. Therefore, this project would not retard attainment of the LWD riparian management objective.

Sediment Delivery: To help determine the potential for effects from sediment delivery from the proposed project area, erosion modeling with the Water and Erosion Prediction Project (WEPP) was used (see the assumptions and limitations of the WEPP model and WEPP model runs in the hydrology section of the project file). The WEPP model output estimates for this project indicate that there would be a very low risk for sediment delivery from hillslope activities to the intermittent stem and tributaries to Fry Creek, Mirror Creek, and the unnamed tributaries to Lake Pend Oreille (Table 3-16).

Table 3-16. Estimated erosion and sediment delivery from project activities using the Disturbed WEPP model interface for hillslope activities and Road WEPP model for the road use activities

Slope Condition/Treatment	Slope (Percent)	Erosion (mean annual tons/acre for hillslope activities and lbs *disturbed* for roads; average annual calculated over 30 yrs)	Sediment Delivery (mean annual tons/acre for hillslope activities and lbs *delivered* for roads; average annual calculated over 30 yrs)
Natural Full Cover Forested	10 - 15	0	0
Natural Full Cover Forested	15 - 40	0	0
Thinned	10 - 15	0	0
Thinned	15 - 40	0	0
Rx Fire/Low Severity	10 - 15	0	0
Rx Fire/Low Severity	15 - 40	0	0
Skid Trail	0 - 10	0	0
Skid Trail	15 - 40	0.6	0
Low Use Road	0 - 4	22	2
Low Use Road	4 - 8	30	5

Erosion and sediment delivery rates are rounded to the nearest whole number and are best estimates of potential erosion from project activities.

The WEPP models combined many factors including: width of the stream buffers, distance of activities from streams, local slope (or road slope) steepness, the amount of ground cover, and the ground surface roughness (sediment storage capability) due to coarse woody debris within the buffers (Elliot et al. 1999 and 1999a). The model indicates that the use of native surfaced roads has the potential to deliver small quantities of sediment to a stream channel. The predicted volumes are relatively low (no more than 1/10th of a ton in all cases). These are estimated sediment delivery amounts and are based on 30 years of simulated rainfall erosion events. The model results should not be construed to be exactly the amount of sediment that would be delivered as a result of project activities, but the results can be utilized as conservative estimates.

Various studies (Burroughs and King 1989, Ketcheson and Megahan 1996) have found that water quality is not affected where vegetative buffer distances exceed sediment delivery length. With implementation of RHCA boundaries, Best Management Practices (BMPs), and other project design features (see Appendix C), the risk of sediment delivery to stream channels would be reduced even further or fully

avoided. Therefore, it is not expected that sediment delivery from project activities will have a substantial effect on water quality or stream stability.

Since sediment delivery estimates are so low, and the implementation of BMPs and other project design features will further reduce sediment delivery, there are no anticipated direct or indirect effects from sediment being delivered to the stream from the proposed project. What little sediment *may* be delivered to the stream will not be of sufficient quantity to degrade water quality, compromise channel stability, or alter channel morphology locally, or down stream. Because there are no local beneficial uses of water and the effects of sediment delivery from the project area would decrease as it is routed through the hydrologic system, there is no potential for impairment of beneficial uses of water further down stream where perennial flows are attained and beneficial uses are identified.

Water Yield: A large increase in water yield has the ability to cause in-stream sedimentation from streambank erosion. Water yield describes the changes in the rate, frequency, and timing of water flows in a watershed due to climatic events such as rainfall and snowmelt (USCOE 1998). In general, water yield increases may occur within drainages when infiltration, transpiration, and runoff patterns are altered. There is an extensive amount of literature documenting the increase in water yield in drainages after extensive roading (Harr 1980) and large-scale removal of vegetation (Hibbert 1965, Troendle 1987, Cline et al. 1977). Construction of forest roads can alter the hillslope hydrology by causing surface flows in areas far away from established channels. Furthermore, watersheds with dense road networks commonly experience increased sedimentation and peak flows (Ketcheson and Megahan 1996).

The proposed action does include several units of regeneration and mixed harvests. These treatments are proposed in response to vegetation conditions including deprivation by insects and disease. Stand conditions in these areas are generally not sustainable (See Vegetation Section) and the amount of canopy is expected to decrease with, or without treatment, so the net effect of the regeneration harvests on water yield would be similar to the no action alternative. Also, there is no morphological evidence that any past activities or instantaneous peak flow events that commonly occur with rain on snow events have overwhelmed stream channels within the project area. Furthermore, the overall acreages of the proposed regeneration treatments are less than 5 percent of the whole project area. In all cases, the total percentage of canopy cover change within all affected subwatersheds is less than three percent and would not cause any measurable change in water yield for any of the subwatersheds.

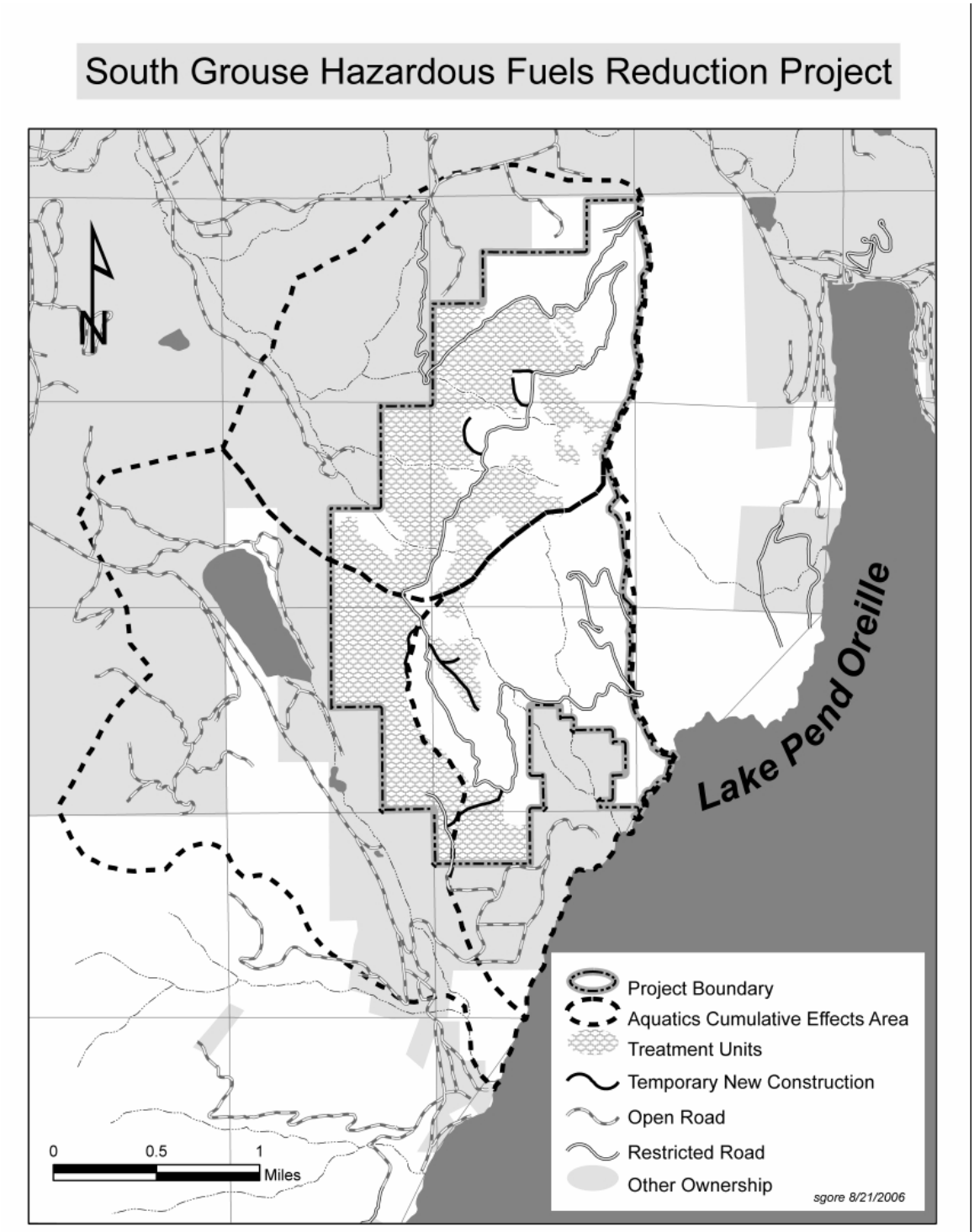

Figure 3-8. Cumulative effects area for watershed analysis in the South Grouse Project.

Cumulative Effects
The cumulative effects area for the South Grouse Fuels Reduction Project is the affected subwatersheds as displayed in Figure 3-8. This cumulative effects boundary was chosen for analysis because it is the smallest area that contains all the project treatments within whole hydrologic boundaries. However, it is not so big as to contain large areas of lightly managed or unmanaged lands that would potentially dilute the effects the analysis would demonstrate.

Past activities such as the 1910 fire and older timber harvest activities (older than 30 years) on public and private lands were not included in analysis because rainfall/snowfall interception, infiltration, and runoff regimes of the affected subwatersheds have recovered from those activities and events. Stream channel stability and function would be one area where lingering effects could be found, but the project area only has a few ephemeral/intermittent stream channels, all of which were found to be in good stable condition. It is not expected that there would be any cumulative impact contribution from older activities or events (Project File).

Alternative 1 – No Action
There would be no cumulative effects to aquatic resources resulting from Alternative 1 as no activities would be implemented to create a cumulative effect.

Alternative 2 – Proposed Action
The direct and indirect effects analysis of the proposed action indicated that there no measurable or foreseeable impacts from the project activities on mass failure, large woody debris, sediment delivery, water yield, fish and fish habitat. Therefore it follows that there would also be no cumulative impacts from the implementation of Alternative 2.

Compliance with the Forest Plan and Other Regulatory Direction

Both alternatives would comply with the Forest Plan and other regulatory direction (see Appendix C and the Hydrology Report in project file). The direct, indirect, and cumulative effects analyses indicate that there would not be any effect to the long-term productivity of the water resource. State water quality standards would be met.

Under the proposed action, the use of best management practices, mitigation measures, and INFS standards and guidelines will help to keep direct and indirect effects at minimal levels. The WEPP erosion model was used to estimate sediment delivery to stream channels. The model results were considered and balanced with site visit information, monitoring, current research, and professional judgment. The direct, indirect, and cumulative effects analyses indicate there would not be any sediment delivery to stream channels that would cause the project to violate State standards or affect any adjacent public water systems. The risk of any adverse effects to downstream fish, or fish habitat is low because there are no perennial streams contributing to fisheries and little possibility for project activities to contribute detrimental sediment to any intermittent or ephemeral tributaries of fishbearing streams.

Visual Quality

Regulatory Framework

Forest Plan Standards for Visual Quality
The Forest wide standard for visual quality is to meet Forest Plan visual quality objectives as stated on page II-25 of the Forest Plan (USDA Forest Service 1987).

The visual resource was evaluated based on visual sensitivity levels assigned to travel routes, use areas, and water bodies in and adjacent to the Idaho Panhandle National Forests. Viewpoints near the project area include middle ground viewing from the Sagle Road (sensitivity level 2 - moderate concern); foreground from Lake Pend Oreille (sensitivity level 1 - high concern); background from Highway 200 (sensitivity level 1 – moderate concern) and foreground viewing from the Sagle Creek Road (sensitivity level 2 - moderate concern).

Visual quality objectives (VQOs) are primarily partial retention with some modification and retention (foreground viewing from the lake). Partial retention is defined as "human activities may be evident, but must remain subordinate to the characteristic landscape." Activities in retention must not be evident. Modification is defined as "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 background or middleground."

Forest Plan standards for Management Area 1 and 4 specify that areas not designated as retention or partial retention be managed as modification or maximum modification. Areas in Management Areas 1, 4 and 9 not meeting VQOs would be brought up to standard when cost-effective to do so. Maintaining the existing visual situation in Management Area 9 areas, visible from Lake Pend Oreille, in an unchanged condition is a major concern.

Methodology for Analysis

The cumulative effects analysis area is the viewshed within the project area and adjacent National Forest System and private lands that can be seen from the viewpoints discussed above.

VQOs were assessed using guidelines contained in Agricultural Handbook 701: Landscape Aesthetics: A Handbook for Scenery Management (USDA Forest Service 1995a).

Affected Environment

Existing Condition
Landscape character is an overall visual and cultural impression of landscape attributes (e.g. uniform, closed canopy and openings in the overstory vegetation). The character of the project area is a natural appearing, forested environment, with interspersed meadows and rock outcrops.

Timber harvesting and road construction on adjacent private lands left a landscape influenced by man's activities with evidence of skid corridors and unnatural appearing openings in the forest canopy. Evidence of these activities is small in scale, is not dominant, but leaves the impression that the landscape has been altered somewhat.

Sensitivity levels are a measure of the public's concern for scenic quality of the National Forests. Three sensitivity levels are used. Each identifies a different level of user concern for the visual environment. Level 1 is of highest concern and level 3 is lowest. Portions of the project area are seen from Highway 2 and the Pend Oreille River; both are sensitivity level 1 viewpoints. Other portions of the project area are

not seen from these viewpoints but can be seen from lower sensitivity level viewpoints like county roads with much less traffic and fewer potential viewers.

Scenic integrity indicates the degree of intactness and wholeness of the landscape character. Scenic integrity levels ranges include unacceptably low (extremely altered), very low (heavily altered), low (moderately altered), moderate (slightly altered), high (appears unaltered), and very high (unaltered). When viewed from the sensitivity level 1 viewpoints, the project area landscape appears slightly altered, with a "moderate" scenic integrity.

Environmental Consequences

Timber harvest, road construction, and fuel treatments can affect the appearance of a forested landscape due to the contrast between natural appearing landforms and vegetation and those modified by management activities. These changes are often expressed in terms of form, color, line, and texture. Visual effects generated by timber removal and associated activities will vary in duration and intensity according to the amount of vegetation cover left and the color, shape, and size of any alterations in cover. If the alterations repeat colors, shapes and sizes of natural occurring openings, then the effects will be minor and short-lived. If the activities introduce unnatural colors, and large shapes then visual impacts will be more easily discernable and longer-lived.

Direct and Indirect Effects

Alternative 1 – No Action

With no timber harvest or road construction there would be no effects to the scenic integrity of the area. The character and scenic integrity would remain the same in the absence of natural or human-caused disturbances. Over the long term, the increasing vulnerability to wildfire due to continued tree mortality and fuels accumulations increases the risk of change to the scenic condition.

Alternative 2 – Proposed Action

Management activities are designed to meet the VQOs assigned by the Forest Plan. The proposed cutting prescriptions call for commercial thinning, regeneration harvest and a mix of thinning and regeneration harvests, with some reserve areas. When viewed from an oblique vertical angle from sensitivity level 1 viewpoints, tree crowns tend to "stack up" and obscure seeing the ground. The current uniform texture of the tree canopy would change to a somewhat mottled texture. Timber harvest would not result in a discernable change in form, line, and color over most of the project area.

One exception to this would be the upper slopes of the area planned for an irregular shelterwood harvest in stand 655-01-003. The view angle into this area is more acute. The top of this area would be visible from viewpoints further out in Lake Pend Oreille after harvest. The vegetation removal here would be designed to repeat the form, line, color, and texture of the natural occurrences common to the surrounding areas by creating small openings that are irregular in shape and similar in size to the natural openings on the landscape.

The proposed road construction would not be visible from sensitivity level 1 areas. The proposed roads would be located on gentle ground where many tree crowns between the observer and the roads will obscure the view. The VQO of partial retention would be met.

