United States
Department of
Agriculture

Forest Service
Northern Region

Idaho Panhandle
National Forests

February 2008

Coeur d'Alene River Ranger District

Deerfoot Resource Area Environmental Assessment

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 USDA, Director, Office of Civil Rights, 1400 Independence Avenue SW, Washington DC 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 for Action

1.1 Introduction ..... Page 1-1
1.2 Purpose and Need for Action ..... Page 1-2
1.3 Proposed Action ..... Page 1-7
1.4 Scope of the Proposal ..... Page 1-8
1.5 Decisions to be Made ..... Page 1-8

Chapter 2 –Alternatives

2.1 Introduction ..... Page 2-1
2.2 Policy, Direction, and Legal Guidance ..... Page 2-1
2.3 Scoping and Alternative Development ..... Page 2-4
2.4 Alternative Descriptions ..... Page 2-8
2.5 Features of the Proposed-Action Alternative ..... Page 2-11
2.6 Mitigation Measures ..... Page 2-14
2.7 Monitoring Activities ..... Page 2-15
2.8 Alternatives Considered but Eliminated ..... Page 2-16

Chapter 3. Existing Conditions & Environmental Consequences

3.1 Introduction ..... Page 3-1

3.2 Forest Vegetation ..... Page 3-1

3.2.1. Policy, Direction and Legal Guidance for Forest Vegetation 3-1

3.2.2. Methodology Used in the Forest Vegetation Analysis 3-1
- A. Scale of the Forest Vegetation Analysis area 3-1
- B. Analysis of Forest Vegetation Conditions 3-2
- C. Information Sources, Models and Other Tools Used in the Forest Vegetation Analysis 3-4

3.2.3. Affected Environment for Forest Vegetation ..... Page 3-5
- A. Vegetative Overview 3-5
- B. Vegetative Agents of Change 3-5
- C. Current Vegetative Conditions in the Deerfoot Resource Area 3-10

3.2.4. Environmental Consequences to Forest Vegetation ..... Page 3-14
- A. Direct and Indirect Effects at the Treatment Unit Scale, No-Action Alternative 3-14
- B. Direct and Indirect Effects at the Treatment Unit Scale, Proposed-Action Alternative 3-15
- C. Direct and Indirect Effects at the Resource Area Scale, Proposed-Action Alternative 3-19
- D. Cumulative Effects at the Resource Area Scale 3-22

3.2.5. Consistency with Policy, Direction and Legal Guidance for Forest Vegetation ..... Page 3-25
- A. Forest Plan Standards for Old Growth 3-25
- B. Forest Plan Standards for Timber 3-28
- C. Forest Plan Standards for Forest Protection 3-32
- D. Consistency with the National Forest Management Act 3-32

3.2.6. References Cited in the Forest Vegetation Analysis ..... Page 3-34

3.3. Fire/Fuels ..... Page 3-37

3.3.1. Policy, Direction and Legal Guidance for Fire/Fuels ..... Page 3-37

3.3.2. Methodology for the Fire/Fuels Analysis ..... Page 3-38

3.3.3. Existing Conditions of Fire/Fuels ..... Page 3-40
- A. Broad-scale Fire History 3-40
- B. Deerfoot Resource Area Fire History 3-41

3.3.4. Environmental Consequences to Fire/Fuels ..... Page 3-49
- A. Flame Lengths 3-49
- B. Probability of Torching and Crowning 3-50
- C. Effects under the No-Action Alternative 3-51
- D. Effects under the Proposed-Action Alternative 3-54
- E. Conflicting Science 3-61

3.3.5. Consistency with Policy, Direction and Legal Guidance for Fire/Fuels ..... Page 3-62

3.3.6. References Cited in the Fire/Fuels Analysis ..... Page 3-64

3.4. Aquatic Resources ..... Page 3-69

3.4.1. Policy, Direction and Legal Guidance for Aquatic Resources ..... Page 3-69

3.4.2. Affected Environment ..... Page 3-70
A. Methodology used in the Assessment and Description of the Aquatic Environment 3-70
B. How Past Actions Influenced Existing Conditions of the Affected Watersheds 3-74
C. Characterization of the Affected Environment 3-75
D. Fisheries 3-85

3.4.3. Environmental Consequences to Aquatic Resources ..... Page 3-92
A. Methodology Used in the Assessment of Environmental Consequences 3-92
B. Direct and Indirect Effects to Aquatic Resources under the No-Action Alternative 3-94
C. Direct and Indirect Effects to Aquatic Resources under the Proposed-Action Alternative 3-94
D. Cumulative Effects 3-100

3.4.4. Consistency with Policy, Direction and Legal Guidance for Aquatic Resources ..... Page 3-103
A. Forest Plan Water Standards 3-103
B. Forest Plan Fish Standards 3-106
C. National Forests Management Act – Species Diversity 3-106
D. Endangered Species Act 3-106
E. Clean Water Act (including State of Idaho Implementation) 3-106
F. Idaho Forest Practices Act 3-106
G. Presidential Executive Order 12962 – Recreational Fishing 3-106
H. State of Idaho Governor's Bull Trout Plan 3-107

3.4.5. References Cited in the Aquatic Resources Analysis ..... Page 3-107

3.5. Soil Productivity ..... Page 3-109

3.5.1. Policy, Direction and Legal Guidance for Soil Productivity ..... Page 3-109

3.5.2. Methodology Used in the Soil Productivity Analysis ..... Page 3-110

3.5.3. Affected Environment for Soil Productivity ..... Page 3-110
A. Geology and Soils 3-110
B. Soils and Productivity 3-112
C. Existing Soil Conditions 3-113
D. Site Conditions from Past Activities 3-116
E. Existing Roads and Transportation 3-118

3.5.4. Environmental Consequences to Soils ..... Page 3-118
A. Methodology Use to Analyze Environmental Consequences to Soils 3-118
B. Direct and Indirect Effects to Soils under Either Alternative 3-120
C. Direct and Indirect Effects to Soils under the No-Action Alternative 3-121
D. Direct and Indirect Effects to Soils under the Proposed-Action Alternative 3-121
E. Cumulative Effects to Soil Resources 3-127

3.5.5. Consistency with Policy, Direction and Legal Guidance for Soil Productivity ..... Page 3-129

3.5.6. References Cited in the Soils Analysis ..... Page 3-130

3.6. Wildlife ..... Page 3-134

3.6.1. Policy, Direction and Legal Guidance for Wildlife ..... Page 3-134

3.6.2. Methodology Used in the Wildlife Analysis ..... Page 3-135
A. Introduction 3-135
B. Geographic Scope 3-136
C. Habitat Model Validation 3-136
D. Wildlife Conservation Assessments and Strategies and Recovery Plans 3-137
E. Species Relevancy Screen 3-137
F. Viability 3-138
G. Suitable and Potential Habitat 3-139
H. Probability of Occurrence 3-140

3.6.3. Species Considered in the Wildlife Analysis ..... Page 3-140
A. Threatened and Endangered Species 3-140
B. Sensitive Species 3-141
C. Management Indicator Species 3-141
D. Nongame Wildlife 3-142
E. Neotropical (Migrant) Birds 3-142