Cumulative Effects

The analysis area includes the project area, private land adjacent to the project area, lands especially along roads from where the proposed project area is visible and Lake Pend Oreille.

Alternative 1 – No Action

Because tree density would not be reduced in the short-term, the contrast between adjacent private land and the National Forest land would remain the same.

As adjacent landowners cut trees and build houses and roads, more contrast would be created between the project area and its surroundings. Inside and outside of the project area, insects, disease, and possibly wildfires are expected to cause tree mortality, introducing a small change in the form, color, and texture. None of these changes is expected to be typically discernable to the casual observer. However, a stand-replacing wildfire may be very apparent to the public.

Alternative 2 – Proposed Action

Because privately owned land adjacent to the project area has been altered somewhat, there is an existing contrast between the National Forest and adjacent lands, particularly west and north of the project area. Activities proposed in this project would reduce the stand density within the project area and create a more mottled texture in some areas. This would reduce the contrast between the National Forest and privately owned lands.

Activities considered in the cumulative effects analysis for visual quality include past timber harvest, road construction, wildfires, and fire suppression. The size and placement of past cutting units and road construction on National Forest lands considered the view from both Lake Pend Oreille and Sagle road. Activities were primarily shelterwoods and commercial thins in middle and background views from the lake on relatively gentle slopes. This created mottled textural differences between interspersed areas of less dense forest and small openings within a more densely forested landscape. From Sagle Road, much of the area is obscured from view by adjacent forest stands. The area is viewed as background along this route from the meadows and farmlands in the valley below.

Past wildfire resulted in a more homogeneous landscape of younger even-aged densely stocked stands, and less visual variety than what may have existed under historical pre-settlement conditions. Fire suppression has largely maintained this condition. A major wildfire could adversely affect the scenic quality with a dramatic change in color of tree boles and canopy and by making roads visible from the viewpoints. Activities on adjacent private land could also reduce the scenic quality, depending on what they are. Heavy timber removal abutting National Forest ownership lines could result in a more noticeable contrast in size and shape of openings that would affect the view.

Inside and outside of the project area, insects and disease are expected to cause tree mortality, which would create a change in color and texture over time. Without a major wildfire, none of these changes is expected to be readily discernable to the casual observer.

Consistency with the Forest Plan and Other Laws and Regulation

Both alternatives would meet visual quality objectives established in the Forest Plan, and both alternatives are consistent with Forest Plan goals and standards for visual quality.

Economic Feasibility

The effect on project feasibility is determined by an appraisal process that estimates the value of proposed management activities under the action alternative, in this case the Proposed Action. All proposed management activities are linked to the sale of commercial forest products (i.e., a timber sale).

Regulatory Framework

The Forest Plan and other agency policies imply the need to develop viable projects. However, there is no direction regarding degree of viability; or of profit required.

Methodology for Analysis

Different revenues and costs are associated with the management activities under each alternative. To arrive at the expected predicted high bid, a Transaction Evidence Appraisal (TEA) was used to determine the potential value (referred to as "stumpage") of trees removed. The TE appraisal method predicts the value using several independent variables developed from recent similar sales within Region 1 of the Forest Service (northern Idaho and western Montana). Since the information used is from actual bidding, current local market conditions and production costs for logging and milling are reflected in the predicted rate.

Cost averages were used for fuel reduction, site preparation and planting (including overhead), and grass seeding. Site -specific Forest Service cost data were used for road construction/reconstruction, and maintenance. Costs for road construction, road maintenance, reforestation, mitigation and other direct costs are deducted from the expected stumpage value. The costs of upgrading exiting road to further reduce long-term risks to the watershed are included in the road maintenance costs.

Non-commodity values were not included in this analysis because these resources are evaluated under each specific resource section. Title 40, Code of Federal Regulations for NEPA (40 CFR 1502.23) states, "For the purposes of complying with the Act, 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." Qualitative effects on resources are documented in individual resource sections.

This analysis focuses on the direct and indirect effects of proposed activities. Past, present and reasonably foreseeable activities on National Forest and other lands within the project area would not have an effect on the economic issues for these alternatives. Therefore, there would be no cumulative effects.

Affected Environment

Timber sale value is affected by the size and quantity of trees harvested, species mix, methods of harvest, slash and reforestation costs, and road costs. Other factors affect sale viability as well, but these are among the most significant. External factors affecting viability are market forces that influence the private sectors ability to purchase federal timber. Imports from other countries, improved mill efficiency, loss of competition due to mill closures and other factors have caused stumpage prices to decline in recent years over much of the United States. However, stumpage for federal timber has remained relatively higher in the northern Idaho than other parts of the country.

Environmental Consequences

Direct, Indirect, and Cumulative Effects

Alternative 1 – No Action

Since no trees would be cut and sold with this alternative, there would be no monetary costs or revenues. Not managing the forest vegetation in this area would result in a loss of productivity over the long-term due to insect and disease mortality, and a loss of opportunity to provide usable wood products from merchantable-sized trees. This alternative does not include a timber sale. Therefore, it has no bid value.

Alternative 2 – Proposed Action

The predicted high bid reflects the road costs; environmental protection costs, logging costs, volumes, and silvicultural prescriptions. This figure uses the value of timber removed (based on size, species and volume), yarding methods used and hauling distances. Logging, hauling, and contractual work (clean-up, fire line construction, fuel treatment, grass-seeding, and road decommissioning) costs are deducted from the value of the timber.

Using a timber sale to accomplish project objectives would be economically viable under this alternative. The predicted high bid for the Proposed Action is a total sale value of **$418,220** (project file). Based on this value the proposed action is considered viable.

Consistency with the Forest Plan and Other Laws and Regulations

Forestwide goals, objectives, and standards for economic feasibility are not specifically addressed in the Forest Plan. This issue was 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 lifestyles. 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 wood products industry" (Forest Plan, p. II-11). The action alternative would meet this direction.

The No Action alternative is neutral with respect to the forest plan because the plan does not require action based on economic return. The plan only sets guidance for implementing activities (i.e., a proposed action).

Environmental Justice and Civil Rights

Regulatory Framework

Executive Order 12898, issued in 1994 orders Federal Agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations. The Order also directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife.

The Civil Rights Act of 1964 provides for nondiscrimination in voting, public accommodations, public facilities, public education, federally assisted programs, and equal employment opportunity. Title VI of the Act, Nondiscrimination in Federally Assisted Programs, as amended (42 U.S. C. 2000d through 2000d-6) prohibits discrimination based on race, color, or national origin.

Affected Environment

State of Idaho 2000 census data reported 36,835 people living in Bonner County. Demographically, Bonner County is 96.6% Caucasian, 1.6% Hispanic/Latino, .9% Native American, 0.9% other races or mixed races.

Census data reported that the 1999 per capita personal income was $17,263 for Bonner County (rank = 11th in state). The statewide unemployment rate in 2000 was 5.8% and Bonner County was 7.3%.

Environmental Consequences

None of the alternatives restrict or alter opportunities for subsistence hunting and fishing by Native American tribes. Tribes holding treaty rights for hunting and fishing on the Idaho Panhandle National

Forest were included on the project mailing list and have the opportunity to provide comments on this project.

Implementing the proposed action alternative would create more employment and income opportunities than by implementing the no action alternative. Implementation of the proposed action alternative 2 would not likely adversely affect minority or low-income populations. The proposed activities would not result in demographic changes such as displacement of minorities, geographic changes such as land use, or economic hardship such as an increase in taxes. The proposed action would not have negative effects on public health. Conversely, beneficial effects such as increased opportunities for employment would occur. Timber sale and TSI contracts would be offered without prejudice toward any particular group, under federal laws, regulations and policies.

List of Preparers

This section includes a list of preparers of the environmental document. The following individuals were primarily responsible for developing and reviewing the environmental analysis.

Line Officer Direction

Richard P. Kramer, District Ranger, Sandpoint Ranger District

Interdisciplinary Team Members

Sandpoint Ranger District

- Chad BaconRind (Fisheries Biologist)
- Jim Barrett (Silviculturist)
- Sandy Gore (GIS specialist)
- Jason Gritzner (Hydrologist)
- Anna Hammet (Botanist)
- A.J. Helgenberg (Forester)
- Luke Hixson (Forester)
- Angelic Koch (Fuels Specialist)
- David Roberts (Wildlife Biologist)
- Gina Rone (IPNF Soil Scientist)
- Tom Sandberg (Archaeologist)

TEAMS Enterprise Unit

- Chris Tootell (Project Team Leader)
- Allison Kuehl (Wildlife Biologist)
- Cavan Maloney (Hydrologist)
- Judy York (Writer-Editor)

Agencies and Organizations Consulted

Federal, State, and Local Agencies

- US Fish and Wildlife Service (FWS)
- Idaho Department of Environmental Quality
- Idaho Department of Parks and Recreation
- Idaho Department of Fish and Game
- Kalispel, Coeur d'Alene, and Confederated Salish and Kootenai Tribes
- Bonner County Urban Interface Fire Mitigation Committee (BONFIRE)
- Idaho Department of Lands

Other Organizations and Groups

- Idaho Native Plant Society, Kinnickinnick Chapter
- Adjacent landowners and interested individuals
- Northwest Access Alliance
- Idaho Conservation League
- Selkirk Conservation Alliance
- Kootenai Environmental Alliance
- The Lands Council

References

Abella, Scott R. and Neil W. MacDonald. 2000. Intense burns may reduce spotted knapweed germination. In: Ecological Restoration. 18(2): 203-204. In: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Agee, James K., and Carl N. Skinner. 2005. Basic principles of forest reduction treatments., Available online at: http://www.sciencedirect.com., p. 4

Allen, Karen and Katherine Hansen. 1999. Geography of exotic plants adjacent to campgrounds, Yellowstone National Park, USA. In: The Great Basin Naturalist. 59(4):315-322. In: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Allen, Michael F. 1991. The ecology of mycorrhizae. Cambridge University Press. Cambridge, U.K.

Amaranthus, M. P.; J. M. Trappe, and R. J. Molina. 1989. Long-term forest productivity and the living soil. In: Maintaining the long-term productivity of Pacific northwest forest ecosystems. D. A. Perry, ed. pp. 36-49.

Anderson, Hal E., 1982. Aids to determining fuel models for estimating fire behavior. USDA, Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. Gen. Tech. Rep. INT-GTR-122, April 1982. 22 pp.

Aney, W.C. and B.R. McClelland. 1990. Pileated woodpecker habitat relationships. In: Warren, N.M., ed. 1990. Old-growth habitats and associated wildlife species in the northern Rocky Mountains. USDA Forest Service, Northern Region Wildlife Habitat Relationships Program, R1-90-42. p 10-18.

Arno, Stephen F. 1996. The concept: restoring ecological structure and process in ponderosa pine forests. *In*: Hardy, Colin C. and Stephen F. Arno, eds. 1996. The use of fire in forest restoration. Gen. Tech. Rep. INT-GTR-341. U.S. Department of Agriculture Forest Service Intermountain Research Station. Ogden, Utah. pp. 37-38.

Baker, T.G., G.M. Will, and G.R. Oliver. 1989. Nutrient release from silvicultural slash: leaching and decomposition of Pinus radiata needles. For. Ecol. and Mgmt, 27:53-60.

Balda, R. P. 1967. Ecological relationships of the breeding birds of the Chiricahua Mountains, Arizona. Ph.D. diss., Univ. of Illinois, Urbana. Quoted in Ghalambor, C. 2003. Conservation Assessment of the Pygmy Nuthatch in the Black Hills National Forest, South Dakota and Wyoming. USDA Forest Service, Rocky Mountain Region, Black Hills National Forest.

Barton, John. 1936. Map of timber sales on the Kaniksu National Forest. Available from South Grouse project files.

Bedunah, Don and Jeff Carpenter. 1989. Plant community response following spotted knapweed (*Centaurea maculosa*) control on three elk winter ranges in western Montana. *In:* Fay, Peter K.; Lacey, John R., eds. Proceedings of the knapweed symposium; 1989 April 4-5; Bozeman, MT. Montana State University: 205-212. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Briese, D.T. 1996. Biological control of weeds and fire management in protected natural areas: are they compatible strategies? In: Biological Conservation. 77(2-3):135-142. In: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

Briese, D.T. 1997. Population dynamics of St. John's wort: past, present and future. In: Jupp, Paul W.; David T. Briese; Richard H. Groves, eds. St. John's wort: Hypericum perforatum L. - integrated control and management: Proceedings of a workshop; 1996 November 13-14. Canberra, Australia. In: Plant Protection Quarterly. 12(2): 59-63. In: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

Bonner County Wildland Urban Interface Fire Mitigation Committee. 2004. Wildland/Urban Interface Fire Mitigation Plan for Bonner County, Idaho. Available at: http://www2.state.id.us/lands/nat_fire_plan/county_wui_plans/bonner/bonner_county_plan.htm

Bull, E.L. 1989. Pileated woodpecker (*Dryocopus pileatus*). In: Clark, T.W., A.H. Harvey, R.D. Dorn, D.L. Genter, and C. Groves, eds. 1989. Rare, sensitive and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, the Nature Conservancy, and the Mountain West Environmental Services. p 87.

Bush, R., and Lundberg, R. 2006 “Estimates of Old Growth Percentages and Snag Density on the Idaho Panhandle National Forest.” USDA Forest Service, Region 1, Forest and Range Management, 200 E Broadway, Missoula, MT, 59802.

Burroughs, E.R. and J.G. King. 1989. Reduction of soil erosion on forest roads. USDA Forest Service, Intermountain Research Station GTR-INT-264. pp. 18.

Burroughs, Edward R. Jr.; Watts, Frederick J.; King, John G.; [and others]. 1985. Relative effectiveness of fillslope treatments in reducing surface erosion, Horse Creek Road, Nezperce National Forest, Idaho. Moscow, ID: USDA-Forest Service, Intermountain Forest and Range Experiment Station, Forestry Sciences Laboratory. 33 p.

Buskirk, S.W. and L.F. Ruggiero. 1994. American marten. In: Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen. Tech. Rep. RM-254. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. p 7-37.

Campbell, M.H. and E.S. Delfosse. 1984. The biology of Australian weeds. 13. *Hypericum perforatum* L. *In:* The Journal of the Australian Institute of Agricultural Science. 50(2):63-73. *In:* Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

Clark, T.W. and D. Casey. 1989. American marten (Martes americana). In: Clark, T.W., A.H. Harvey, R.D. Dorn, D.L. Genter, and C. Groves, eds. 1989. Rare, sensitive and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, the Nature Conservancy, and the Mountain West Environmental Services. p 113-114.

Cline, Richard G., Harold F. Haupt and Gaylon S. Campbell. 1977. Potential water yield response following clearcut harvesting on north and south slopes in northern Idaho. USDA Forest Service Research Paper INT-191. Intermountain Forest and Range Experiment Station Forest Service, US Department of Agriculture. 16 pgs.

Cook, M.J. and J.G. King. 1983. Construction Cost and Erosion Control Effectiveness of Filter Windrows on Fill Slopes. USDA Forest Service Research Note, INT-335; FSH 7709.56b.

Council on Environmental Quality. 2005. CEQ Memorandum to the Heads of Federal Agencies regarding Guidance on the consideration of past actions in cumulative effects analysis, June 24, 2005. Available from the project files.

Crane, M. F. and William C. Fischer. 1986. Fire ecology of the forest habitat types of central Idaho. General Technical Report INT-218. USDA Forest Service Intermountain Research Station. Ogden, UT. 85 pp. *In:* Fire Effects Information System. Species profile for oceanspray (*Holodiscus discolor*). Online at http://www.fs.fed.us/database/feis/plants/shrub/holdis/all.html.