3.6.4. Affected Environment and Environmental Consequences to Wildlife ..... Page 3-143
A. Terrestrial Wildlife Habitat 3-143
B. Analysis of Threatened and Endangered Wildlife Species 3-146
C. Analysis of Sensitive Wildlife Species 3-148
D. Analysis of Old-growth Management Indicator Species 3-169
E. Analysis of Big-game Management Indicator Species 3-181
F. Analysis of Non-game Habitat 3-186
G. Analysis of Forest Land Birds 3-188
3.6.5. Consistency with Policy, Direction and Legal Guidance for Wildlife ..... Page 3-189
A. Forest Plan 3-189
B. Endangered Species Act 3-192
C. National Forests Management Act 3-192
D. Migratory Bird Treaty Act 3-192
3.6.6. References Cited in the Wildlife Analysis ..... Page 3-192
3.7. Scenery ..... Page 3-197
3.7.1. Policy, Direction and Legal Guidance for Scenery ..... Page 3-197
3.7.2. Methodology Used in the Scenery Analysis ..... Page 3-197
3.7.3. Existing Scenic Conditions ..... Page 3-197
3.7.4. Effects to Scenic Conditions ..... Page 3-198
3.7.5. Consistency with Policy, Direction and Legal Guidance for Scenery ..... Page 3-199
3.7.6. References Cited in the Scenery Analysis ..... Page 3-199
3.8. Recreation ..... Page 3-199
3.8.1. Policy, Direction and Legal Guidance for Recreation ..... Page 3-199
3.8.2. Existing Recreation Conditions ..... Page 3-200
3.8.3. Effects to Recreation ..... Page 3-200
3.8.4. Consistency with Policy, Direction and Legal Guidance for Recreation ..... Page 3-200
3.9. Economic Analysis ..... Page 3-201
3.9.1. Policy, Direction and Legal Guidance for Finances ..... Page 3-201
3.9.2. Methodology Used in the Financial Analysis ..... Page 3-201
3.9.3. Affected Financial Environment ..... Page 3-202
3.9.4. Financial Consequences ..... Page 3-202
3.9.5. Consistency with Policy, Direction and Legal Mandates for Finances ..... Page 3-203

Acronyms/Glossary

Appendices

Appendix A ..... Best Management Practices
Appendix B ..... Inland Native Fish Strategy Standards and Guidelines
Appendix C ..... Past, Ongoing & Reasonably Foreseeable Activities
Appendix D ..... Unit Information
Appendix E ..... Concerns Not Addressed in Detail

LIST OF TABLES

Table 2-1. Reasonably foreseeable activities on NFS lands in the Deerfoot Resource Area ..... Page 2-5
Table 2-2. Summary of activities in the Deerfoot Resource Area under the Proposed-Action Alternative ..... Page 2-9

Table 3-VEG-1. Minimum standards for old-growth types in the Deerfoot Resource Area ..... Page 3-3
Table 3-VEG-2. Acres of harvest in the Deerfoot Resource Area from 1960 to present ..... Page 3-9
Table 3-VEG-3. Allocated old growth in OGMUs 321 and 324 ..... Page 3-12
Table 3-VEG-4. Current structural conditions in the Deerfoot Resource Area based on patch analysis ..... Page 3-13
Table 3-VEG-5. Distribution of treatments under the Proposed-Action Alternative ..... Page 3-16
Table 3-VEG-6. Summary of treatment acres in the Deerfoot Resource Area trending toward desired conditions under the Proposed Action Alternative ..... Page 3-19
Table 3-VEG-7. Summary of effects to forest cover types under the Proposed-Action Alternative ..... Page 3-20
Table 3-VEG-8. Summary of effects to structural stages under the Proposed-Action Alternative ..... Page 3-20
Table 3-VEG-9. Summary of effects to canopy cover under the Proposed-Action Alternative ..... Page 3-21
Table 3-VEG-10. Summary of effects to patch sizes under the Proposed-Action Alternative ..... Page 3-21
Table 3-VEG-11. Summary of effects to growth under the Proposed-Action Alternative ..... Page 3-21
Table 3-VEG-12. Distribution of habitat types in the cumulative effects area ..... Page 3-22
Table 3-VEG-13. Distribution of forest cover types in the cumulative effects area ..... Page 3-23
Table 3-VEG-14. Distribution of structural stages in the cumulative effects area ..... Page 3-23
Table 3-VEG-15. Distribution of canopy cover in the cumulative effects area ..... Page 3-23
Table 3-VEG-16. Distribution of patch sizes on combined ownership in the cumulative effects area ..... Page 3-24
Table 3-VEG-17. Summary of growth in the cumulative effects area ..... Page 3-24
Table 3-VEG-18. Disclosure of criteria to meet Forest Plan standard 10(f) ..... Page 3-28
Table 3-VEG-19. Units under the Proposed-Action Alternative with openings exceeding 40 acres ..... Page 3-31

Table 3-AQ-1. Summary of existing conditions for each watershed in the analysis area ..... Page 3-76
Table 3-AQ-2. Sediment reduction from watershed restoration work in Stump Creek subwatershed ..... Page 3-78
Table 3-AQ-3. Sediment reduction from watershed restoration work in Mokins Creek subwatershed ..... Page 3-80
Table 3-AQ-4. Sediment reduction from watershed restoration work in Jim Creek subwatershed ..... Page 3-81
Table 3-AQ-5. Sediment reduction from watershed restoration work in Yellowbanks Creek subwatershed ..... Page 3-83
Table 3-AQ-6. Stocking, snorkel and electrofishing records for Deerfoot Resource Area subwatersheds ..... Page 3-85
Table 3-AQ-7. Comparison of changes to peak flow and water yield in the Deerfoot Resource Area ..... Page 3-95
Table 3-AQ-8. Comparison of changes in sediment yield in the Deerfoot Resource Area ..... Page 3-96

Table 3-SOIL-1. Percent sensitive landtypes associated with harvest activities in the Deerfoot Resource Area and their potential for hazards, Proposed-Action Alternative ..... Page 3-113
Table 3-SOIL-2. Percent sensitive landtypes associated with prescribed burning activities in the Deerfoot Resource Area and their potential for hazards, Proposed-Action Alternative ..... Page 3-114
Table 3-SOIL-3. Existing conditions for harvest treatment units following guidelines in Niehoff 2002 ..... Page 3-117
Table 3-SOIL-4. Potential detrimental disturbance coefficients for various logging/prescribed fire scenarios ..... Page 3-119
Table 3-SOIL-5. Summary of existing conditions and potential impacts under the Proposed Action Alternative following guidelines in Niehoff 2002 ..... Page 3-123
Table 3-SOIL-6. Distribution of harvest treatments under the Proposed-Action Alternative ..... Page 3-125
Table 3-SOIL-7. Distribution of prescribed and broadcast burning under the Proposed Action Alternative ..... Page 3-126

Table 3-WL-1. Reasons why viability would be maintained in the Northern Region for the next 100 years ..... Page 3-139
Table 3-WL-2. Probability of Sensitive species occurring on the Coeur d'Alene River Ranger District ..... Page 3-141
Table 3-WL-3. Cumulative effects analysis areas, by species ..... Page 3-143
Table 3-WL-4. Suitable flammulated owl habitat treated under the Proposed-Action Alternative ..... Page 3-151
Table 3-WL-5. Percent late successional-stage forest and acres of suitable fisher habitat ..... Page 3-160
Table 3-WL-6. Changes in vegetative stand structure in goshawk foraging habitat, by alternative ..... Page 3-177
Table 3-WL-7. Effects to suitable goshawk nesting habitat, by alternative ..... Page 3-177
Table 3-WL-8. Percent Elk Habitat Potential during and after project activities ..... Page 3-185
Table 3-WL-9. Acres of elk security existing and during project activities ..... Page 3-185
Table 3-WL-10. Forest Plan compliance for elk habitat potential ..... Page 3-189

Table 3-FIN-1. Predicted high bids, value and timber volume ..... Page 3-203
Table 3-FIN-2. Projects funded by other than a timber sale ..... Page 3-203

LIST OF FIGURES

Figure 1-1. Vicinity map of the Deerfoot Resource Area ..... Page 1-1
Figure 1-2. View from the Deerfoot Resource Area looking toward Hayden Lake and Rathdrum Prairie ..... Page 1-2
Figure 1-3. A large, intense fire burning in ponderosa pine ..... Page 1-4
Figure 1-4. A circa 1930 picture of a train on the Ohio Match Railroad ..... Page 1-5
Figure 1-5. A large, dead ponderosa pine snag in a dense forest of Douglas-fir trees ..... Page 1-6
Figure 1-6. An old pine stump now shelters a Douglas-fir sapling ..... Page 1-6
Figure 1-7. Current stand conditions in the Deerfoot Resource Area ..... Page 1-7

Figure 2-1. Proportion of Management Area Designations in the Deerfoot Resource Area ..... Page 2-2
Figure 2-2. Dead ponderosa pine surrounded by Douglas-fir trees ..... Page 2-3

Figure 3-VEG-1. Habitat type groups in the Coeur d'Alene River Basin and Deerfoot Resource Area ..... Page 3-6
Figure 3-VEG-2. Habitat type groups in the Deerfoot Resource Area ..... Page 3-10
Figure 3-VEG-3. Existing forest cover types in the Deerfoot Resource Area ..... Page 3-11
Figure 3-VEG-4. Structural stages in the Deerfoot Resource Area ..... Page 3-12

Figure 3-FF-1. Passive crown fire behavior or torching ..... Page 3-39
Figure 3-FF-2. Active crown fire behavior ..... Page 3-39
Figure 3-FF-3. An open ponderosa pine forest in the Deerfoot Resource Area ..... Page 3-41
Figure 3-FF-4. Circa 1840 painting by Father Nicolas Point depicting an Indian fire surround ..... Page 3-42
Figure 3-FF-5. Recorded fire history of the Deerfoot Resource Area, 1905 to present ..... Page 3-43
Figure 3-FF-6. A 1924 photo of the same location in the Deerfoot Resource Area ..... Page 3-44
Figure 3-FF-7. A 2002 photo of the same location as shown in Figure 3-FF-6 ..... Page 3-45
Figure 3-FF-8. Conditions in the Deerfoot Resource Area ..... Page 3-46
Figure 3-FF-9. Graphical summary of winds at the Hayden weather station ..... Page 3-47
Figure 3-FF-10. Current Fire Regime Condition Class of the Deerfoot Resource Area ..... Page 3-48
Figure 3-FF-11. Flame length over time ..... Page 3-49
Figure 3-FF-12. Probability of torching ..... Page 3-50
Figure 3-FF-13. Crowning index ..... Page 3-51
Figure 3-FF-14. A recent prescribed burn near the Deerfoot Resource Area ..... Page 3-55
Figure 3-FF-15. Minimum travel time for a fire originating on the southwest corner of the resource area ..... Page 3-58
Figure 3-FF-16. Post-treatment Fire Regime Condition Classes ..... Page 3-59
Figure 3-FF-17. Alternative comparison of Fire Regime Condition Classes ..... Page 3-60

Figure 3-AQ-1. Watershed cumulative effects area for the Deerfoot Project ..... Page 3-72
Figure 3-AQ-2. Lower Stump Creek, where user-created fords were rehabilitated in 2006 ..... Page 3-78
Figure 3-AQ-3. Existing sediment yield in the Stump Creek subwatershed ..... Page 3-78
Figure 3-AQ-4. Existing sediment yield in the Nilsen Creek subwatershed ..... Page 3-79
Figure 3-AQ-5. Existing sediment yield in the Mokins Creek subwatershed ..... Page 3-81
Figure 3-AQ-6. Existing sediment yield in the Jim Creek subwatershed ..... Page 3-82
Figure 3-AQ-7. Existing sediment yield in the Yellowbanks Creek subwatershed ..... Page 3-83
Figure 3-AQ-8. WATSED-modeled sediment yield increase in Stump Creek subwatershed ..... Page 3-97
Figure 3-AQ-9. WATSED-modeled sediment yield increase in Nilsen Creek subwatershed ..... Page 3-97
Figure 3-AQ-10. WATSED-modeled sediment yield increase in Mokins Creek subwatershed ..... Page 3-98
Figure 3-AQ-11. WATSED-modeled sediment yield increase in Jim Creek subwatershed ..... Page 3-98
Figure 3-AQ-12. WATSED-modeled sediment yield increase in Yellowbanks Creek subwatershed ..... Page 3-99

Figure 3-SOIL-1. Geologic Composition of the Deerfoot Resource Area ..... Page 3-110
Figure 3-SOIL-2. Satellite photo of Mt. Mazama, now known as Crater Lake ..... Page 3-111
Figure 3-SOIL-3. A small hydrophobic patch with pooled water bead ..... Page 3-120

LIST OF FIGURES (continued)

Figure 3-WL-1. Tree cavities provide habitat for a number of wildlife species ..... Page 3-144
Figure 3-WL-2. Gray wolf ..... Page 3-146
Figure 3-WL-3. Historic ponderosa pine stand on the Rathdrum Prairie ..... Page 3-149
Figure 3-WL-4. Fire scar on a ponderosa pine within flammulated owl habitat ..... Page 3-150
Figure 3-WL-5. Ulm Peak Fire provides habitat for the black-backed woodpecker ..... Page 3-153
Figure 3-WL-6. Current number of breeding bald eagle pairs in the Pacific Northwest ..... Page 3-156
Figure 3-WL-7. Bald eagle ..... Page 3-156
Figure 3-WL-8. Fisher near hair snare on the Idaho Panhandle National Forests ..... Page 3-159
Figure 3-WL-9. Cirque basins that provide denning habitat for wolverine (not found in the resource area). Page 3-163
Figure 3-WL-10. Coeur d'Alene salamander along a stream edge ..... Page 3-165
Figure 3-WL-11. Boreal toad tadpoles found on the Coeur d'Alene River Ranger District ..... Page 3-167
Figure 3-WL-12. Fringed myotis bat ..... Page 3-168
Figure 3-WL-13. Pileated woodpecker in cavity ..... Page 3-169
Figure 3-WL-14. Pileated woodpecker habitat in the Deerfoot Resource Area ..... Page 3-171
Figure 3-WL-15. Map depicting distribution of goshawks in North America ..... Page 3-174
Figure 3-WL-16. Pine marten in snag ..... Page 3-178
Figure 3-WL-17. Map depicting Deerfoot Resource Area relative to Elk Habitat Units ..... Page 3-183

CHAPTER 1
PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

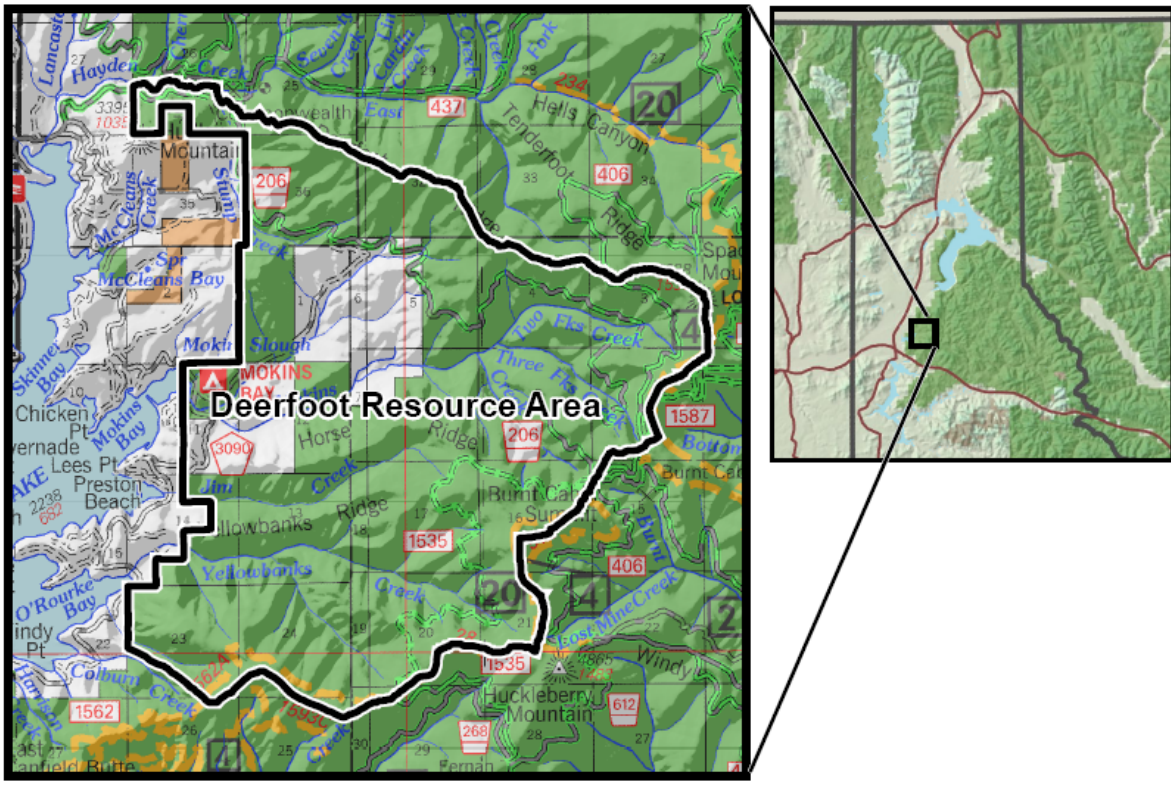
The 10,540-acre Deerfoot Resource Area is located in Kootenai County, Idaho (Figure 1-1). Popular with local recreationists, it is close to several communities, including Hayden, Hayden Lake, Dalton Gardens and Coeur d'Alene, which have a combined population of approximately 56,610. The western edge of the area is visible from Hayden Lake and private lands along the lake, while higher elevations are visible from the Rathdrum Prairie (Figure 1-2). Elevations in the resource area range from about 4,700 feet along the ridge between Huckleberry Mountain and Spades Mountain, to 2,200 feet along the shores of Hayden Lake.