DeBano, L.F. 1981. Water repellant soils: a state-of-the-art. Gen. Tech. Rep. PSW-46, Pacific Southwest Forest and Range Exp. Stn., USDA Forest Service, Berkeley, CA. 21 pp.

DeBano, L.F. 1991. The effect of fire on soil properties. In: Proceedings--Management and Productivity of Western Montane Forest Soils. Harvey, A and L. Neuenschwander, compilers. Gen. Tech. Rep. INT-280. USDA, Forest Service, Intermountain Research Station. pp. 151-155.

Debano, L.F., D.G. Neary, and P.F. Folliott. 1998. Fire's effects on ecosystems. John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158-0012.p 56, 57

DiTomaso, Joseph M. 2000. Invasive weeds in rangelands: species, impacts, and management. *In*: Weed Science. 48(2)255-265. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Drlik, T.; I. Woo and S. Swiadon, editors. 1998. Integrated vegetation management guide. Bio-Integral Resource Center. Berkeley, Ca. 16 pp.

Dudley, J., and V. Saab. 2003. A field protocol to monitor cavity-nesting birds. Research Paper RMRS-RP-44. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 16 p.

Edmonds, R.L. 1987. Decomposition rates and nutrient dynamics in small diameter woody litter in four ecosytems in Washington, USA. Ca. J. For. Res. 17: 449-509.

Elliot, Bill et al. 1999. WEPP: ROAD (Draft 12/1999). WEPP interface for predicting Road Runoff, Erosion, and Sediment Delivery. Technical Documentation. USDA Forest Service Rocky, Mountain Research Station and San Dimas Technology and Development Center. http://forest.moscowfsl.wsu.edu/fswepp/docs/wepproaddoc.html

Elliot, Bill et al. 1999a. WEPP: Disturbed (Draft 02/2000). WEPP interface for Disturbed Forest and Range Runoff, Erosion, and Sediment Delivery. Technical Documentation. USDA Forest Service Rocky, Mountain Research Station and San Dimas Technology and Development Center. http://forest.moscowfsl.wsu.edu/fswepp/docs/distweppdoc.html

Ellis, Mark W., Ronald J. Taylor and Richy Harrod. 1999. The reproductive biology and host specificity of *Orobanche pinorum* Geyer (Orobanchaceae). *In:* Madrono, Volume 46:1. pp 7-12.

Evans, David and Associates. 2005. Conservation assessment of eleven sensitive moonworts (Ophioglossaceae; *Botrychium* subgenus *Botrychium*) on the Idaho Panhandle National Forests. Spokane, Washington.

Executive Order 13112. 1999. Invasive species. Order by President Bill Clinton to prevent the introduction of invasive species and provide for their control. Signed February 3, 1999. Washington D.C.

Fire Effects Information System. 2005. Summaries of the biology, ecology and relationship of living organisms to fire. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Flatten, B. 2003. Determining appropriate winter logging conditions for protection of the soil resource. Okanogan and Wenatchee NF, Dec. draft.

Garrison, M.T., and J.A. Moore. 1998. Nutrient management: a summary and review. In: Intermountain Forest Tree Nutrition Cooperative Supplemental Report 98:5.

Ghalambor, C. 2003. Conservation Assessment of the Pygmy Nuthatch in the Black Hills National Forest, South Dakota and Wyoming. USDA Forest Service, Rocky Mountain Region, Black Hills National Forest.

Graham, R.T., A.E. Harvey, M.F. Jurgenson, T.B. Jain, J.R. Tonn and D.S. Page-Dumroese. 1994. Managing coarse woody debris in forests of the Rocky Mountains. USDA Forest Service Intermountain Research Station. Research paper INT-RP-477.

Graham, Russel T., Alan E. Harvey, Theresa B. Jain, and Jonalea R Tonn. 1999. The effects of thinning and similar stand treatments on fire behavior in Western forests. September, 1999. p.20

Graham, Russell T, R. L. Rodriquez, K. M. Paulin, R. L. Player, A. P. Heap, and R. Williams. 1999a. The northern goshawk in Utah: habitat assessment and management recommendations. Gen. Tech. Rep. RMRS-GTR-22. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 48pp.

Graham, R.T.; S. McCaffrey and T.B. Jain, eds. 2004. Science basis for changing forest structure to modify wildfire behavior and severity. Research paper RMRS-GTR-120. USDA Forest Service Rocky Mountain Research Station.

Green, P., J.D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old-growth forest types of the Northern Region. R-1 SES 4/92; Northern Region. Missoula, MT.

Gunter, D. and Keene R. 2005. Personal Communication regarding historic harvest and associated practices on Grouse Mountain

Hagle, Sue, 2000. Personal communication with Don Gunter, district silviculturist, regarding root disease. Sue Hagle is a Northern Region Forest Pathologist. 3 pp.

Hammet, Anna E. and Robert Klarich. 1996. Personal observations that oxeye daisy (*Leucanthemum vulgare*) has the ability to spread into areas with canopy reduction to below approximately 55 percent.

Hammet, Anna E. 1991-2005. Personal observations of the project botanist concerning earliest emergence of sensitive moonworts (*Botrychium* subgenus *Botrychium*) during 15 years of rare plant surveys and monitoring on the Kaniksu portion of the Idaho Panhandle National Forests.

Hammet, Anna E. 1999-2005. Personal observations of weed infestation levels on roads and old harvest units in the West Gold project area, noting an overall decline in population density of weed species along road prisms in the project area after initial and follow-up treatments. A summary is in the project file.

Hammet, Anna E. 2004. Personal observations of the effectiveness of weed treatments on Forest Road 1051 in the South Grouse project area. Observations made during field trips to the project area with the interdisciplinary team.

Hann, Wendel J. and Bunnel, David L. 2001. Fire and Land Management Planning and Implementation Across Multiple Scales.

Harpel, Judy. 2002. Personal communication between Gifford Pinchot National Forest botanist and IPNF North Zone botanist regarding habitat requirements and abundance of *Buxbaumia viridis* in western Washington.

Harr R. Dennis. 1980. Streamflow after patch logging in small drainages within the Bull Run Municipal Watershed, Oregon. USDA Forest Service. Pacific Northwest Forest and Range Experiment Station. Res. Paper: PNW-268. March 1980. 17 pages.

Harris, P. and R. Cranston. 1979. An economic evaluation of control methods for diffuse and spotted knapweed in western Canada. Canadian Journal of Plant Science. 59:375-382. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Harris, J.A. and A.M. Gill. 1997. History of the introduction and spread of St. John's wort (*Hypericum perforatum* L.) in Australia. *In:* Jupp, Paul W.; David T. Briese; Richard H. Groves, eds. St. John's wort: *Hypericum perforatum* L. - integrated control and management: Proceedings of a workshop; 1996 November 13-14. Canberra, Australia. *In:* Plant Protection Quarterly. 12(2): 52-56. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

Harrison, R.D.; N.J. Chatterton and R.J. Page [and others]. 1996. Effects of nine introduced grasses on ecological biodiversity in the Columbia Basin. *In:* Rangelands in a sustainable biosphere: Proceedings, 5th international rangeland congress; 1995 July 23-28; Salt Lake City, UT and Denver, CO. *In:* Society for Range Management: 211-212. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Harvey, Alan E. 1994. Interactions between forest health and the carbon cycle: Inland Northwest American and Global Issues, A paper presented at the Forest Health Working Group session at the SAF National Convention held at Anchorage, Alaska, on September 18-22, 1994, p 87.

Harvey, Stephen J. and Robert M. Nowierski. 1989. Spotted knapweed: allelopathy or nutrient depletion? *In:* Fay, Peter K and John R. Lacey, eds. Proceedings: knapweed symposium; 1989 April 4-5. Montana State University. Bozeman, MT. p. 118. *In:* Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Hayward, G.D. and J. Verner, tech. eds. 1994. Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest, and Range Experiment Station. p 14-41.

Hayward, G.D. and R.E. Escano. 1989. Goshawk nest-site characteristics in western Montana and northern Idaho. The Condor 91:476-479.

Healthy Forest Initiative. 2002. Available at: http://www.fs.fed.us/projects/hfi/background.shtml

Healthy Forests Restoration Act. 2003. Available at: http://www.fs.fed.us/projects/hfi/background.shtml

Hejl, S.J. 1994. Human-induced changes in bird populations in coniferous forests in western North America during the past 100 years. Studies in Avian Biology No. 15:232-246.

Hibbert, Alden R. 1965. Forest Treatment Effects on Water Yield. International Proceedings on Forest Hydrology. Proceedings of a National Science Foundation Advanced Science Seminar held at The Pennsylvania State University, Pennsylvania. August 29 through September 10, 1965. pp. 527-543.

Hitchcock, C. Leo, Arthur Cronquist, Marion Ownbey and J. W. Thompson. 1959. Vascular Plants of the Pacific Northwest. Part 4: Ericaceae through Campanulaceae. University of Washington Press. Seattle, WA. Page 432.

Hobbs, Richard and Stella E. Humphries. 1995. An integrated approach to the ecology and management of plant invasions. In: Conservation Biology 9(4): 761-770.

Huffmann, E.L., L.H. MacDonald, and J.D. Stednick. 2001. Strength and persistence of fire-induced soil hydrophobicity under ponderosa and lodgepole pine, Colorado Front Range. Hydrol. Process. 15: 2877-2892.

Hutto, Richard L. 1995. USFS Northern Region Songbird Monitoring Program: Distribution and Habitat Relationships. USFS contract # R1-95-05, Second Report. University of Montana Missoula. 119 pp.

ICDC. 2005. Idaho Dept. of Fish and Game Conservation Data Center. Element Occurrence Records contained in an electronic database. Boise, Idaho.

IDEQ. 2002. Lake Pend Oreille Total Maximum Daily Load for Nutrients for the Nearshore Waters of Pend Oreille Lake, Idaho. Idaho Department of Environmental Quality. Boise, Idaho.

IDEQ. 2005. Principles and Policies of the 2002 Integrated [303(d)/305(b)] Report. Idaho Department of Environmental Quality. Boise, Idaho.

Idaho Department of Fish and Game. 2004. White-tailed Deer Progress Report, Study I, Job 3. Project W-170-R28. Boise, Idaho 45p.

Idaho Partners in Flight. 2000. Idaho bird conservation plan. Version 1.0. Hamilton (MT): Idaho Partners in Flight. 36 p.

James, Robert L., 2005. Plant pathologist trip report, South Grouse Hazardous Fuels Reduction Project.

Johnson-Groh, C. L., and D. R. Farrar. 1989. [Abstract] Ecological monitoring of *Botrychium campestre* and a new species of *Botrychium* in western Minnesota. Unpublished report on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise, ID.

Johnson-Groh, C. L., and D. R. Farrar. 1993. Population dynamics of prairie moonworts (*Botrychium* subgenus *Botrychium*) in Iowa and Minnesota (abstract). American Journal of Botany 80 (supplement): 109. *In:* Evans, David and Associates. 2005. Conservation assessment of eleven sensitive moonworts (Ophioglossaceae; *Botrychium* subgenus *Botrychium*) on the Idaho Panhandle National Forests. Spokane, Washington.

Johnson-Groh, C.L., and D.R. Farrar. 1996. [Abstract] Effects of leaf loss on moonwort ferns, *Botrychium* subgenus *Botrychium*. American Journal of Botany 83(Supple.): 127.

Johnson-Groh, C.L., and D.R. Farrar. 2003. *Botrychium* inventory and monitoring technical guide. Revised draft. Unpublished. 37pp.

Keane, Robert E., Stephen F. Arno, and James K. Brown. 1990. Simulating cumulative fire effects in ponderosa pine/Douglas-fir forests. Ecology. 71(1), pp 189-203.

Keene, Robert and Donald Gunter. 2005. Personal communication with adjacent landowner Keene and Sagle resident Gunter regarding past harvest in the South Grouse project area.

Ketcheson, G. and W. Megahan. 1996. Sediment production and downslope sediment transport from forest roads in granitic watersheds. Res. Pap. INT-RP-486. Ogden, UT: USDA Forest Service, Intermountain Research Station. 11pp.

King, John G. 1994. Streamflow and sediment yield responses to forest practices in north Idaho. Baumgartner, David M.; Lotan, James E.; Tonn, Jonalea R., eds. Interior cedar-hemlock-white pine forests: ecology and management; 1993 March 2-4, Spokane, WA; Pullman, WA. Washington State University Cooperative Extension: 213-220.

Krag, Raymond. 1991. Options for reducing soil disturbance during timber harvesting. In: Canadian Forest Industries, CPPA Woodlands Paper. October/November, 1991. pp. 60-64.

Lacey, John R.; Clayton B. Marlow and John R. Lane. 1989. Influence of spotted knapweed (*Centaurea maculosa*) on surface runoff and sediment yield. Weed Technology. 3(4):627-631. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Laskowski, R., B. Berg, M, Johansson, and C. McClaugherty. 1995. Release pattern for potassium from decomposing forest needle and leaf litter. Long-term decomposition in a Scots pine forest. Ca. J. Bot. 73:2019-2027.

Lawton, Elva. 1971. Moss flora of the Pacific Northwest. Hattori Botanical Laboratory. Nichinan, Miyazaki, Japan.

LeJeune, Katherine D. and Timothy R. Seastedt. 2001. *Centaurea* species: the forb that won the west. Conservation Biology. 15(6):1568-1574.

Lichthardt, J. 1995. Conservation strategy for *Allotropa viragta* (Candystick). U.S. Forest Service, Northern and Intermountain Regions. Idaho Department of Fish and Wildlife. Boise, ID. 26pp.

Lichthardt, Juanita. 2003. Conservation strategy for clustered lady's-slipper orchid (*Cypripedium fasciculatum*) in US Forest Service Region 1. Idaho Conservation Data Center. Boise, ID.

Lux, David. 2006. Personal Communication with David Lux, FMO regarding fall burning practices in the Sandpoint Ranger District.

Maddox, D.M. 1979. The knapweeds: their economics and biological control in the western states, USA. *In*: Rangelands 1(4): 139-141. *In:* Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Maron, John L.; Montserrat Vila; Riccardo Bommarco; Sarah Elmendorf and Paul Beardsley. 2004. Rapid evolution of an invasive plant. *In*: Ecological Monographs. 74(2):261-280. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

McEllin, S. M. 1979. Nest Sites and Population Demographies of White-breasted and Pigmy (sic) Nuthatches in Colorado. Condor 90(3), pp. 348-352.

McIver, James D. and Lynn Starr. 2000. Environmental effects of postfire logging: literature review and annotated bibliography. USDA Forest Service Pacific Northwest Research Station Gen. Tech. Rep. PNW-GTR-486.

Merrill, E.H. 1982. Shrub responses after fire in an Idaho ponderosa pine community. Journal of Wildlife Management. 46(2):496-502. *In*: Noste, Nonan B. and Charles L. Bushey. 1987. Fire response of shrubs of dry forest habitat types in Montana and Idaho. General Technical Report INT-239. USDA Forest Service Intermountain Research Station. Ogden, Utah.

Megahan, Walter F. 1990. Erosion and site productivity in western-Montana forest ecosystems. In: Proceedings, Management and Productivity of Western-Montana Forest Soils. Gen. Tech. Rep. INT-280. USDA, Forest Service, Intermountain Research Station. pp. 146-150.