There are six watersheds in the area: Stump Creek, Nilsen Creek, Mokins Creek, Jim Creek, Yellowbanks Creek and the Hayden face tributary. All of the streams flow through private land in their lower reaches before eventually feeding into Hayden Lake. Forest vegetation is dominated by grand fir and Douglas-fir. About 5 percent of the timber on National Forest System lands is young (seedling, sapling or shrub), about half is small to medium-sized, and the remainder is mature and large timber. The resource area does not include any designated wilderness or roadless areas.

In Chapter 1 you will find:

- *An introduction to the Deerfoot Resource Area*
- *An explanation for why we have proposed activities in this area (the purpose and need for action)*
- *A description of our proposed action*
- *The scope of our proposal*
- *Criteria for making a decision*

Figure 1-1. Vicinity map of the Deerfoot Resource Area.



This environmental assessment is tiered to and references the Land and Resource Management Plan for the Idaho Panhandle National Forests (PF Doc. CR-002) which sets forth the direction for managing the resources of the Forest. For clarity, that document is referred to simply as the "Forest Plan."

This document is organized into three chapters, an acronyms/glossary, and five appendices. Chapter 2 presents the key resource issues within the area and describes the alternatives considered. Chapter 3 identifies applicable policy, direction and legal guidance for each resource (including any standards or processes that replace or supersede those identified in the Forest Plan); describes the existing conditions of specific resources; and discloses the changes that would occur to each resource under implementation of each alternative. Direct, indirect and cumulative impacts are discussed.

The appendices contain analytical reports and specific or supplemental information that further explains discussions in the main chapters. Many more reports and analyses have been referenced or developed during the course of this project, but were not included in this document either because they were technical in nature or were of excessive length. Those items are referred to as being part of the "project files," and are referenced as "PF. Doc-." A number of common references (such as the Forest Plan and the Kootenai County Wildland Urban Interface Fire Mitigation Plan) are cited multiple times throughout the document. To avoid repetitiveness, the project file document number for common references ("PF Doc. CR-") is used only the first time the reference is noted in that particular chapter. All project files for the Deerfoot Environmental Assessment are available for review by contacting the Project Team Leader.

Forest Supervisor Ranotta K. McNair is the responsible official for this proposal.
For further information or to review project files, please contact
Ecosystems Staff Officer Sherri Lionberger or Project Team Leader Sarah Jerome
at the Fernan Office of the Coeur d'Alene River Ranger District, (208) 664-2318.

1.2 PURPOSE AND NEED FOR ACTION

The Forest Service is proposing activities in the Deerfoot Resource Area to reduce hazardous fuels and promote more resilient, healthier forests. The Deerfoot Resource Area is within the wildland-urban interface (WUI) as defined by Kootenai County. Being in the WUI means that the Deerfoot Resource Area's location just east of Hayden Lake is very near to private land, homes and community infrastructure. An uncontrolled fire in the WUI could threaten lives, homes, infrastructure, air quality, and tourism. A severe wildfire could also result in the loss of environmental values such as forest cover, wildlife habitat, soil productivity, water quality, and visual quality.

Figure 1-2. View from the Deerfoot Resource Area looking toward Hayden Lake and the Rathdrum Prairie.

The need for action in the Deerfoot Resource Area begins with the premise that the dry sites (34 percent of the resource area) have been most altered by the departure from the historical fire regime. Dry sites generally had a shorter fire return interval than moist sites, and so have missed more fires and have experienced more pronounced changes than moist sites. Dry sites are generally south-facing slopes that

receive the most sunlight. Since they are drier, historically they burned more often in wildfires than shady, moist sites. Usually, fuelbed and tree density conditions have changed the most on the southerly dry aspects, and these can be the first areas designated for treatment.

By treating southerly aspects initially, large landscapes composed of contiguous fuelbeds and dense and layered tree cover can be broken up in a highly intuitive manner (Agee et al. 2005; PF Doc. FF-2).

The departure from the historical disturbance regime on these dry sites and other factors such as historical logging, and insect and disease activity have resulted in:

- *An increase in hazardous fuels*
- *A shift in species composition from fire-resistant, shade intolerant species such as ponderosa pine and western larch to more Douglas-fir and grand fir*
- *Loss of dry-site stand structures that were created and maintained through periodic fires*
- *Landscapes that are more homogeneous with a lack of diversity in structural stages*

The need for action in the Deerfoot Resource Area is derived from site-specific fire history and forest structure information, as well as the following direction:

- *Forest Plan for the Idaho Panhandle National Forests (PF Doc. CR-002)*
- *USDA Forest Service Strategic Plan for Fiscal Years 2007-2012 (PF Doc CR-030)*
- *Integrated Restoration and Protection Strategy in the Northern Region of the Forest Service (PF Doc. CR-031)*
- *Northern Region Overview Detailed Report (1998, PF Doc CR-032)*
- *2001 National Fire Plan (PF Doc. CR-033) as guided by the Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan, 2006 (PF Doc. CR-034)*
- *Interior Columbia Basin Strategy (PF Doc. CR-035)*
- *Coeur d'Alene Geographic Assessment (PF Doc. CR-025)*
- *Kootenai County Wildland Urban Interface Fire Mitigation Plan (PF Doc. CR-036)*

Objective A. Reduce hazardous fuels (surface, ladder and crown fuels) on dry sites

The first strategic goal of the Forest Service's Strategic Plan (PF Doc CR-030) is to restore, sustain, and enhance the nation's forests and grasslands. In order to achieve this goal, the Forest Service will focus its efforts on several objectives, the first of which is to reduce the risk to communities and the natural resources from wildfire.

The Deerfoot Resource Area is located on the western edge of National Forest System lands within the Coeur d'Alene River Ranger District of the Idaho Panhandle National Forests (IPNFs). The resource area is immediately adjacent to private lands and near the community on the east side of Hayden Lake. There are approximately 450 structures within this community and most are within a mile of the resource area.

As described on the Forest Service's website (found at (www.fs.fed.us/projects/four-threats/), the combination of fire and fuels is one of the Forest Service Chief's Four Threats to the nation's forests. Catastrophic fires can have severe social, economic and ecological impacts:

The purpose of this Deerfoot Resource Area proposal is to:

A. Reduce hazardous fuels (surface, ladder and crown fuels) on dry sites

B. Improve and maintain proportions of resilient species such as ponderosa pine and western larch on dry sites

C. Improve and maintain dry site structure at both the stand and landscape scales by promoting 1) stands with a significant component of large, old, resilient trees; and 2) a distribution of structural stages across the landscape that is sustainable and will provide a range of habitats

Following is a more detailed description of these objectives, with full citations and additional discussion in Chapter 3.

- *Socially, catastrophic fires and related evacuations disrupt communities in rural areas and the wildland-urban interface (Figure 1-3).*
- *Economically, fires cost jobs and income from unrealized recreational activities on federal lands. Fire suppression costs often surpass $1 billion dollars per year.*
- *Ecologically, some sensitive species cannot find suitable habitat in overcrowded forests, and catastrophic fires often destroy the few remaining refuges available to wildlife.*
- *Fire-fighting expenditures reduce funds available for proactive forest management*

Many of the dry-site forests, such as those found in the Deerfoot Resource Area, are currently in a condition that could be subjected to larger, more intense fires than occurred historically (Figure 1-3). This condition is common throughout Rocky Mountain ecosystems (Keane et al. 2002; PF Doc. FF-32).

Historically, about 250 acres per year would have burned or reburned on average in wildfires in the resource area, although there was great variation around this average. In contrast, there has not been a fire of significant size in the resource area in almost 80 years. Even including management-ignited prescribed burning, the total (about 1,115 acres in 80 years) is only a small percentage of what would have burned historically. Since fire has not been consuming fuels, they have been building steadily on the ground, as well as in ladder and crown fuels in the form of dense trees and brush. Events such as the Ice Storm of 1996, followed by epidemic levels of Douglas-fir bark beetles and continuing mortality from root diseases contribute to uncharacteristic fuel loadings that could result in severe, high-intensity fires that resist control and threaten communities.

Figure 1-3. A large, intense fire burning in ponderosa pine.

Limited harvest and fuels treatment occurred in the resource area after ice storms in the winter of 1996 and a subsequent Douglas-fir bark beetle outbreak in 1998, but these activities did not significantly address the fuel accumulation problem in the resource area.

The goals of the 10-Year Strategy for Implementation of the National Fire Plan (PF Doc FF-25) include reducing hazardous fuels to reduce the risk of wildfire to communities and the environment and restoring fire-adapted ecosystems in a manner that will provide sustainable environmental, social and economic benefits. The Implementation Strategy emphasizes a landscape-level vision for restoration of fire-adapted ecosystems and the importance of using fire as a management tool. A standard for fire management in the Forest Plan is that human life and property will be protected. In addition, a goal of the Forest Plan for the IPNFs is to provide efficient fire protection and fire use to help accomplish land management objectives. The Kootenai County WUI Fire Mitigation Plan emphasizes the prevention of wildland-urban interface fires using a proactive, cooperative approach. The Fire Mitigation Plan also advocates responsible practices to reduce loss from wildland-urban interface fire on public and private land in Kootenai County.

Objective B. Improve and maintain proportions of resilient species such as ponderosa pine and western larch on dry sites.

The Interior Columbia Basin Ecosystem Management Project found that habitat for some wildlife species has declined substantially. The Interior Columbia Basin Strategy recognizes that the extent of shade-intolerant forest species (such as ponderosa pine and western larch) has decreased with associated decline in forest ecosystem processes and functions, therefore increases in the extent of these species in pure stands and in mixed stands where ecologically appropriate is desirable and would be beneficial to wildlife. The same trend is reflected in the Geographic Assessment and Region 1 Overview, which found that there has been a substantial reduction in long-lived early seral species such as western white pine, ponderosa pine and western larch.

Since the late 19th century, the densities of relatively fire intolerant and shade-tolerant species such as Douglas-fir and grand fir have increased in response to the suppression of low-severity fires in areas that historically experienced mixed-severity fire regimes (Kaufmann et al. 2000 in Schoennagel et al. 2004; PF Doc. FF-60). Shoennagel et al. state that increases in density probably have occurred more commonly at lower elevations, on drier aspects, and adjacent to grasslands where frequent, low-severity fires were more dominant historically. Zack and Morgan (1994; PF Doc. FF-23) substantiate this reasoning, stating that the Hayden Lake watershed (which includes the Deerfoot Resource Area) had substantially shorter fire intervals than the interior of the Coeur d'Alene Basin, likely because it lies downwind from the drier, pine-dominated Rathdrum Prairie.

Figure 1-4. A circa 1930 picture of a train on the Ohio Match Railroad, likely within the Resource Area. Note the open pine forest above the road in the background. (Photo provided courtesy of the Museum of North Idaho.)

About 34 percent of the Deerfoot Resource Area is characterized as dry habitat, capable of supporting ponderosa pine dominated forests. According to forest surveys from the 1930's, a corresponding 30 percent of the resource area was characterized as ponderosa pine forests (Figure 1-4). Currently, however, only about 10 percent of the area is classified as ponderosa pine forests. Since fire was important in shaping forest composition in the past, removing it from the system has had major implications in terms of species composition. Ponderosa pine is a species that is highly adapted to frequent fires, and without those fires to maintain its dominance in the stand, it is out-competed by other tree species such as Douglas-fir and grand fir (MacKenzie et al., 2004; PF Doc. FF-36).

Although all of the major tree species found within the mixed-conifer forests in the Coeur d'Alene Basin are native, the relative amounts of Douglas-fir and grand fir have increased to well above historic levels. As a result of this shift in species composition, the ecosystem has been altered and root diseases now play a heightened role in their development (Geographic Assessment; PF Doc. CR-025).

Goals of the Forest Plan include providing for a diversity of plant and animal communities and managing the forest resources to protect against insect and disease damage. The forest protection objective in the Forest Plan states that root disease will be managed through regeneration of less susceptible species, and insect epidemics managed through the regeneration and culture of multi-species stands. Forest-wide standards also state that silvicultural practices will promote stand structure and species mix which reduce susceptibility to insect and disease damage.

Objective C. Improve and maintain dry site structure at both the stand and landscape scales by promoting 1) stands with a significant component of large, old, resilient trees; and 2) a distribution of structural stages across the landscape that is sustainable and will provide a range of habitats.

Historically, a mixture of large, well-spaced ponderosa pine and Douglas-fir trees characterized many of the dry-site stands in the Deerfoot Resource Area (Figure 1-5). The undergrowth consisted primarily of a combination of relatively short shrubs (2 to 5 feet or less), grasses and forbs. The shrubs were much less abundant than in the area today. The lower branches of large trees were pruned by fire, and regeneration of Douglas-fir and grand fir was substantially restricted due to frequent fire. This led to stands much less dense and with fewer ladder fuels than exist today. Fires in many ponderosa pine and drier-site ecosystems were more frequent, less intense, of lower severity and of different spatial arrangements, resulting in open, large-diameter overstory ponderosa pine with low surface fuels (Smith and Fischer 1997; PF Doc. FF-4.

Present-day stands are characterized by areas of either medium-density overstories or scattered overstory trees. Both types of areas have thickets of sapling and pole-sized Douglas-fir with dense tall shrubs. There are commonly moderate levels of root diseases and only scattered ponderosa pine. These structures are more likely to support intense, stand-replacing fires.

There is also a lack of nesting and foraging habitat for sensitive wildlife species such as the flammulated owl and pygmy nuthatch. These species prefer habitats with large-diameter ponderosa pine trees, a mix of grass understories, small patches of brush and multi-aged Douglas-fir.

Figure 1-5. A large, dead ponderosa pine snag in a dense forest of Douglas-fir trees.

Figure 1-6. An old pine stump now shelters a Douglas-fir sapling.

With fire suppression, forests that historically experienced mixed-severity fire regimes have developed a more homogenous forest structure across the landscape, resulting in larger areas of continuously dense forest and perhaps in larger patches of crown fire than were witnessed historically (Schoennagel et al. 2004; PF Doc. FF-60).

Figure 1-7. Current stand conditions in the Deerfoot Resource Area. Brush is thick and up to ten feet tall.

In the Deerfoot Resource Area, young forests are much more limited than they were historically. Currently, only 4 percent of the Deerfoot Resource Area is in the young forest structural stage, while the desired range is 10 to 30 percent (PF Doc. VEG-13 and VEG-23). Fully 96 percent of the resource area is in the mid-aged to mature structural stages, resulting in a more homogeneous landscape which is more susceptible to various disturbances such as fire, insects, and diseases. When the landscape is uniform, insect and disease epidemics can spread very easily, just like a fire spreads easily through a uniform bed of fuels.