Montana Bald Eagle Working Group. 1994. Montana Bald Eagle Management Plan. Bureau of Reclamation, Billings, MT. 104 pp.

Montana Partners in Flight. 2000. Montana Bird Conservation Plan, Version 1.0. 2000. Blacked-backed woodpecker @ http://biology.umt.edu/landbird/mbcp/mtpif/mtbbwo.htm

Montana/Idaho Airshed Group, Operating Guide. March 2004.

Montgomery, D. R., and Buffington, J. M. 1996. Channel-reach morphology in mountain drainage basins. Geological Society of America Bulletin, 109(5), 596-611.

Moore, J.A., D.A. Hamilton, Jr., Y. Xiao, and J. Byrne. 2004. Foliar Characteristics of Four Conifer Species in the Interior Northwest United States. West. J. Appl. For. 19(1):13-24.

National Wildfire Coordination Group. 1996. USDA, Wildland Fire Suppression Tactics Reference Guide, April, 1996 p. 20, 24, 32, 33.

National Wildfire Coordination Group, Smoke Management Guide for Prescribed and Wildland Fire. 2001. December. pp. 143-150.

Neary, D.G., K.C. Ryan, and L.F. DeBano, eds. 2005. Wildland fire in ecosystems: effects of fire on soils and water. Gen. Tech. Rep. RMRS-GTR-42-vol.4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 250 pp.

Niehoff, Gerald. 1985. Technical Guide to Determine Potential Soil Damage By Prescribed Burning and Wildfire. Unpublished report available from Idaho Panhandle National Forests Supervisors Office, Coeur d'Alene, Idaho.

Niehoff, Gerald. 2002. Soil NEPA analysis process and source of soil disturbance model coefficients. Unpublished report available from Idaho Panhandle National Forests Supervisors Office, Coeur d'Alene, Idaho.

NIFC (National Interagency Fire Center). 2001. Review and update of the 1995 Federal Wildland Fire Management Policy. Available at: http://www.nifc.gov/fire_policy/history/index.htm

Norris, R. A. 1958. Comparative biosystematics and life history of the nuthatches Sitta pygmaea and Sitta pusilla. Univ. Calif. Publ. in Zoology 56: 119-300. Quoted in Ghalambor, C. 2003. Conservation Assessment of the Pygmy Nuthatch in the Black Hills National Forest, South Dakota and Wyoming. USDA Forest Service, Rocky Mountain Region, Black Hills National Forest.

Noste, Nonan V. 1982. Vegetation response to spring and fall burning for wildlife habitat improvement. *In*: Baumgartner, David M., compiler. Site preparation and fuels management on steep terrain: Proceedings of a symposium; 1982 February 15-17; Spokane, WA. Pullman, WA: Washington State

University, Cooperative Extension. pp. 125-132. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Noste, Nonan B. and Charles L. Bushey. 1987. Fire response of shrubs of dry forest habitat types in Montana and Idaho. General Technical Report INT-239. USDA Forest Service Intermountain Research Station. Ogden, Utah.

NWCG (National Wildfire Coordinating Group). 1993. Fireline Handbook Appendix B, Fire Behavior. National Wildfire Coordinating Group. NFES 2165.

Ochsmann, Jorg. 2001. On the taxonomy of spotted knapweed (*Centaurea stoebe* L.). *In*: Smith, Lincoln, ed. Proceedings, 1st international knapweed symposium of the 21st century, 2001 March 15-16; Coeur d'Alene, Idaho. Albany CA: USDA Agricultural Research Service. pp. 33-41. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Olson, Bret E. 1999. Impacts of noxious weeds on ecologic and economic systems. *In*: Sheley, Roger L.; Petroff, Janet K., eds. Biology and management of noxious rangeland weeds. Corvallis, OR: Oregon State University Press. pp. 4-18. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Palviainen, M., L. Finer, A. Kurka, H. Mannerkoski, S. Piirainen, and M. Starr. 2004. Release of potassium, calcium, iron and aluminum from Norway spruce, Scots pine and silver birch logging residues. Plant and Soil 259:123-136.

Parendes, Laurie A. and Julia A. Jones. 2000. Role of light availability and dispersal in exotic plant invasion along roads and streams in the H.J. Andrews Experimental Forest, Oregon. *In*: Conservation Biology. 14(1):64-75. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

Peck, J.H., C.J. Peck, D. R. Farrar. 1990. Influences of life history attributes on formation of local and distant fern populations. *In*: American Fern Journal 80(4): 126-142.

Penny, Diane. 1995. Monitoring *Botrychium lanceolatum* subsp. *lanceolatum* in Hanna Flats Cedar Grove. Priest Lake Ranger District, Idaho Panhandle National Forests. Unpublished technical report.

Plotnikoff, M., M. Schmidt, and C. Bulmer. 2000. Retrospective studies of soil conditions and forest productivity on rehabilitated landings: Interior of British Columbia. In Proc., From science to management and back: a science forum for southern interior ecosystems of B.C. C. Hollstedt, K. Sutherland, and T. Innes (ed.) South Interior For. Ext. and Res. Partnership, Kamloops, B.C., pp. 113-117.

Powell, G.W.; B.M. Wikeem; A. Sturko and J. Boateng. 1997. Knapweed growth and effect on conifers in a montane forest. Canadian Journal of Forestry Resources 27(1997):1427-1433.

Powers, R.F. 1990. Are we maintaining the productivity of forest lands? Establishing guidelines through a network of long-term studies. Proceedings of the Symposium on Management and Productivity of Western-Montane Forest Soils. April 10-12. Boise, ID. p 70-74.

Quigley, Thomas M. and Sylvia J. Arbelbide, tech. eds. 1997. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Volume III. USDA Forest Service Gen. Tech. Rep. PNW-GTR-405. Pacific Northwest Research Station. Portland, OR. pp. 1570-1185

Rees, Norman E. Paul C. Quimby, Jr., Gary L. Piper, Eric M. Coombs, Charles E. Turner, Neal R. Spencer and Lloyd V. Knutson, eds. 1996. Biological control of weeds in the west. Western Society of Weed Science. Bozeman, Montana.

Reynolds, R.T. and B.D. Linkhart. 1992. Flammulated owls in ponderosa pine: Evidence of preference for old growth. In: Kaufmann, M.R., W.H. Moir, and R.L. Bassett. 1992. Old growth forests in the Southwest and Rocky Mountain Regions: Proceedings of a workshop. Gen. Tech. Rep. RM-213. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, CO.

Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management recommendations for the northern goshawk in the southwestern United States. Gen. Tech. Rep. RM-217. Fort Collins (CO): USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. p 13-16.

Ridenour, Wendy M. and Ragan M. Callaway. 2001. The relative importance of allelopathy in interference: the effects of an invasive weed on a native bunchgrass. Oecologia. 2001(126):444-450.

Roberts, David J. 2005. Personal communication regarding flammulated owl surveys. 13 April and July 9.

Roche, Ben F., Jr.; Gary L. Piper and Cindy Jo Talbot. 1986. Knapweeds of Washington. Washington Sate University, Cooperative Extension, College of Agriculture and Home Economics. Pullman, WA. 41 pp. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html

Rockwell, F.I. 1917. Western White Pine – Part I: the tree and the stand. USDA Forest Service, Northern Rocky Mountain District, Office of Silviculture, Missoula, MT. pp. 64-66.

Rothermel, Richard C. 1983. How to predict the spread and intensity of forest and range fires. USDA Forest Service Gen. Tech. Rep. INT-143. Intermountain Forest and Range Experiment Station, Ogden, Utah 84401.p. 161.

Ruggiero, Leonard F.; Lawrence L.C. Jones and Keith B. Aubry. 1991. Plant and animal habitat associations in Douglas-fir forests of the Pacific Northwest: an overview. *In*: Ruggiero, Leonard F.; Keith B. Aubry; Andrew B. Carey and Mark H. Huff, technical coordinators. Wildlife and vegetation of unmanaged Douglas-fir forests. General Technical Report PNW-GTR-285. USDA Forest Service Pacific Northwest Research Station. Portland, OR. pp. 447-462. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

Saab, Victoria A. and Jonathan G. Dudley. 1998. Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pine/Douglas-Fir forests of southwestern Idaho. USDA Forest Service Research Paper RMRS-RP-11. Ogden, UT. Rocky Mountain Research Station. 17 pp.

Sallabanks, Rex. 2005. Idaho Bald Eagle Nest Monitoring Report. Idaho Department of Fish and Game. Nongame and Endangered Wildlife Program. Boise, ID.

Samman, Safiya; Logan, Jesse, tech. eds. 2000. Assessment and response to bark beetle outbreaks in the Rocky Mountain area. Report to Congress from Forest Health Protection, Washington Office, Forest Service, U.S. Department of Agriculture. Gen. Tech. Rep. RMRS-GTR-62. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 46 p.

Sampson, Arthur W. and Kenneth W. Parker. 1930. St. Johnswort on range lands of California. Bulletin 503. University of California, College of Agriculture, Agriculture Experiment Station. Berkeley, CA. 47

pp. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

Samson, F.B. 2006. A conservation assessment of the northern goshawk, black-backed woodpecker, flammulated owl, and pileated woodpecker in the Northern Region, USDA Forest Service. Unpublished report on file. Forest Service Northern Region, Missoula, Montana.

Schmidt, Kirsten M.; Menakis, James P.; Hardy, Colin C.; Hann, Wendall J.; Bunnell, David L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 41 p. + CD.

Scott, Joe H. and Elizabeth D. Reinhardt. 2001. Assessing crown fire potential by linking models of surface and crown fire behavior. Res. Pap. RMRS-RP-29. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. p. 31-32

Seyedbagheri, K.A. 1996. Idaho Forestry Best Management Practices: Compilation of research on their effectiveness. USDA Forest Service, Intermountain Research Station, Gen. Tech. Rep. INT-GTR-339. October 1996. 89 pages.

Sheley, Roger L. and B.F. Roche. 1982. Rehabilitation of spotted knapweed infested rangeland in northeastern Washington. *In*: Western Society of Weed Science 31. Abstract. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Sheley, Roger L.; James S. Jacobs and Michael F. Carpinelli. 1998. Distribution, biology, and management of diffuse knapweed (*Centaurea diffusa*) and spotted knapweed (*Centaurea maculosa*). *In:* Weed Technology. 12(2): 353-362. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Sheley, Roger L.; James S. Jacobs and Michael L. Carpinelli. 1999. Spotted knapweed. *In*: Sheley, Roger L. and Janet K. Petroff, eds. Biology and management of noxious rangeland weeds. Oregon State University Press. Corvallis, OR. pp. 350-361. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Sheley, Roger; Mark Manoukian and Gerald Marks. 2002. Preventing noxious weed invasion. MONTGUIDE MT 199517 AG 8/2002. Montana State University Extension Service. Bozeman, MT. 3pp.

Smith, J.K. and W.C. Fischer. 1997. Fire Ecology of the Forest Habitat Types of Northern Idaho. USDA Forest Service Intermountain Research Station, Gen. Tech Rep. INT-GTR-383. Ogden, UT. pp. 10, 50-51, 56-57.

Smith, Jane Kapler and William C. Fischer. 1997. Fire ecology of the forest habitat types of northern Idaho. General Technical Report INT-GTR-363. USDA Forest Service Intermountain Research Station. Ogden, Utah.

Stark, N.M. 1979. Nutrient losses from timber harvesting in a larch/Douglas-fir forest. USDA FS Res. Paper INT-231, 41 p., Intermt. For. and Range Exp. Stn., Ogden, UT.

Storer, B. E. 1977. Aspects of the breeding ecology of the Pygmy Nuthatch (*Sitta pygmaea*) and the foraging ecology of wintering mixed-species flocks in western Montana. Master's thesis, Univ. Montana,

Missoula. Quoted in Ghalambor, C. 2003. Conservation Assessment of the Pygmy Nuthatch in the Black Hills National Forest, South Dakota and Wyoming. USDA Forest Service, Rocky Mountain Region, Black Hills National Forest.

Tisdale, E.W. 1976. Vegetational responses following biological control of *Hypericum perforatum* in Idaho. *In*: Northwest Science. 50(2):61-75. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

Tisdale, E.W.; M. Hironaka and W.L. Pringle. 1959. Observations on the autecology of *Hypericum perforatum*. In: Ecology. 40(1):54-62. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/hypper/all.html.

Troendle, C.A. 1987. The potential effect of partial cutting and thinning on streamflow from the subalpine forest. USDA Forest Service. Rocky Mountain Forest and Range Experiment Station. Research Paper RM-274 8 pages.

Tyser, Robin W. 1990. Ecology of fescue grasslands in Glacier National Park. *In*: Boyce, Mark S. and Glenn E. Plumb, eds. National Park Service Research Center, 14th annual report. Laramie, WY: University of Wyoming, National Park Service Research Center. pp. 59-60. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Tyser, Robin W. and Carl H. Key. 1988. Spotted knapweed in natural area fescue grasslands: an ecological assessment. Northwest Science. 62(4):151-160.

U.S. Environmental Protection Agency (EPA). 2001. Urban wildland interface communities within the vicinity of Federal Lands that are at high risk from wildfire, Federal Register (Volume 66, Number 3).

USCOE, U.S. Army Corps of Engineers. 1998. Engineering and design runoff from snowmelt. EM1110-2-1406.

USDA and USDI. 2000. Managing the Impacts of Wildland Fires on Communities and the Environment - A Report to the President (aka National Fire Plan) http://www.fireplan.gov/resources/annual_report.htmlForest Vegetation

USDA and USDI 2001. A collaborative approach for reducing wildland fire risks to communities and the environment: A 10-Year comprehensive strategy. Available online at http://www.fireplan.gov.

USDA Forest Service. 1968. Sundance Fire. Research Paper INT-56, Intermountain Forest and Range Experimental Station, Ogden, UT. p. 1.

USDA Forest Service. 1987. Idaho Panhandle National Forests Forest Plan. Idaho Panhandle National Forests, Coeur d'Alene, ID.

USDA Forest Service. 1995. Inland Native Fish Strategy Environmental Assessment Decision Notice and Finding of No Significant Impact.

USDA Forest Service. 1995a. Landscape Aesthetics: A Handbook for Scenery. U.S. Forest Service Agricultural Handbook 701: 1995.

USDA Forest Service. 1997. Skin Environmental Assessment (EA). IPNF Bonners Ferry Ranger District. Bonners Ferry, Idaho. A copy of the EA is available at the Bonners Ferry District Office.

USDA Forest Service. 1998. Northern Region Overview Detailed Report and Summary, October 1998. Northern Region, Missoula, MT. October 1998. 51 pg.

USDA Forest Service. 1998a. Sandpoint Noxious Weed Control Project Environmental Impact Statement. Idaho Panhandle National Forests, Sandpoint Ranger District. Available at the district office.

USDA Forest Service. 1998b. Idaho Panhandle National Forests Forest Plan Monitoring and Evaluation Report. Coeur d'Alene, ID.

USDA Forest Service. 1998c. Ruened Salvage Timber Sale project file. IPNF Sandpoint Ranger District. Sandpoint, Idaho. A copy of the project file is available at the Sandpoint District Office.

USDA Forest Service. 1998d. Wildland and prescribed fire management policy. Implementation procedures reference guide. p. 65

USDA Forest Service. 1999a. Roads Analysis: Informing Decisions About Managing the National Forest Transportation System, misc. reports FS-643.

USDA Forest Service. 2000. Northern Region Snag Management Protocol. Northern Region, Missoula, MT.

USDA Forest Service. 2001. Idaho Panhandle National Forests Forest Plan Monitoring and Evaluation Report. Coeur d'Alene, ID.

USDA Forest Service. 2001a. Guide to noxious weed prevention practices. Version 1.0. Available online at http://fsweb.sanjuan.r2.fs.fed.us/range/fsweedprevention_070.doc.

USDA Forest Service. 2002. Idaho Panhandle National Forests Forest Plan Monitoring and Evaluation Report. Coeur d'Alene, ID.

USDA Forest Service. 2003. Influence of forest structure on wildfire behavior and severity of its effects. May 2003. p. 3.

USDA Forest Service. 2003a. Idaho Panhandle National Forests Forest Plan Monitoring and Evaluation Report. Coeur d'Alene, ID.

USDA Forest Service. 2004. Wind and weather files from Forest Service Remote Automated Weather Stations.

USDA Forest Service. 2004a. Idaho Panhandle National Forests Forest Plan Monitoring and Evaluation Report (unpublished report). Coeur d'Alene, ID.

USDA Forest Service. 2005. BehavePlus fire modeling system, version 3.0.

USDA Forest Service. 2005. Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/index.html

USDA Forest Service. 2005a. Idaho Panhandle National Forests Forest Plan Amendment for Fry Emergence. Decision Notice and Finding of No Significant Impact. Coeur d’Alene, Idaho.

USDA Forest Service. Unpublished report. Geographic assessment of the Pend Oreille River Basin. Idaho Panhandle National Forests, Coeur d'Alene, ID.

USDI Bureau of Reclamation. 1994. Montana Bald Eagle Management Plan. Billings, Montana. 104pp.

USDI Fish and Wildlife Service. 2006. Updated Species List for Bonner County, Idaho (3/1/2006). Upper Columbia Fish and Wildlife Office, Spokane, Washington. Accessed online at http://www.fws.gov/easternwashington/ESA.html.
Vanderhorst, J. 1997. Conservation assessment of sensitive moonworts (*Botrychium* subgenus *Botrychium*) on the Kootenai National Forest. Montana Natural Heritage Program, Helena, MT. 82 pp. plus appendices.

Washington National Heritage Program. 2006. Field guide to selected rare vascular plants of Washington. Available online at http://www.dnr.wa.gov/nhp/refdesk/fguide/htm/fsp_asmi.htm. Species profile for *Astragalus microcystis*.

Warren, N., tech. editor. 1990. Old growth habitats and associated wildlife species in the northern Rocky Mountains. Northern Region Report R1-90-42: USDA Forest Service, Missoula, MT. 47 pp.

Watson, A.K. and A.J. Renney. 1974. The biology of Canadian weeds. 6. *Centaurea diffusa* and *C. maculosa*. *In:* Canadian Journal of Plant Science. 54: 687-701. *In*: Fire Effects Information System. An online database at http://www.fs.fed.us/database/feis/plants/forb/cenmac/all.html.

Weldon, L.; A.B. Bail and C. R. Graham. 2001. Conservation strategy for *Botrychium pumicola* (pumice grape fern) on the Deschutes, Fremont and Winema National Forests and Prineville District, Bureau of Land Management. Oregon. 22pp.

Wells, C.G.; R. Campbell; L. DeBano; C. Lewis; R. Fredriksen; E.C. Franklin; R. Froehlich; and P. Dunn. 1979. Effects of fire on soil. USDA General Technical Report WO-7. 34 pages.

Whitson, Tom D., Larry C. Burrill, Steven A. Dewey et al. 1991. Weeds of the West. Western Society of Weed Science. Bozeman, Montana.

Wisdom, M.J., R.S. Holthausen, B.C. Wales, C.D. Hargis, V.A. Saab, D.C. Lee, W.J. Hann, T.D. Rich, M.M. Rowland, W.J. Murphy and M.R. Earnes. 2000. Source habitats for terrestrial vertebrates of focus in the Interior Columbia Basin: Broad-scale trends and management implications, Volume 2 – Group level results. Gen. Tech. Rep. Threatened and Endangered Species, Sensitive Species and Management Indicator Species and the level of analysis required. PNW-GTR-485. pp. 181-190; 209-215; 224-229; 242-248; 258-265; 305-311.

Young, Richard P. 1983. Fire as a vegetation management tool in rangelands of the Intermountain Region. *In:* Monsen, Stephen B; Shaw, Nancy, compilers. Managing Intermountain rangelands - improvement of range and wildlife habitats: Proceedings; 1981 September 15-17; Twin Falls, ID; 1982 June 22-24; Elko, NV. General Technical Report INT-157. USDA Forest Service Intermountain Forest and Range Experiment Station. Ogden, UT. pp. 18-31. *In:* Fire Effects Information System. Species profile for oceanspray (*Holodiscus discolor*). Online at http://www.fs.fed.us/database/feis/plants/shrub/holdis/all.html.

Zack, Arthur C. and Penelope Morgan. 1994. Fire history on the Idaho Panhandle National Forest (Review Draft).

Zack, A. 2006. Review of Old Growth Assessments for the Idaho Panhandle National Forest. Idaho Panhandle National Forests, Northern Region.

Appendix A - Design Features and Mitigation Measures

In this section, design features are specific instructions intended to help achieve overall project objectives. Mitigation measures are intended to minimize, eliminate, avoid, rectify, or compensate for potential negative effects of proposed activities on some resource. Where mitigation measures are listed, the estimated effectiveness of the measure is provided.

Vegetation Treatments

Retention of Large Old Trees in Stands Not Designated as Old Growth – Within treatment units where there are individual and groups of large old trees that are not defined as old growth, marking guidelines will specify that these trees be retained.

Post-cutting Treatments - In regeneration units, site preparation, fuels treatment, and planting activities will occur within five years following timber cutting or the start of rehabilitation. Site preparation and/or fuels treatment may include a combination of prescribed burning, underburning, grapple piling, and hand piling, depending on post-cutting conditions.

Retention of Untreated Vegetation in Treatment Areas - Pockets, stringers and islands of untreated vegetation will be left untreated in stands where harvest is proposed. These areas would contribute to both structural and compositional diversity.

Estimated Effectiveness: High; Large tree retention is a normal feature of silvicultural prescriptions and marking guidelines. Additionally, these trees would be protected from damage during implementation by leaving other smaller trees around them to act as buffers. Post cutting activities would be highly successful at meeting the project purpose and need and are normally accomplished within a five year time frame. Retention of untreated vegetation is done frequently and is a normal feature of silvicultural prescriptions to meet visual resource and wildlife habitat needs and enhance structural diversity.

Road Construction

Road design and decommissioning are features used to minimize effects from temporary road construction.

Road Design – Temporary roads generally greater than 300 feet in length[3] would be designed by a Forest Service Engineer to avoid potential resource damage from roads that may remain on the landscape until post-sale activities are completed. An engineering representative would monitor new temporary road construction to ensure design specifications were met. At the end of all project activities, all temporary roads would be decommissioned and removed from the forest transportation system.

Estimated Effectiveness: High; extensive research has demonstrated that improved design, building, and maintenance of roads can reduce road-related surface erosion at the scale of individual road segments. Key factors are road location, particularly layout relative to stream systems (USDA Forest Service 1999b), road drainage (Haupt 1959, Copstead 1998), surfacing (Burroughs and King 1989, Kochenderfer and Helvey 1987, Swift 1984), and cut slope and fill slope treatments (Burroughs and King 1989, Cook and King 1983, Hungerford 1984). Many studies show that surfacing materials and vegetation measures can be used to reduce the yield of fine sediment from road surfaces (Beschta 1978, Burroughs et al 1983, Kochenderfer and Helvey 1987, Swift 1984, Foltz and Truebe 1995).

[3] This distance could be increased if ground conditions are such that resource damage would be minimal.

Temporary Road Decommissioning - All temporary road construction segments would be obliterated with appropriate techniques. This may include full and partial recontouring; removing all culverts; stabilizing fill slopes and restoring stream channel crossings back to natural grade. Seeding, fertilizing, and placement of woody debris would follow to prevent erosion, establish desired vegetation and prevent noxious weed spread. Unless circumstances change during implementation that will extend the duration of time a road is needed, roads will be decommissioned within the following timeframes:

- Temporary roads or existing road segments proposed for decommissioning that are not needed for post-cutting activities (e.g. fuel treatment or planting) will be decommissioned the same season following cutting activities or no later than the following season.
- Other road segments proposed for decommissioning that are needed for post-cutting activities, such as prescribed burning or planting, will be decommissioned within two to five years of cutting activities.

Estimated Effectiveness: High; road-decommissioning activities provide long-term improvements in reducing erosion and sediment delivery to stream channels. Removing culverts would prevent them from plugging and prevent the associated fill from failing and delivering large quantities of sediment (USDA Forest Service 2000 and 1999). Decommissioning activities also start the restoration process for soils disturbed by road construction.

Fuels Treatment

Prescribed burning treatments will be conducted according to established standards in FSM 5142:

Prescribed Fire Management - A site-specific burn plan will be prepared for each area to be burned. Burning will only occur when weather, fuel conditions, and available resources are at the levels specified in the prescribed burn plan. Site conditions may dictate the use of other fuel treatment methods prior to prescribed burning so burns can be conducted safely and the objectives of the silvicultural prescription are met. Because post-harvest fuel conditions cannot be completely predicted, assessments will need to be made by a fire/fuels specialist and/or a silviculturist after harvest activities.

Estimated Effectiveness: High; burns conducted in compliance with an approved prescribed burn plan have a high success rate (USDA Forest Service 1998d).

Slash and Pile Burning – Landing slash and excavator piles will be burned in late fall after heavy rains and during cooler temperatures when the risk of escape into adjoining stands and potential damage to residual timber is lessened.

Estimated Effectiveness: High; decades of burning piles in late fall has proven successful at ensuring there have been no escape fires in the Sandpoint Ranger District (Lux 2005, personal communication).

Fireline and Fuelbreaks – If natural fuelbreaks are not present, firelines and fuelbreaks will be constructed around the perimeters of all burn units. Where possible, firelines and fuelbreaks will be constructed on ridges, benches, and the toe of the slopes, using the advantage of the terrain to best control the fire.

Estimated Effectiveness: High; fuelbreaks that follow favorable terrain are more effective in reducing radiant heat and preventing burning debris from crossing fuelbreaks (NWCG 1996, pp. 20, 24, 32, and 33).

Along private land boundaries a variable width fuelbreak will be created, dead vegetation will be removed, and trees left will be pruned. The width of fuelbreaks will range from to thirty to several hundred feet depending upon slope, private resources threatened (homes and other improvements), and the type of treatment proposed in adjacent stands.

Estimated Effectiveness: High; these activities will have beneficial effects and are expected to lower existing fuel concentrations, decrease ladder fuels (brush and small trees), raise canopy base heights, and therefore, reduce fire behavior such as fireline intensity, flame length, and the potential for crown fires (Anderson 1982).

Use of Water and Engines – Fire hose will be installed along critical sections of fireline using water supplied from fire engines.

Estimated Effectiveness: High; fuelbreaks that are reinforced with water are more effective in keeping fire within the fuelbreak (NWCG 1996, pp. 20, 24, 32, and 33).

Air Quality

Smoke Management – 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/Idaho State Air shed Group. The procedures used by the Air Shed 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 March through November, they work in collaboration with the Idaho Department of Environmental Quality, assisting with any recommendations. During the winter months (December through February) the Idaho Panhandle Forests voluntarily collaborate with the airshed group. This unit monitors meteorological data, air quality data, and planned prescribed burning and decides daily on whether to issue recommendations on burning for the following day.

Each year, a list of all prescribed burning (understory and pile burning) planned for the Sandpoint Ranger District is entered into a database administered by the monitoring unit before March 1. Before 11:00 a.m., proposed burns for the next day are entered into the database. By 3:00 p.m. the same day, the monitoring unit posts any recommendations on a website concerning the next days burns.

Estimated Effectiveness: High; these procedures limit smoke accumulations to legal, acceptable limits. The District strictly complies with these procedures, and has had no air quality violations (MT/ID Airshed Group 2004).

Historically, prescribed burning occurs in the spring and fall seasons, within 45 to 60 days during each season. All burning complies with federal, state, and local regulations.

Estimated Effectiveness: High; management practices include, but are not limited to, burning under spring-like conditions (high moisture content in fuels, soil and duff) to reduce emissions, retain large woody debris, and protect soil. Prescribed burning during spring or fall will generate less smoke than a much hotter stand replacing summertime wildfire (NWCG 2001, p. 143-150).

Wildlife Habitat and Security

Management of Gated Roads During Project Activities - During logging activities, the existing gate that controls motorized access to the project area will remain closed to all motorized vehicles not associated with the logging operation or Forest Service administrative use to help maintain wildlife security. The purchaser would not be allowed to use motorized vehicles to gather firewood, hunt or transport big game animals from behind the gates.

Estimated Effectiveness: High; this measure has a high likelihood of success with regards to the purchaser using the roads for unauthorized purposes through the use of contract provision and compliance monitoring by the sale administrator. Access to the proposed temporary road construction would be controlled by the gate at the Forest boundary. However, it is difficult to ensure that some use by the general public does not occur as the gate could be accidentally left open or vandalized.

Road Design - To retain habitat for snag-dependent species and species dependent on large-diameter trees, the location of the proposed new roads will ensure, whenever practical, that veteran and relic survivor trees and snags would not be removed during construction.

Estimated Effectiveness: Low to Moderate; road location is determined to a large degree by FS road construction standards and the local terrain near the site to be accessed. Cost reduction is also an important consideration. It is likely that some veteran and relic survivor trees will be removed when locating new roads.

Skid Trail and Cable Corridor Location - To maintain habitat for snag-dependent species, the timber sale or contract administer will ensure, whenever practical, that the design of skid trails and cable corridors will avoid veteran and relic fire survivor trees and snags.

Estimated Effectiveness: Moderate; the sale administrator has authority under timber sale contract provisions to approve all skid trail and cable corridor locations. However, there are many practical considerations in choosing these locations. Avoiding individual desirable trees is only one of those considerations. It cannot be expected that all veteran and relic trees will be protected by this measure.

Road Management - All temporary roads, including the proposed spur roads, will be decommissioned following use in accordance with the Area Road Management Plans and the IPNF Forest Plan. Existing roads, which are currently restricted and utilized for this project, will be returned to their pre-project road status.

Estimated Effectiveness: High; this is part of the proposed action and will be implemented under the sale contract. Closing the roads will provide both habitat and security for wildlife.

Wildlife Tree and Down Log Retention - Snag management objectives for the project will be patterned after historical conditions for vegetative communities, recognizing that the existing density and distribution of snags vary across the landscape and that current conditions may not make it possible to immediately meet these objectives for some areas (e.g. long-term fire suppression that interrupted natural snag recruitment, past timber harvesting).

Snags and live tree replacements will be retained where opportunities exist in treatment units at levels recommended or exceeding recent studies and scientific literature (Bull et al. 1997). Where possible, this project will strive to exceed the minimum Regional Snag Management Protocol for snag and live tree replacements within treatment units. Where they exist, the following minimum amounts of snags and live tree replacements will be retained within cutting areas:

Dry forest habitats: 4-6 snags/acre and 8 live tree replacements/acre from the largest representative trees.

Moist forest habitats: 6-12 snags/acre and 12 live tree replacements/acre from the largest representative trees.

Estimated Effectiveness: Moderate/High; this measure would be implemented using project layout, contract provisions, compliance monitoring and fuels treatment, and would have a moderate chance of avoiding and/or reducing adverse effects on snag dependent wildlife. It would not be the intent of this project to willfully remove the high hazard snags and snags in the advanced stages of decay ("soft" snags). Some of these "soft" snags would survive and remain standing during the life of the project.