In addition to research and site-specific data, several policy documents support improving stand and landscape structure. The Interior Columbia Basin Strategy says that an integrated mix of restoration activities should provide for re-patterning succession and disturbance regimes and achievement of sustainable landscape conditions, thereby contributing to a reduction of events such as uncharacteristically large and severe wildland fires. The Coeur d'Alene Geographic Assessment recommended sustaining and restoring open stand structures dominated by large, fire-resistant early seral tree species like ponderosa pine and western larch. The Geographic Assessment also recommended regenerating large blocks of potentially long-lived early seral species. The Forest Plan Objectives for forest protection encourage the practice of breaking up large areas of single age classes to reduce the potential for bark beetle outbreaks (PF Doc. CR-002, page II-11). Goals of the Forest Plan include providing for a diversity of plant and animal communities and managing the forest resources to protect against insect and disease damage.

1.3 PROPOSED ACTION

The Proposed Action includes vegetation management in the form of prescribed burning, timber harvesting, and vegetative rehabilitation activities. Also included is road work associated with the timber harvesting, design features, and construction of barriers to illegal travel on pioneered routes. A detailed description of the activities included in the Proposed Action is included in Chapter 2. For specific unit information (including acres, logging systems, and slash treatment) as well as other information related to the Proposed-Action Alternative, please refer to Appendix D.

Vegetation and fuel treatment activities would occur on 1,880 acres under the Proposed Action (represented by Alternative 2), including:

- 1,257 acres prescribed burning
- 583 acres of regeneration harvest followed by underburning and planting
- 8 acres of thinning harvest followed by underburning
- 17 acres of regeneration/thinning combination harvest followed by underburning and planting
- 15 acres of vegetative rehabilitation

Of the harvested timber,

- 25% would be yarded by helicopter
- 57% would be yarded by skyline
- 13% would be yarded by tractor
- 5% would be yarded using a skyline swing to a temporary skid road

Harvest would result in an estimated 3.7 million board feet of timber volume.

1.4 SCOPE OF THE PROPOSAL

The scope of this environmental assessment was determined through the need (described in Section 1.2) to:

- *Reduce hazardous fuels on dry sites*
- *Improve and maintain proportions of resilient species such as ponderosa pine and western larch on dry sites*
- *Improve and maintain dry site structure at both the stand and landscape scales*

The scope was also defined through community, public and agency scoping, in accordance with the requirements of 40 CFR 1508.25. The scope of the actions to be addressed includes the specific activities proposed in the Deerfoot Resource Area as described in Chapter 2.

As stated earlier, the activities under this proposal would begin to reverse some of the trends in stand structure, composition and potential fire behavior. However, in order to further shape and maintain the desired stand conditions, additional management activities (such as prescribed burning, precommercial thinning, or other timber management) will be necessary in the future to shape and maintain the desired stand conditions, regardless of the alternative chosen for implementation. Because of the uncertainty of the timing and conditions of these future actions, they would be analyzed at the time they are proposed, following the applicable legal requirements.

1.5 DECISION TO BE MADE

This assessment discloses the environmental consequences of implementing the proposed action or alternatives to that action. The IPNF Forest Supervisor is the deciding official. The Forest Supervisor will review this environmental assessment and determine whether the Proposed Action may have a significant effect on the quality of the human environment (FSH 1909.15, Chapter 40, Part 43.1). If the Forest Supervisor determines that the Proposed Action may have a significant effect on the quality of the human environment, an environmental impact statement would need to be prepared. Otherwise, a Finding of No Significant Impact (FONSI) would be prepared, and a decision issued. The Forest Supervisor will make a decision based on the following criteria:

- *The extent to which each alternative addresses the purpose and need for action;*
- *consistency with the goals and findings of Forest policy (including standards, goals and objectives of the Forest Plan) and legal mandates;*
- *how well each alternative responds to the environmental issues and concerns identified by the public, other agencies, and Forest Service resource specialists; and*
- *effects of the selected alternative in comparison to other alternatives considered.*

The details of the decision will be documented in a Decision Notice and FONSI that will be sent to other agencies and those who indicated an interest in the project, and posted to the IPNFs website (www.fs.fed.us/ipnf/eco/manage/nepa/index).

CHAPTER 2
ALTERNATIVES

2.1 INTRODUCTION

This chapter describes potential management alternatives that would achieve the objectives identified for the Deerfoot Resource Area, as described under "Purpose and Need for Action" in Chapter 1. National Environmental Policy Act (NEPA) regulations require federal agencies to *identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment* (40 CFR 1500.2(e)). This chapter also identifies project design features and mitigation measures (management requirements) designed to avoid potential effects. Several sources of direction and guidance were used to identify a Proposed Action that would meet the purpose and need for this project. The Proposed Action was carefully constructed to address all of the issues that we believe are relevant to the Deerfoot Resource Area. After a review of the scoping comments, there were no suggestions for an alternative to the Proposed Action that met the Purpose and Need or addressed any issues that had not already been considered. The range of alternatives is reasonable given characteristics of the area, current conditions, the purpose and need for action, and the desired conditions.

2.2 POLICY, DIRECTION AND LEGAL GUIDANCE

USDA Forest Service Strategic Plan FY 2007-2012

Strategic planning takes place at the highest level and identifies strategic priorities for the agency that are implemented over a period of time through agency budgets. The Forest Service's strategic priorities are based on national assessments of natural resources and are responsive to social and political trends (PF Doc CR-030). Goal 1 of this strategy is to restore, sustain and enhance the nation's forests and grasslands. To achieve this goal and restore the resiliency of our forest and grassland ecosystems, the Forest Service will focus its efforts on several objectives, the first of which is to reduce the risk to communities and natural resources from wildfire by restoring fire-adapted ecosystems. Another objective is to build community capacity to suppress and reduce losses from wildfire, which will be measured by the percentage of acres treated in the wildland-urban interface.

National Fire Plan

Following extensive wildland fires over the summer of 2000, and prior decades of increasing incidence of large scale high-intensity fires, the Secretaries of Agriculture and the Interior were directed by Congress to develop a response to severe wildland fires. The result was the National Fire Plan, which outlines a strategy to reduce the risk of severe fires to communities and to the environment. The Implementation Plan (PF Doc FF-25) was updated in 2006, but the goals of reducing hazardous fuels and restoring fire-adapted ecosystems remain the same. The Implementation Strategy emphasizes a landscape-level vision for restoration of fire-adapted ecosystems and the importance of using fire as a management tool. The purpose and need for the project is guided in part by the National Fire Plan and the Implementation Strategy (PF Doc FF-25).

In Chapter 2 you will find:

- *A brief description of the policies and laws that guided this analysis*
- *A description of our scoping efforts*
- *How we developed alternatives*
- *Descriptions of the alternatives*
- *Activities that are either ongoing or can be reasonably expected to occur in the area*
- *Mitigation measures to reduce effects of activities*
- *Monitoring activities that would occur under the Proposed-Action Alternative*

Forest Plan for the Idaho Panhandle National Forests

General management direction for the Idaho Panhandle National Forests (IPNF) is found in the Forest Plan, which provides Forest-wide goals, objectives, standards and guidelines related to each Forest resource (Forest Plan, Chapter II). The standards and guidelines for the Forest Plan apply throughout the Resource Area. The proportion of Management Area classification of lands in the Deerfoot Resource Area are described in the figure below.

Management Area 1 – emphasis on timber production

Management Area 4 – emphasis on managing big-game winter range to provide sufficient forage to support predicted big-game habitat needs, through timber harvest and permanent forage areas

Management Area 9 – managed to maintain and protect existing improvements and resource productive potential with minimum investments

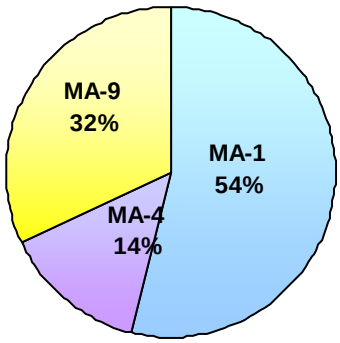


Figure 2-1. Proportion of Management Area Designations in the Deerfoot Resource Area.