Past monitoring (including formal post-sale reviews) has demonstrated that tree harvesting and subsequent burning has the potential to remove many of the existing snags (especially those that are "soft," or highly decayed) from treatment areas. With this in mind, snag-rich patches or clumps would be left at strategic locations throughout treatment areas. Snag retention areas would be selected and located as to be relatively free from safety concerns associated with logging or prescribed burning activities.

New snags would be created by using prescribed burning to purposely kill residual green trees. This source of snags would be acknowledged in both the silvicultural prescriptions and burn plans for treatment areas.

Also, no harvest would occur within Riparian Habitat Conservation Areas (RHCA) and/or riparian buffers, areas that contain both snags and potential recruitments.

Marking guides would specify the retention of green trees scattered in patches and individually (regeneration cutting), and uniformly (selective cutting) across treatment areas in excess of the Regional Snag Management Protocol. As a minimum, these guides would also specify number of snags, snag recruits and live trees needed to meet Regional Snag Management Protocol.

Snag Selection - Selection of snags will emphasize practices that assure a diversity of snag structural classes and the highest probability for long-term retention. High-hazard snags and snags in the advanced stages of decay will not be used to meet retention objectives. Snag retention practices will give emphasis to larger diameter ponderosa pine, western larch, western red cedar, and western white pine available within each treatment unit. When these snags are not available, Douglas fir and grand fir will be used. Veteran or relic ponderosa pine and western larch snags will be top priority for retention. Trees killed by root disease will be avoided, where possible, to meet retention objectives because of their rapid deteriorate/fall-down rate. The minimum retention snag will be 10" DBH.

Estimated Effectiveness: High; the silvicultural prescriptions, derivative marking guides and the burn plan would provide detailed instructions for the implementation of these features by field crews. Compliance monitoring would be done by the timber sale administrator and interdisciplinary team.

Maintaining Habitat for Snag-dependent Species - To maintain habitat for snag-dependent species, the tree marking guide derived from the silvicultural prescription will assure a diversity of snag structural classes and the highest probability for long-term retention. An emphasis will be placed on retention of the largest snags. Where necessary, an unharvested perimeter will be left around large, relic, fire-burned trees and/or snags to protect them from harvest operations.

Estimated Effectiveness: High; this method has been used successfully for many years. Using marking guides, field crews can identify appropriate trees to leave for wildlife habitat needs and will communicate with the interdisciplinary team regarding any questions..

While **snag retention objectives** are accounted for on a treatment level scale, some snags will be represented on every 10 acres of treatment, in clusters or clumps where feasible, to promote good distribution of snags. Large diameter snags (generally greater than 25" DBH) that are felled for safety reasons will remain on site to provide for large woody debris recruitment and long-term site productivity. Retention snags will be left in areas that are not easily assessable from FS roads and outside the fuelbreak zones, whenever possible. This will increase the likelihood the snags will not be removed for firewood and will remain on the landscape.

Estimated Effectiveness: High; this measure is accomplished during the layout phase of project implementation. Identification and clumping of snag retention areas is commonplace in the layout and design of timber sales today.

Snag Recruitment - Silvicultural prescriptions will be designed to retain large-diameter, live trees, which may be managed for future snag recruitment and retention. Large-diameter live trees (except those posing safety concerns and infected with root disease, or at-risk Douglas-fir), will be retained whenever possible. Large-diameter trees marked for retention that are felled for safety concerns will be left on the ground, unless they are within approximately 150 feet of an accessible road and would likely be taken for firewood. In this case, they could be removed by the operator. Down logs in excess of minimum down wood guidelines within the fuelbreak zone adjacent to privately owned land would also be removed. In grapple-pile treatment units, the large-diameter logs will be left in place.

Estimated Effectiveness: High; using silvicultural prescriptions, marking guides, and compliance monitoring by the sale administrator, this feature would have a high likelihood of retaining large-diameter trees and down logs.

Maintaining Pockets of Fire-Surviving Forest Structure - Areas within treatment units that contain small pockets of fire-surviving structure will be thinned from below or not treated. These unique areas will be managed on a case-by-case basis. Vegetation type, moisture regime, logging system, wildlife species suitability and surrounding treatments will all be considered.

Estimated Effectiveness: High; this measure has a high likelihood of protecting these areas. Several of these areas have already been identified in walkthrus of the project area (project file) and have planned protection. Additional pockets of fire-surviving trees encountered in the field by the marking crew will be protected and their existence communicated to the interdisciplinary team. These areas will then be mapped and the success of the protection measures monitored.

Retention of Veteran and Relic Trees - To maintain habitat for snag-dependent species and to protect veteran and relic trees and snags, where practical, individuals implementing prescribed burns will attempt to retain these trees by pulling slash back from the snag or live tree base and by adjusting ignition patterns. Grapple-piling will be considered to treat fuels on moderate slopes where residual veteran trees and snags will be at risk from broadcast burning.

Estimated Effectiveness: Moderate; this measure is somewhat labor intensive and the need must be communicated to crew implementing the burn. Prescribed burning costs will also dictate how much can be practically accomplished. Despite appropriate fuels treatment prior to the burn, it is not always possible to prevent loss of snags during prescribed burns.

Retention of Hardwood Trees - To maintain forest species diversity and wildlife habitat, aspen and birch trees will not be harvested for pulp. If trees of these species need to be cut for safety reasons, they will remain on site for coarse woody debris and long-term site productivity. Conifers in and around aspen and birch patches, including burn only treatment units, will be slashed to reduce competition for water, sunlight, nutrients as well as to help provide fuel for underburning. Where appropriate, individual trees may be cut or pushed over to encourage sprouting. Whenever possible, these areas will be underburned to stimulate sprouting. This strategy will provide vegetative diversity, which benefits various wildlife species.

Estimated Effectiveness: High; this measure has a high potential for being implemented. These measures would be implemented through contract provisions and compliance monitoring. Effectiveness is high because regardless of whether hardwood trees remain standing or felled for safety reasons, they remain on site and provide benefits to various wildlife species. Hardwoods, such as aspen and birch, will re-sprout if felled or killed by burning.

Grapple Piling - Leave an average of one to three slash piles per acre unburned for small forest mammals and land birds, except within the fuelbreak zone adjacent to private property.

Estimated Effectiveness: High; this measure would have a high likelihood of providing suitable habitat for small mammals and birds and has become fairly standard practice. It would be specified in the burn plans used by the field crews implementing the burning of the piles.

Goshawk Nest Site Protection – If a goshawk nest were discovered, mitigation measures would be implemented to help ensure that nest sites and post-fledgling areas are receiving minimal disturbance. A no-activity buffer (>150 foot radius) would be placed around each known active nest tree. In addition, a 30-acre buffer would be placed around each nest area to provide long-term nesting habitat (Reynolds et al. 1992). Treatments within the 30-acre buffer would be limited to activities that would enhance suitability of nesting habitat (e.g. thinning understory congestion while retaining overstory protective cover).

Purchasers operations and related Forest Service activities would be suspended within ½-mile distance of active nest areas from March 15 to August 15 1) to promote nesting success and 2) provide foraging opportunities for adults and fledgling goshawks during fledgling-dependency period. Activity restrictions would be removed after June 30 if the Forest Service determines the nest site is inactive or unsuccessful.

Estimated Effectiveness: High; by modifying implementation under the auspice of the interdisciplinary team and/or using contract provisions, this feature would have a high likelihood of achieving the desired objectives.

Threatened, Endangered, and Sensitive Wildlife Species Protection - If any threatened, endangered, or sensitive species are located during project layout or implementation, management activities will be altered under the auspice of the interdisciplinary team to include proper protection measures. Timber sale contract provision B6.24 (Protection of Plants, Animals, Cultural Resources, etc.) would be in the timber sale contract.

Estimated Effectiveness: High; via internal communications and the use contract provisions, this feature would have a high likelihood of achieving the desired objectives.

Regeneration Units – Regeneration treatment units larger than 5 acres in sizes will leave patches of variable size and shape of untreated trees to retain security areas and structural diversity for wildlife. The regeneration units will leave a scattered overstory with variable spacing and density in order to achieve reforestation objectives and future snag recruitment objectives.

Estimated Effectiveness: High; using silvicultural prescriptions, marking guides and compliance monitoring by the timber sale administrator and interdisciplinary team, this feature would have a high likelihood of retaining islands of trees for wildlife diversity.

Watershed Protection

Implement Soil and Water Conservation Best Management Practices as defined in the Idaho Panhandle National Forests LRMP (USDA 1987), and R1/R4 Soil and Water Conservation Best Management Practices (USDA Forest Service).

Seasonally flowing or intermittent streams, wetlands less than one acre, landslides and landslide prone areas (INFISH)--at a minimum the RHCAs must include:

- the extent of landslides and landslide prone areas;
- the intermittent stream channel and the area to the top of the inner gorge;
- the intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation.
- For non priority watersheds the area from the stream channel, wetland, landslide, landslide prone area to a distance equal to one half site potential tree or 50 feet slope distance, whichever is greater.

No mechanical entry into RHCAs will occur. End lining of woody fuel materials will occur where slopes are less than 20%. Handwork (thinning, slashing, hand piling, etc.) will be allowed.

No active lighting of prescribed fire within RHCAs. Fire will be allowed to back down into RHCAs.

Limit use of mechanical activities (cutting with shears, mastication, skidding, or chipping) to slopes 30% or less, and on slopes between 30 - 50% for distances no longer than 50 feet.

Limit harvest operations or roadwork to time periods outside of the spring runoff when the potential for mass failures and surface erosion is highest.

Apply slash filter windrow and mulch to bare soil areas on new road construction for 100 ft. on either side of stream crossings.

Estimated Effectiveness: Moderate to high; depending on the practice. Research and monitoring have evaluated the effectiveness of BMPs (Seyedbagheri 1996, USDA Forest Service Monitoring Reports 1995 - 2004). These practices would be implemented since they are requirements tied to the timber sale contract. The Forest Service Timber Sale Administrator would frequently review the project for compliance with these and other timber sale requirements. The North Zone aquatics staff would also do periodic monitoring to assess the effectiveness of these practices. Research (Cook and King, 1983) has shown that slash filter windrows are quite effective in reducing sedimentation from road fill slopes.

Soils Protection

The following practices are designed to minimize the detrimental impacts of soil compaction, displacement, severe burning, and nutrient and organic matter depletion on long-term soil

productivity. The use of these practices would insure that the soil quality standards listed in the Forest Plan and Regional Soil Quality Standards would be met. They would include applications from the Soil and Water Conservation Practices (SWCP) Handbook (FSH 2509.18_2).

Ground-based Yarding – Skid trails for ground-based yarding would be designated, and located at 100-foot or greater spacing. Yarding would occur over slash and/or snow when possible. Erosion control measures for skid trails could include either covering trails with slash and randomly placed logs (on contour) to increase the microtopography needed to reduce runoff, stabilizing skid trail slopes with waterbars, or a combination thereof. Excavated skid trails would be recontoured and seeded after logging is completed.

Estimated Effectiveness: High; these guidelines exceed the requirement of the Idaho Forest Practices Act and meet the Forest and Regional Soil Quality Standard by limiting disturbance to less than 15% of the activity area (Niehoff 2002).

Skyline Yarding - The leading end of logs would be suspended during yarding. Yarding across any designated RHCA would require full suspension.

Estimated Effectiveness: High; the intent is to reduce the potential detrimental soil impacts of displacement and compaction. Past Forest Plan monitoring (USDA Forest Service 2004) indicates low amounts of soil compaction and displacement with skyline yarding systems (Niehoff 2002).

Road Construction - An engineer or hydrologist would review locations of all roads longer than 300 feet prior to construction. Temporary road and landing construction proposed in stands 655-01-074 and 655-01-007 would utilize existing skid trails and landings. This would limit the cumulative impacts of the proposed activities.

Estimated Effectiveness: High; road location, particularly relative to streams, is a key factor in reducing road-related surface erosion at the scale of individual road segments. This feature would be implemented through contract provisions, administration of contract provisions, and compliance monitoring by the sale administrator or engineering representative (USDA Forest Service 1999a, Roads Analysis: Informing Decisions About Managing the National Forest Transportation System).

Nutrient Protection - The latest soil nutrient management recommendations from the Intermountain Forest and Tree Nutrient Cooperative (IFTNC) and Rocky Mountain Research Station would be applied to each activity area where organic material is removed. As appropriate:

- Conventional removal (lop and scatter) rather than whole-tree removal would be practiced. The "lop and scatter" technique would be used during intermediate (thinning) as well as final harvest (regeneration) operations.
- Slash would remain on site over-winter so that mobile nutrients such as potassium can leach from fine materials back to the soil.
- Broadcast burn or underburns would be "light" in nature and would foster release of potassium and other nutrients.

Tree species suitable to the site would be planted.

Estimated Effectiveness: High; this practice is based on research and Intermountain Forest Tree Nutrition Cooperative recommendations (Baker 1989; Edmonds 1987; Garrison and Moore 1998; Laskowski et al. 1995; Moore et al. 2004; Palviainen et al. 2004).

Retention of Coarse Woody Debris - Management of coarse woody debris and organic matter in regeneration units would follow the USFS Region 1 guidelines described in Table A-1. In units where existing coarse material is not sufficient, project activities would provide enough dispersed dead and downed coarse material to meet the guidelines.

Estimated Effectiveness: High; based on research (Graham et al. 1994) and Forest Plan Monitoring Reports (USDA Forest Service 2001, 2002 and 2003), effectiveness is high when guidelines are used; implementation has been moderately successful.

Table A-1. Coarse woody debris requirements

Stands	Potential Vegetation Code	Habitat Type	Coarse Woody Debris[1]
Douglas-fir/ninebark	260	PSME/PHMA	5-10 tons/acre
Grand fir/bear grass	510	ABGR/XETE	7-14 tons/acre
Western hemlock/queencup beadliliy	570	TSHE/CLUN	17-33 tons/acre

1 The minimum amounts listed should be retained after intermediate harvest, whereas the higher levels are recommended after final harvest and slash treatments.

Protection During Grapple Piling, Excavator Piling or Mechanical Harvest Activities –Grapple piling, excavator piling and ground-based yarding or harvesters would operate on a slash mat on slopes 30% or less, and on slopes between 30 - 50% for distances no longer than 50 feet.

Estimated Effectiveness: High; past Forest Plan monitoring (USDA Forest Service 2001, 2002, 2003 and 2004) indicates little to no soil disturbance if equipment is operated on a slash matt.

Protection During Logging Activities - If an area is winter logged one or more of the following requirements apply:

- Require a 24-inch snow layer or 18 inches of settled snow
- Require a combination where mineral soil is frozen at least 2 inches and a minimum of 6 inches of snow is maintained beneath the tread or wheels of operating equipment and logs dragged behind skidders
- Require frozen ground to a depth of 4 inches with equipment operation restricted to skid trails or where adequate slash matting exists.

Estimated Effectiveness: High; past Forest Plan monitoring reports and literature (USDA Forest Service 2001, 2002 and 2003, 2004 and Flatten 2003) indicate little to no detrimental soil compaction and displacement with these requirements.

Protection of Soils in Landings - Landings would be rehabilitated by recontouring, scarifying, ripping, subsoiling (as appropriate), seeding, planting and by covering them with slash and coarse woody debris for nutrient retention and erosion control. In stands 655-01-074 and 655-01-007 where detrimental impacts may exceed 15%, these measures would reduce detrimental impacts to below their pre-project levels.