In addition to those management areas identified above, streamside (riparian areas) were designated as Management Area 16, with primary goals of managing those areas to feature riparian-dependent resources (fish, water quality, certain vegetation and wildlife communities) while producing other resource outputs at levels compatible with the objectives for dependent resources.

The Inland Native Fish Strategy was prepared in July 1995 to provide interim direction to protect habitat and populations of resident native fish outside of anadromous fish habitat in eastern Oregon, eastern Washington, Idaho, western Montana, and portions of Nevada. Under the authority of 6 CFR 219.10(f), the INFS decision amended Regional Guides for the Forest Service's Intermountain, Northern, and Pacific Northwest Regions, and amended Forest Plans in the 22 affected National Forests, including the IPNF. For further discussion, please refer to "Features Common to All Action Alternatives – Features Designed to Protect Aquatic Resources" in this chapter, "Aquatic Resources" in Chapter 3, and "Standards & Guidelines of the Inland Native Fish Strategy" in Appendix B.

Interior Columbia Basin Strategy

The Interior Columbia Basin Strategy (2003, PF Doc CR-035) is a strategy for applying the knowledge gained by the Interior Columbia Basin Ecosystem Management Project (ICBEMP, 1996, PF Doc. CR-037) to the revision of forest and resource management plans and project implementation. The Interior Columbia Basin Ecosystem Management Project found current broad-scale forest health conditions increase the susceptibility of forests to uncharacteristic wildfires and large scale insect and disease events, and have impacted wildlife habitat. These resulted from departures from native disturbance and successional processes. The changes are represented by decreases in ponderosa pine, western larch, and white pine along with increases in Douglas-fir and grand fir, white fir; decreases in large trees component (live and dead) and increase in mid seral structures; and increased fragmentation and decreased connectivity.

Coeur d'Alene River Basin Geographic Assessment and Northern Region Overview

An assessment of current and a range of historic conditions in the Coeur d'Alene River basin (Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin, USDA Forest Service, 1998; PF Doc. CR-025) was conducted to gain a better understanding of basin-scale resource conditions in relation to those at the Upper Columbia River Basin scale. For clarity, that document is referred to as the **Geographic Assessment**. The findings of the assessment were consistent with the findings of the Interior Columbia River Basin (PF Doc. CR-037) at the sub-basin scale. At the same time, the Forest Service developed the **Northern Region Overview** (generally encompassing national forest system lands in Montana and north

Idaho). This overview set management priorities that integrated the Forest Service Natural Resource Agenda with resource conditions. The findings of the Northern Region Overview were consistent with both the Interior Columbia Basin and the Geographic Assessment.

Figure 2-2. Dead ponderosa pine surrounded by Douglas-fir trees. Heavy ladder fuels and dense crown conditions are common in the Deerfoot Resource Area.

According to the Geographic Assessment, the long-lived early seral species white pine, western larch and ponderosa pine have deceased drastically compared to historic conditions; while Douglas-fir, grand fir and western hemlock have increased. The Geographic Assessment states that the **drier**, south-facing slopes that once contained mixed, open stands of ponderosa pine, western larch and Douglas-fir with a sparse understory now have more dense tree cover with a higher component of Douglas-fir and grand fir along with dense understories of shrubs and shade tolerant reproduction (Figure 2-2). Some of these additional trees and shrubs may have been killed in the past by light underburns and are now competing with more disease resistant early seral species resulting in a shift from dominance by long lived early seral species (western larch and ponderosa pine) to more shade tolerant species (Douglas-fir and grand fir) potentially contributing to increasing the risks associated with root diseases and insect outbreaks (USDA 1998, PF Doc. CR-025).

The Deerfoot Resource Area is described as having high road densities and undesirable terrestrial conditions, such as high-graded stands of medium sized trees of poor quality. Such landscapes are the highest priority for vegetative restoration. The Geographic Assessment further classifies the Hayden Lake Basin as functioning but at risk and directs that these areas will be among the highest priority for watershed and aquatic restoration. On these landscapes, the Geographic Assessment recommends that we thin from below and use shelterwood harvests with reserve trees and group selection harvests to sustain or restore open stand structures dominated by large fire-resistant early seral tree species (ponderosa pine and western larch).

Kootenai County Wildland Urban Interface Fire Mitigation Plan

The Kootenai County Wildland Urban Interface Fire Mitigation Plan (PF Doc. CR-036) describes information gathering, community and agency involvement, community established goals and action steps to reduce the risk of fire in the urban interface and to treat fuels in high-risk areas. FireSmart Kootenai County is a program designed to meet the objectives of this plan by reducing fuels around homes and making them more likely to survive a wildfire. The Deerfoot Resource Area is adjacent to private lands and residences near Hayden Lake, where many FireSmart projects have been implemented (PF Doc. FF-80). Any proposed activities would be coordinated with the FireSmart effort and would be consistent with Kootenai County wildland/urban interface fire hazard reduction goals. The Kootenai County WUI Fire Mitigation Plan emphasizes the prevention of wildland-urban interface fires using a proactive, cooperative approach. The Fire Mitigation Plan also advocates responsible practices to reduce loss from wildland-urban interface fire on public and private land in Kootenai County.

2.3 SCOPING AND ALTERNATIVE DEVELOPMENT

A. Scoping

The NEPA process term "scoping" (40 CFR 1501.7) is designed to determine the potential issues associated with a proposed action and to identify those issues and concerns that may be significant to the decision. Scoping is used to develop and refine alternative management actions using a collaborative process. Scoping for this project was initiated through public notification on April 17th, 2007 with the *Quarterly Schedule of Proposed Actions* for the Idaho Panhandle National Forests, and continuing through the current issue. During the initial scoping period, an article was published in the Spokesman Review describing the project and requesting comments.

In May of 2007, a letter was mailed to the interested public providing a description of the current conditions in the Resource Area, the purpose and need for the project, the proposed action, and a map of the proposed activities. In response to the scoping letter, replies were received from the Idaho Department of Parks and Recreation, WildWest Institute on behalf of The Lands Council (TLC), Alliance for the Wild Rockies and Kootenai Environmental Alliance (KEA). KEA also provided a separate letter, which requested specific information be included and/or addressed in the EA. The Idaho Department of Parks and Recreation stated that they did not have any concerns and wanted to be removed from the mailing list. WildWest Institute's letter was 44 pages long, discussed many general issues and quoted science on a wide range of topics.

The project interdisciplinary team carefully reviewed the comments received, but did not find any additional issues that were not already considered in the design of the proposed action. Other alternatives suggested but not considered in further detail are described in Section 2.8.

B. Ongoing and Reasonably Foreseeable Activities

In addition to direct and indirect effects, NEPA requires analysis and disclosure of potential cumulative effects – the combined effect of past, present, and reasonably foreseeable actions. The effects of past activities are represented by and disclosed in the discussion of existing resource conditions. Information about past actions (such as timber harvest, prescribed burning, etc.) in the Resource Area are provided in Appendix C; past actions specific to each cumulative effects analysis area are described in the respective analysis, and in the Project Files (Forest Vegetation, Fire/Fuels, Aquatic Resources).

Ongoing activities include development of the Coeur d'Alene River Ranger District's Travel Plan and Motor Vehicle Use Map, which will identify the roads and trails designated for motorized travel. This process is expected to be complete within the next year. No major changes to designated routes are expected within the Deerfoot Resource Area.

Three special use permits authorize ongoing activities (use) in the Deerfoot Resource Area: 1) road access to Camp Mivoden; 2) road access and a recreation residence; and 3) Hayden Fire Station. In addition, the Lakes Highway District has a right-of-way for East Hayden Drive.

The Deerfoot Resource Area is within a portion of the Iron Mokins – North Fork Grazing Allotment. Only the Mokins portion lies within the Deerfoot area. This is an "on-off" term permit, meaning the cattle are on National Forest System lands for a portion of the time and on private lands a portion of the time. There are a total of nine cow/calf pairs allowed on this portion of the allotment from May 1 through October 31, with one pair on National Forest System lands. These same cattle are transported to the North Fork side of the allotment from June 1 through September 30, so they actually spend very little time on the Mokins side, and in effect, have very little impact.