Estimated Effectiveness: High to moderate; literature indicates that decompaction by a winged subsoiler and the introduction of organic matter to tilled soils are effective in initiating soil recovery (Plotnikoff et al. 2000, USDA Forest Service 2004).

Protection During Prescribed Burning Activities - Prescribed underburning and pile burning would take place only when the upper surface inch of mineral soil has a soil moisture content of 25 percent by weight or 100 percent duff moisture. Prescribed fire would not be used in the fall on south aspects.

Estimated Effectiveness: High; this practice is effective in retaining decomposing forest floor litter and organic matter to retain nutrients and soil productivity potential (Niehoff 1985, Niehoff 2002, USDA Forest Service 2001, 2002 and 2003).

Noxious Weeds

Noxious weed treatment will be conducted according to guidelines and priorities established in the Sandpoint Noxious Weed Control Project FEIS (USDA 1998). Methods of control may include biological, chemical, mechanical and cultural. Follow-up treatments and monitoring would be conducted as needed.

Gravel or borrow pits on federal lands to be used during road construction or reconstruction will be free of new weed invader species (as defined by the IPNF Weed Specialist). A list of weed species considered potential new invaders is included in the project file.

Any priority weed species (as defined by the IPNF Weed Specialist) identified during road maintenance will be reported to the District Weed Specialist. A list of priority weed species is included in the project file.

Weed treatment of all haul routes, service landings and helicopter landings on NFS lands will occur prior to ground disturbing activities where feasible. If the timing of ground disturbing activities would not allow weed treatment to occur when it would be most effective, it will occur in the next treatment season following the disturbance.

All timber sale contracts would require cleaning of off-road equipment prior to entry onto National Forest lands. If operations occur in areas infested with new invaders (as defined by the IPNF Weed Specialist), all equipment will be cleaned prior to leaving the site.

All newly constructed roads, skid trails, landings or other areas of disturbance (including maintenance on existing roads) will be seeded with a weed-free native and desired non-native seed mix and fertilized as necessary. Areas that are underburned will be evaluated after the burn and seeded and fertilized as necessary.

All straw or hay used for mulching or watershed restoration activities will be certified weed-free.

Road segments identified for weed treatment and proposed for obliteration will be treated prior to obliteration.

Estimated Effectiveness: The above mitigation measures are accepted weed prevention practices developed by public land management agencies and university cooperative extension offices and promoted by weed management organizations across the nation (e.g. Sheley et al. 1998, Drlik et al. 1998, USDA Forest Service 2001a). They are described in FSM 2981.2- 1a and FSM 2081.2 - 6a, respectively (see project file). Also included are weed prevention practices recommended but not required (see project file).

For new weed invaders, the estimated effectiveness of the above measures is high; the measures are expected to be very effective at preventing establishment of new invaders. According to current research (Hobbs and Humphries 1995), early detection and treatment of infestations before explosive spread occurs can significantly reduce the social cost of weed invasions.

For existing infestations that occur along road rights-of-way, estimated effectiveness is moderate; the measures are expected to be somewhat effective at reducing the spread of these in the project area. For existing infestations that have spread off the road, estimated effectiveness is low. Effectiveness of treatments on National Forest lands could be reduced if adjacent landowners do not treat their weed infestations. Existing weeds and new invaders are also spread by wildlife, winds, water and hikers – the mitigation measures would have no effect on these sources of weed spread.

TES Plants

All documented sensitive plant occurrences will be buffered from project activities. The buffers will be established by a qualified botanist. Any changes to the selected alternative that may occur during layout will be reviewed, and rare plant surveys conducted as necessary prior to project implementation. Newly documented occurrences will be evaluated, with specific protection measures implemented to protect population viability. Such measures could include the following;

- Dropping units from harvest activity
- Modifying unit boundaries to provide adequate buffers around documented occurrences, as determined by the project botanist and based on topography, extent of contiguous suitable habitat for documented occurrences and the type of treatment proposed
- Modifying harvest methods, fuels treatment or logging systems to protect TES plants and their habitat
- Implementing, if necessary, Timber Sale Contract provisions B6.24, Protection Measures Needed for Plants, Animals, Cultural Resources, and Cave Resources; C6.24#- Site Specific Special Protection Measures; and B8.33, Contract Suspension and Modification.

Estimated Effectiveness: Estimated effectiveness is high. The measures would protect documented occurrences of the Forest species of concern pine broomrape (*Orobanche pinorum* Geyer).

Scenery and Visual Quality

In foreground and mid-ground areas visible from Lake Pend Oreille unit shape and design will imitate natural openings and landform configurations, including leaving islands of untouched vegetation, openings, clumps of trees and open stands of trees with irregular spacing. This technique borrows color and texture from the existing landscape. In thinning units, the spacing of leave trees will vary and some clumps of denser canopy will be retained to create a natural appearance. Roads and landings will be located and constructed to minimize cuts and fills. Hardwoods will be maintained for diversity of color and texture.

In the background view areas, openings will be shaped to a size and form that appear as natural. Vegetation will be blended from treated to untreated areas.

Estimated Effectiveness: Moderate to high. The use of varied logging systems (e.g. helicopter) along with the opening of the canopy to create a natural appearing mosaic has proven to be effective on numerous projects in the Sandpoint Ranger District in the recent past (see project file for photos). The 2003 IPNF Forest Plan Monitoring and Evaluation Reports showed that of the two timber sale projects completed on Sandpoint Ranger District in that year, one (Pack Saddle South) met the Visual Quality Objectives (VQOs) at the 90% level and the other (White French) met the VQOs at the 100% level. (USDA 2003, pp. 24 and 25).

Heritage Resources

The South Grouse project area has been surveyed for heritage resources and only one site has been noted for protection within the project area (Project File). This site is not within any proposed activity area, and no other sites are known to occur within any activity areas.

In the event that heritage resources are encountered during program activities, the Idaho Panhandle National Forests has the authority to modify or stop timber sale activities. The standard heritage resources timber sale contract provision (B6.24 Protection of Cultural Resources) would be included in the timber sale contract. The provision specifically requires the contractor to notify Idaho Panhandle National Forests regarding such discoveries. Mitigation of impacts for timber sales can include but are not limited to:

- Establishing buffer zones
- Directional falling
- Altering cutting unit boundaries
- Changing road locations
- Designating skid trails away from historic properties
- Limiting the cutting methods in certain areas
- Allowing only seasonal activities
- Limiting slash disposal and tree planting activities

Estimated Effectiveness: High; the Idaho State Historical Preservation Office (SHPO) has reviewed and agrees with the mitigation measures and Forest Service determination on this project (see project file – heritage section). Special contract provisions are utilized in all contracts and have been effective in protecting heritage resources (USDA Forest Service 2002, p. 22).

Appendix B – Compliance with Old Growth Standards

This section is provided to show how the South Grouse Hazardous Fuels Reduction project is consistent with Forest Plan standards for protecting and maintaining 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).

The Regional Task Force published its report *Old Growth Forest Types of the Northern Region* by P. Green et al. (1992), as part of the US Forest Service, R-1 SES Series. The IPNF used the definitions in this report in allocating its old growth. Therefore, standard 10a has been met.

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

The Forest Plan identified 2,310,000 forested acres on the IPNF. Therefore, the Forest Plan standard requires maintaining 231,000 acres of old growth. The most recent Forest Plan Monitoring Report (2004a) indicates that based on Forest Inventory and Analysis (FIA) data, the estimated percent of old growth on the forested lands of the IPNF is 12.85%[4]. We have identified and allocated 278,552 acres of forest stands (12.1% of IPNF forested acres) to be retained as old growth. Therefore, standard 10b has been met. Detailed information confirming the IPNF's standing relative to this standard is contained in the project file (Zack 2006).

Sandpoint Ranger District's old growth allocation - The IPNF old growth allocation of 10% old growth 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 (project file). The Sandpoint Ranger District was responsible for allocating 21,500 acres of old growth. The 2004 Forest Plan Monitoring Report indicates that 24,591 acres have actually been allocated in the Pend Oreille River Subbasin (USDA Forest Service 2004a). Therefore, the Forest Supervisor's allocation was exceeded in the District. Detailed information District's standing relative to this standard is contained in the project file (Zack 2006).

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.

The South Grouse Project Area (2,211 acres) is located within a portion of Old Growth Management Unit 27 (OGMU 27). This OGMU contains 10,072 acres of National Forest System land and 3,313 acres of private land (13,385 total acres). OGMU 27 contains 195 acres of field-allocated old growth. This represents 1.5% of the total acres in the OGMU and 2.8% of the National Forest System land in the OGMU. An additional 85 acres of potential old growth has been identified in OGMU 27, neither allocation is located in the South Grouse project area. Stand 655-01-044 (17.34 acres) is the only allocated old growth located in the South Grouse project area. No treatments are proposed in this stand.

Past wildfires and historic logging are responsible for the scarcity of old growth in OGMU 27. The majority of stands in OGMU 27 consist of trees regenerated after large wildfires around the beginning of the 20th century.

[4] The 90% confidence intervals of this estimate are 10.55% to 15.27%.

The South Grouse project proposes regeneration harvest in stands that are experiencing high levels of insect and disease-caused mortality. These stands are unlikely to reach old growth structural status. Stands where selective cutting is proposed should begin to contribute to the acreage of long-lived seral old growth in the OGMU within about 50 years.

Old growth standard 10c requires selection and maintenance of at least five percent of the forested portion of those old growth units that have five percent or more of existing old growth. Less than 3% of OGMU 27 is old growth; therefore, because there is less than 5% presently, the project would not be required to bring OGMU 27 up to the 5% old growth. No reduction in old growth within OGMU 27 would occur as a result of the proposed action. No harvest is proposed in field-allocated old growth or in field-allocated potential old growth. Areas proposed for thinning in the project area, as well as untreated stands throughout the OGMU would likely increase the proportion of the OGMU occupied by old growth over the next 50 years. Old growth standard 10c would be met.

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%.

As there is no plan to harvest old growth, or in old growth stands, old growth standard 10d would be met.

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

The habitat type series distribution of the allocated old growth on the IPNF reflects approximately the same habitat type series distribution on the IPNF. The 2004 Forest Plan Monitoring report supports this finding (USDA Forest Service 2004a). Old growth standard 10e would be met. Additional information IPNF's standing relative to this standard is contained in the project file (Zack 2006).

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.

As described in "Old Growth Standard 10c" above, OGMU 27 contains 195 acres of field-allocated old growth and an additional 85 acres of potential old growth. None of these acres is located in the South Grouse project area.

Past wildfires and historic logging are responsible for the scarcity of old growth in OGMU 27. The majority of stands in OGMU 27 consist of trees regenerated after large wildfires around the beginning of the 20th century. Areas proposed for thinning in the project area, as well as untreated stands throughout the OGMU will very likely increase the proportion of the OGMU occupied by old growth over the next 50 years.

As time passes, groups of contiguous stands of stands throughout OGMU 27 will move toward old growth structural status. These assemblages will be 100 acres or more in size, and the potential exists for 300+ acre of continuous old growth to develop on the Grouse Mountain portion of OGMU 27. Old growth standard 10f would be met.

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

None of the proposed road construction activities would occur in, or adjacent to any old growth stands, and would not reduce the size of any old growth management stands. Therefore, old growth standard 10g would be met.

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

The proposed activities do not include any new domestic grazing allotments. Old growth standard 10h would be met.

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.

The 2004 Forest Plan Monitoring Report (USDA Forest Service 2004a) includes a table showing the Forest Plan management areas that have acre goals associated with them for old growth allocation. The table also shows the existing amounts of allocated old growth for those same areas. Current old growth allocations meet and far exceed those Forest Plan goals. Therefore, old growth standard 10i has been met.

Appendix C – Best Management Practices and Forest Plan Consistency for Aquatic Resources

Site-Specific Best Management Practices

PRACTICE 11.05 - Wetlands Analysis and Evaluation

Objective: To delineate wetlands within sale areas in order to prevent damage to facilities or degradation of soil and water resources.

Effectiveness: High

Compliance: FPA Rule 4.d.v(c) – Meets

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 CT6.61# (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 50 feet from the wetlands, bogs, and wet meadows.

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 Timber Sale Contract provision CT6.601# (Erosion Control Seeding). Timber Sale Contract provision CT6.623# (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.

PRACTICE 14.06 - Riparian Area Designation

PRACTICE 15.12 - Control of Construction in Riparian Areas

Objective: To minimize the adverse effects on Riparian Areas with prescriptions that manage nearby logging and related land disturbance activities.

Effectiveness: Moderate

Compliance: FPA Rules 3.g.ii, iii, & iv; 3.f.iv - Meets

Implementation: Riparian areas will be protected through the following requirements that will be incorporated into timber sale layout, or into the timber sale contract as identified below:

1. Provide the large organic debris, shading, soil stabilization, wildlife cover, and water filtering effects of vegetation along streams [FPA Rule 3.g.i-iii]. The following measure(s) are implemented during sale layout:

   (a) Stream Protection Zone that consists of a buffer of 50 feet slope distance from the edge of intermittent channels. No timber harvest activities shall occur within the Stream Protection Zone.

2. Waste resulting from logging operations, such as crankcase oil, filters, grease and fuel containers, shall not be placed inside the Stream Protection Zones [FPA Rule 3.f.iv and TSC Provision BT6.34].

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 at least 100 feet outside of the appropriate Stream Protection Zone [FPA Rule 3.f.iii].
2. Skid trails and landings will be seeded with a mix specified in C6.601#.

Landings:

1. During period of use, landings will be maintained in such a manner that debris and sediment are not delivered to any streams.
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 [Provision BT6.63 (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. [Reference FSH 7709.56]

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.

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.

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), Timber Sale Contract Clause C5.4, and Standard Road Specifications-Special Project Specification 204.04].

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 Clause C5.4].

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)).

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.

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.

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)

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 C5.411# and C5.412#. 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 C5.4- T301, 310).

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 Clauses C5.4 and C5.253, 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 Timber Sale Contract Clauses C5.441 and C6.341].

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).

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.

PRACTICE: 15.25 - Obliteration of Temporary Roads

Objective: To reduce sediment generated from temporary roads by obliterating them at the completion of their intended use.

Effectiveness: High. Following use, obliteration would bring full recovery within 3-5 years.

Compliance: No FPA rules directly address road obliteration. Obliteration exceeds standards for abandoned roads (4.04.e.i-iv).

EXPLANATION: Temporary roads are constructed for a specific short-term purpose, such as, ski area development roads, logging spurs on a timber sale, and so forth. In order to prevent continued low level casual use, such roads are obliterated at the completion of their intended use. Due to short-term nature of temporary roads, continued maintenance funds can not be used for work on temporary roads. Temporary roads that are allowed to remain in use beyond their prescribed time are subject to continued, uncorrected damage, and they can become chronic sediment sources.

Effective obliteration is generally achieved through a combination of the following measures:

a. Road effectively drained and blocked.

b. Temporary culverts and bridges removed and natural drainage on figuration re-established.

c. Road returned to resource production through revegetation (grass, browse, or trees).

d. Sideslopes reshaped and stabilized.

IMPLEMENTATION: For timber sales, temporary road closure, stabilization and removal of temporary structures are accomplished by the Timber Purchaser. The certified Sale Administrator assures compliance with plans and the Timber Sale Contract. Forest Service supervisors are responsible for insuring that other temporary roads developed by the Forest Service met design standards and management requirements. Temporary road development on Forest Service lands that are allowed through special use permits and/or easements are subject to the same obliteration requirements as temporary roads on timber sales. District Rangers or their representatives are responsible for assuring the obliteration of such roads is accomplished.

REFERENCES: Timber Sale Contract provisions B6.62, B6.5, C6.6, and C6.601; FSM 2522; SWCP 11.03, 11.08, 11.09, 13.04, 14.12 - 14, 14.19, and 15.03; NFMA; FSH 2409.15, Timber Sale Administration Handbook; see references in "Best Management Practice" Definition (05--2 and 3).

Idaho Panhandle National Forests Forest Plan Consistency (IPNF, Forest Plan, p. II-33)

Specific management objectives in the Idaho Panhandle National Forests Forest Plan pertaining to water resources are:

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 South Grouse Hazardous Fuel Reduction Project will meet standard BMPs. Site-specific BMPs were also included with this project as mitigation measures to improve water quality.

2. **Maintain concentrations of total sediment or chemical constituents within state standards.**

The net production and delivery of sediment from the proposed project is anticipated to be very small. With the implementation of design criteria, State and site-specific BMPs, and INFS standards, the potential for sediment delivery will be further reduced. Since there are no specific water quality standards, or beneficial use of water within the project area, and what little sediment or chemical constituents that may enter an intermittent channel will be further reduced and dispersed before entering any perennial waters. The action alternative will meet State standards for sediment and chemical constituents.

3. **Implement project level standards and guidelines for water quality contained in the Best Management Practices.**

The proposed action is consistent with consistent with Idaho Forest Practices Rules. 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.

4. **Cooperate with the states to determine necessary instream flows for various uses.**

Instream flows are not an issue with the proposed project. Therefore, this standard is not applicable.

5. **Manage public water system plans for multiple uses by balancing present and future resources with public water supply needs.**

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 fisheries standards whichever is applicable

6. **Activities within non-fishery drainages, including first and second order streams, will be planned and executed to maintain existing biota.**

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.

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.**

This standard has been met for the proposed action. The WEPP model was used to predict sediment yield changes. Road drainage crossings were inventoried to assess erosional hazards and potential risks. The condition of the pipe, fill, and channel were examined and assessed to determine the overall condition of the crossing (project file).

Appendix D – Fisheries Management Direction & Guidelines

Inland Native Fish Strategy Standards and Guidelines (USDA Forest Service 1995, A7-A13)

Only INFS standards and guidelines that apply to the range of alternatives for the South Grouse Hazardous Fuels Reduction Project 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 alternative within RHCAs in the project area.

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.

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:

RF-2 a. Completing watershed analyses prior to construction of new roads or landings in Riparian Habitat Conservation Areas (RHCAs) within priority watersheds.
No construction of new roads, temporary roads, or landings is proposed within RHCAs.

RF-2 b. Minimizing road and landing locations in Riparian Habitat Conservation Areas.

No new roads or landings are proposed within RHCAs in the action alternative.

Effectiveness: High.

RF-2 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 (IDT) evaluated access and road improvement needs within the project area.

Effectiveness: Moderate.

RF-2 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.

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.

RF-2 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.

RF-2 f. Avoid sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RHCAs in priority watersheds.

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 construction and maintenance described in Chapters II and III originate from the above standards. The action alternative would meet this standard.

Effectiveness: High. Existing roads are proposed for maintenance 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 action alternative would meet this standard.

Effectiveness: High. There are no stream crossings for any of the proposed temporary roads.

RF-5. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

There are no existing or proposed crossings of fish-bearing streams in the project area.

Effectiveness: High. There are currently no crossings that are known fish barriers in the project area.

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 II and III originate from the above standards. The action alternative would meet this standard

.

Effectiveness: High. Prescribed burning would not occur 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 2, and 3 originate from the above standards. The action alternative 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.

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 listed in the Sandpoint Noxious Weed FEIS, the action alternative would meet this standard.

Effectiveness: High. Standards would be met as required by the Sandpoint Noxious Weed EIS.

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. This standard would be applied in the prescribed burn plans associated with the project. 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: High. The action alternative 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: Moderate to High. Cooperation at the multiple levels as listed occurred within the framework for developing the proposed activities of this project.

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. Road maintenance 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 Guidelines (USDA 1987, pp. II – 29-31)

Fry Emergence (Fish Standard 1 and 2):
On June 2, 2005, the Forest Supervisor for the Idaho Panhandle National Forests signed a decision notice and finding of no significant impact that amended the Forest Plan to modify or remove objectives, standards, and monitoring requirements pertaining to fry emergence success (IPNF, 2005). The amendment was implemented because the fry emergence objectives, standards and monitoring requirements that were in the IPNF Forest Plan did not contribute as well as Inland Native Fish Strategy (INFS) objectives, standards, guidelines, and monitoring direction towards meeting the goals of providing sufficient habitat in support of maintaining diverse and viable populations of fish species across the forest. In addition, because of the limited application of the fry emergence models and their unreliability and the inability to determine fry emergence success in the field due to high variability affected by multiple natural and human-caused factors, the Forest Service was not able to state with any degree of certainty whether measures of fry emergence success were accurate or precise.

Appendix E – Cumulative Effects Analysis Information

In *Lands Council v. Powell*, the U.S. Court of Appeals for the 9th Circuit held that, under the circumstances presented in the case, proper cumulative impact analysis required some cataloging of past projects and their effect on the current project area. Furthermore, such cataloguing should provide sufficient detail to allow for analysis of the differences between prior projects and proposed projects, which could provide the information necessary to consider alternatives that might have less impact on the environment.

Within this Environmental Assessment (EA), we have provided information concerning relevant past, present and reasonably foreseeable projects and activities that have occurred, are occurring, or are proposed to occur within each of the resource cumulative effects areas examined in this analysis. Additionally, an adequately detailed discussion of the effects of these past, ongoing, and reasonably foreseeable activities has been provided in Chapter 3 to promote an informed assessment of environmental considerations.

The Council on Environmental Quality (CEQ), whose responsibility it is to coordinate federal environmental efforts and work closely with agencies and other White House offices in the development of environmental policies and initiatives, has provided guidance to federal agencies on the consideration of past actions in cumulative effects analysis (CEQ 2005)[5]. CEQ stated that "generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historic details of individual past actions" (CEQ 2005 p. 2). Cumulative impact is defined in CEQ's NEPA regulations as the "impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions…" (40 CFR 1508.7). CEQ has interpreted this regulation as referring only to the cumulative impact of the direct and indirect effects of the proposed action and its alternatives when added to the aggregate effects of past, present, and reasonably foreseeable future actions (CEQ 2005 p. 2).

During the preparation of the EA, the Forest Service determined what information regarding past actions was useful and relevant to the analysis of cumulative effects. While CEQ found that cataloging past actions and specific information about the direct and indirect effects of a past project's design and implementation could in some contexts be useful to predict the cumulative effects of the proposal, the regulations do not require the Forest Service to catalog or exhaustively list and analyze all individual past actions (CEQ 2005 p. 3).

This EA has provided a description of known past activities and their effects; however, due to the marked difference between past and current land management practices and policies, this analysis did not further aid in assessing whether one form or another of the proposed activities would assist in meeting the project's purpose and need for action with minimal environmental harm. The evolution that has occurred in land management practices is the result of science and our ongoing monitoring actions. The following discussion explains how past forest management activities have changed over time.

On the forest, early to mid 20th century road construction activities focused construction mainly through river valleys, riparian areas, floodplains, and adjacent hillsides. The roads efficiently provided access but decreased the land's effectiveness as wildlife habitat and constricted stream

[5] CEQ Memorandum to the Heads of Federal Agencies regarding Guidance on the Consideration of Past Actions in Cumulative Effects Analysis, June 24, 2005.

channels, while providing a new avenue for erosion and discharge of sediment into streams. Roads on national forest lands often were simply an expansion of existing trails and paths that provided access so that they would accommodate newer equipment and current land uses. In some situations, roads were developed on abandoned railroad beds. In both cases, the location and design were predetermined from the previous use and era. As time progressed, roads were "designed" and located to achieve their primary purpose, which was to provide access and haul product at a minimal cost. In the decades following World War II (1950s –'70s), the road network was rapidly expanded to support the domestic need for lumber in housing construction. Over the last twenty years, both road design and location have evolved as necessary tools to not only provide efficient access; but also to protect the valuable watershed resources they encroached upon. Forest Service Best Management Practices (BMPs) (FSH 2509.22 Soil and Water Conservation Practices Handbook) currently incorporated into road construction/reconstruction activities on the forest include:

- Road surfacing (gravel, etc…) was incorporated to not only provide better trafficability; but also to prevent and control erosion from the road surface.
- Road drainage controls are now being incorporated into designs that:
    - Reduce the erosive flows in ditches by providing frequent cross-drains to relieve ditch flows;
    - Avoid water movement down the road by dispersing the drainage quickly by crowning or outsloping the road surface;
    - Stabilize ditches by lining; and
    - Disperse drainage water (that often carries sediment) onto stable forested slopes before ditches discharge into waterways.
    - Allow new and existing stream crossings to safely pass extreme events (i.e. 100 year flood event).
- Special construction techniques and designs have been utilized (i.e., full- or partial-benching of roads) to avoid unstable side casting of waste materials; windrowing clearing slash to prevent sediment delivery to streams from construction activities themselves as well as from erosion of road fills and treads that are not yet protected with erosion control vegetation.
- Some roads now are designed to take advantage of the non-uniformities of the slopes they cross by "rolling grades" and grade breaks to prevent the potential for accumulations of water or excessive ditchflows that have destabilized the road bed or cause surface erosion in the past.
- Designers and planners develop road networks that avoid highly erosive or unstable slopes utilizing the *land system inventory*, hydrologists, soil scientists, and geotechnical engineers.
- Road crossings are being located at more stable sites and crossing designs are now considering water quality and fish passage as primary design criteria, rather than criteria that just account for costs and traffic efficiency.
- Roads are being located well away from streams and their riparian areas where ever practicable; and the number of crossing sites is being minimized. These features are in stark contrast to past road locations that sometimes resulted in chronic sources of sediments, extended exposure of streams to direct sunlight resulting in temperature elevations, and nearly permanent reductions of the replacement sources of the structural components of streams and aquatic cover, riparian deadfall.
- In the past, when a road's utility ended, the road was simply abandoned. These abandoned roads have been a substantial water quality and slope stability issue as they

> have deteriorated, especially without any maintenance. Current practice is to restore key abandoned or no longer useful roads to a "hydrologically neutral" condition where its remnants are self-maintaining and are no longer disturbing slope stability or the movement of slope water, either on or below the soil surface or the natural functions and adjustments of streams, wetlands, and other water bodies.

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

In 1972, Section 208 of the Clean Water Act Amendments established the regulatory framework for non-point source pollution control thorough use of BMPs. BMPs are defined in Idaho as a practice or combination of practices determined to be the most effective and practicable means of preventing or reducing the amount of pollution generated by non-point sources (IDAPA 20.02.01). BMP monitoring is annually conducted by the forest to validate the implementation and effectiveness of BMPs associated with land management activities. Monitoring results are used to adapt future management actions where improvements in meeting water quality objectives are indicated. Forest monitoring of BMPs indicates that in most cases they continue to function as expected and are meeting their intent (USDA Forest Service 2002b, 2003, 2004). At the time the IPNF Forest Plan was written (1987), the emphasis was on developing a commodity production strategy while minimizing impacts to watersheds and aquatic resources, including fish. The strategy for watershed management was constructed in the forest plan as a "maintenance" objective. In some situations, thresholds, or "minimum impact" standards defined the criteria for maintenance. To ensure that watersheds and aquatic resources were maintained during forest management activities, BMPs were applied. Despite the existing forest plan standards and BMPs, the condition of fish habitat on the forest was declining, primarily due to timber harvest and road building activities (USDA Forest Service 1992).

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

Harvest methods and removal of timber products from the national forest has changed substantially over time. Early harvest methods (1950s, ’60s, and ‘70s) focused primarily on financial objectives of providing low cost wood products. Harvest placement often occurred in the highest volume, easily accessible stands. Timber harvest often occurred within riparian areas and adjacent to streams. Most of the harvest prescriptions were primarily designed to produce healthy young stands with shorter rotation ages.
Modern timber harvest prescriptions and design emphasizes desired conditions of the forest after the harvest. This usually results in the retention of various amounts of trees in a post-harvest stand, addressing objectives that may include wildlife habitat, watershed conditions, hazardous fuels, visual quality, soil productivity, forest health and others. On sites determined suitable for timber production, timber harvest may also produce timber products on a regulated basis while compatible with these other resource objectives and values. Some examples where timber production and resource objectives can be achieved simultaneously are:

- Reducing tree densities to decrease bark beetle hazard, thereby prolonging the development of the forest and maintaining tree cover
- Managing tree canopies to limit fire spread from the forest floor to the tree crowns
- Developing flamulated owl habitat in ponderosa pine forest through removal of smaller stems crowding larger trees, thereby providing more room to grow for the remaining trees, and open stand conditions favored by the owl
- Designing harvest patterns across the landscape to facilitate wildlife movement, such as providing corridors and preserving travel routes for ungulates. Also, using harvest prescriptions and landscape patterns as part of a wildfire hazard reduction strategy
- Increasing the amount of native western white pine, western larch and ponderosa pine, which generally are insect and disease resistant and are long-lived, as well as increasing western red cedar in valley bottoms, where it historically was more abundant than today
- Using variable retention harvests to meet visual management objectives

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

Increased environmental awareness has also lead to improvements in logging systems that we use to remove trees from the forest. Early harvests emphasized cheap, labor intensive logging methods, such as railroad, horse, short distance jammer systems, and tractor logging. Logging systems were selected primarily by the least expensive method to transport the trees from the forest to the mill. This sometimes involved harvesting on steep slopes, creating excessive soil disturbance and increasing the risk of erosion. Streams were sometimes used as a method to transport logs from the harvest site, causing impacts to the aquatic system and adjacent riparian habitat. Road systems were sometimes dense (ten miles/square mile) to facilitate rapid and inexpensive removals, in some cases compromising water quality.

Today’s logging systems recognize and reduce the threat of environment harm in a number of ways. Tractor logging generally occurs on slopes 35 percent or less, and is limited to designated locations, reducing soil impacts. Skyline and other cable yarding systems are used on steeper slopes, which greatly reduces the amount of soil disturbance. Increasingly, helicopter logging is used, which extends yarding distances and thereby reduces road densities. A suite of best management practices and forest plan standards and guidelines aids in the development of the

least impactive design possible. Monitoring during and after the sale is completed provides a valuable feedback loop that quickly identifies and corrects variances should they occur.
The forest ceased regeneration harvest of allocated old growth stands a number of years ago. Presently, our focus is on maintaining the old growth stands that we have and allocating additional stands for future old growth as they mature. On drier sites, restoration of old growth may include various mixes of prescribed fire, and thinning to restore historic more open old growth stand structures and reduce risk of stand replacing fire. Planting of shade-intolerant, fire-adapted species may also be done if these are in short supply. On these dry sites, our objective is to restore and sustain the old growth by retaining the large old trees, preserving the old growth characteristics, and restoring historic old growth structures and processes (USDA Forest Service 2003, USDA Forest Service 2004, Quigley and Arbelbide 1997).

For the above stated reasons, changes in road construction/reconstruction and maintenance practices; implementation of INFS management direction and watershed BMPs; and changes in harvest practices and objectives, an individual analysis of past projects cannot be clearly compared to analysis of the proposed actions.

However, for most resources analyzed, the effects of past actions are accounted for in the discussion of the existing condition. Additionally, the effects of past actions that are similar to activities proposed are discussed when they would be useful in describing the possible effects of the proposed action.