The following table displays information about projects that are reasonably foreseeable in the Deerfoot Resource Area.

Table 2-1. Reasonably foreseeable activities on National Forest System lands within the Deerfoot Resource Area.

Project Name	Activity	Estimated Occurrence	Acres
Ice Hayden Heli	Jackpot burning of natural fuels	2008	138
Yellow Horse Beetle	Burning to prepare sites for planting	2008	4
	Planting (without concurrent site preparation)	2008	12
		2009	4
	Jackpot burning of natural fuels	2008	16
	Underburning in natural fuels	2008	12
Shoulder Tree Maintenance	Removing shoulder trees along Roads 437, 1552 and 206 that are hindering road maintenance operations. The project would remove less than 40 trees within the Deerfoot Resource Area.	2008-2009	N/A

To ensure a comprehensive view of ongoing and reasonably foreseeable activities, in October of 2007 Forest Practices Act Notifications for private land within the Deerfoot Resource Area were obtained from the Idaho Department of Lands. For the years 2005-2007, only one Forest Practices Act Notification was issued, and it expired in November 2007 (PF Doc. FF-17). The notification issued to the landowner identified an amount of timber harvest not sufficient to cause a fire hazard.

The effects analysis incorporated the influences of ongoing and reasonably-foreseeable activities as appropriate (please refer to the cumulative effects discussions for each resource in Chapter 3). Some of these activities may have been completed during the time it took to complete analysis and documentation for this proposal; their impacts are reflected in the cumulative effects analysis.

C. Identification of Issues and Concerns

Key Issues

Key issues are those within the scope of the project and of sufficient concern to drive the development of alternatives to the Proposed Action. The Proposed Action was carefully crafted to address concerns such as old growth, flammulated owl habitat, and fuel reduction. As standard practice, the Forest Service complies with all regulatory requirements such as the Forest Plan, Clean Water Act, Inland Native Fish Strategy, and the Endangered Species Act. Proposed activities would be completed using Best Management Practices (BMP's) as identified in Idaho Water Quality Standards. Measures to reduce the spread of noxious weeds, protect wildlife security and protect soil productivity are incorporated into the proposed action, as described later under **Design Features**. Reforestation is a crucial aspect of meeting the purpose and need of this project, and is also required by the National Forest Management Act. After careful review of the scoping comments, no key issues were defined, and consequently there are no alternatives to the Proposed Action.

Concerns and Indicators

The objectives of the purpose and need include reducing hazardous fuels and changing vegetative conditions to improve species composition and stand and landscape structure. The Fire/Fuels and Forest Vegetation analyses describe in detail the effects of the alternatives, as well as the length to which each alternative meets the purpose and need. To measure this progress towards meeting the purpose and need, these analyses use **indicators**, which are described below.

Fire/Fuels

The first objective of this project is to reduce hazardous fuels. There are three different kinds of fuels: surface, ladder and crown fuels. Surface fuel loading and the arrangement of those fuels is directly related to **flame length**, which is the first indicator used in the Fire/Fuels analysis. The second indicator measures

ladder fuels with an indicator called the **probability of torching**. The probability of torching estimates the probability of finding a torching situation in a forest stand, or in simpler terms, the proportion of the stand where ladder fuels are sufficiently present for fire to climb up into the trees. Crown fuels are measured with the **crowning index**, which is the wind speed 20 feet above the canopy at which active crowning is possible. The higher the crowning index, the lower the crown fuel loading and the lower the crown fire hazard. The indicators listed thus far are stand-level indicators, meaning they measure fuel loading only at the stand scale; they don't tell us how all of the proposed treatments will act together to affect the entire Resource Area. To measure the effects of the treatments at the Resource Area scale, and indicator called **Minimum Travel Time** was used. Minimum Travel Time simulates fire spread across the landscape, and calculates the amount of time it would take for a fire to reach each small part of the landscape. With this indicator, we can see how the treatments act collectively to reduce fuels and affect fire spread across the landscape.

Vegetative Resources

Objectives of this project relate to the need for a healthy and resilient forest ecosystem in the Deerfoot Resource Area. No single indicator is definitive as to forest health. Landscapes are healthy when their components and processes are functioning properly. Resilience is the amount of change or the amount of change that a system can absorb before it undergoes a major shift in composition, structure or processes. A healthy and resilient forest ecosystem will supply both: resilient species composition, structure, landscape arrangement, growth; and will also meet the multiple resource objectives for this resource area including fire/fuels (in this wildland urban interface), wildlife, recreation, aquatics, etc. Forest composition and a few characteristics of forest structure wll be used to assess the trend toward or away from healthy and resilient conditions. These include **forest composition** or stand forest cover type (i.e. Douglas-fir, ponderosa pine, western larch, etc.) and 3 forest structure characteristics: **structural stage** (shrub/seedling/sapling, small to medium timber, and mature/large timber), stand **canopy cover** and landscape **patch sizes** of the structural stages. These will be analyzed to allow comparison of current and desired conditions as an indicator of health and resiliency.

Forest health can also be gauged by how a forest is meeting specific management objectives. Simplistically, stands that are growing faster than they are dying are more likely to meet the Forest Plan management objectives (considered healthy) covering a full range from wildlife requirements for large trees, large snags and down wood to local commodity production. The stand and landscape condition in which growth is greater than mortality is indicated by **positive growth** (volume growth minus mortality for the previous 10 year period that is greater than zero). This growth indicator will compare current conditions to no action and proposed action on both dry and moist habitat type groups. **Old growth** is a common concern with all vegetative analyses; the analysis discloses how the current condition and Proposed-Action Alternative meet Forest Plan standards for old-growth allocation.

Wildlife Resources

Forest Service policy requires a documented review of proposed activities in sufficient detail to determine how an action may affect threatened, endangered, proposed, sensitive, or management indicator wildlife species. Specific indicators may vary by species, but generally include changes in habitat, forage and/or prey, and security (disturbance to the species).

Individual species addressed in this analysis include:

- Gray wolf
- Bald eagle
- Coeur d'Alene salamander
- Boreal toad
- Black-backed woodpecker
- Pygmy nuthatch
- Flammulated owl
- Fisher
- Fringed myotis bat
- Wolverine
- Northern goshawk
- Pileated woodpecker
- Pine marten
- Rocky Mountain elk

Two other groups of wildlife are addressed:

- ***Nongame species*** *(those not managed by the State of Idaho as a hunted species) are often important prey for other furbearers and large predators. Changes in vegetation composition and structure are used to assess effects to nongame species.*
- ***Neotropical or migrant birds*** *are those that breed and nest in one area and migrate to Mexico, Central America or South America in winter. These birds can be affected by loss of habitat. However, changes that benefit one species may at the same time have undesirable effects on another species. Changes in habitat for these birds are discussed in a qualitative manner.*

Aquatic Resources

Streams and waterways within the Deerfoot Resource Area continue to recover from the residual effects of historic disturbances in addition to ongoing human disturbances such as water use, residential development, timber harvest, and road construction. The Geographic Assessment identified all tributaries in the Deerfoot Resource Area as *functioning at risk.* Watersheds that are considered *functioning at risk* are the highest priority for aquatic restoration and protection. Hayden Lake, which borders the project area, is a 303d listed water body for nutrient loading. The analysis addresses effects of proposed activities on increases in water yield, peak flow, sediment yield, and on aquatic habitat in drainages of the Deerfoot Resource Area. Effects are measured through changes in water yield and sediment delivery. Also addressed in the analysis are effects of proposed activities and road management on fish populations and habitat related to sensitive and management indicator species.

Soils

The soils analysis within the Deerfoot Resource Area centers on the Activity Area, which is the unit in which activities are proposed. The analysis addresses past, proposed and foreseeable activities that have caused or that may cause detrimental effects to soils such as; compaction, displacement, rutting or severe burning. Such activities as timber harvest, roading and burning (both wildfire and prescribed burning) have taken place within the Deerfoot Resource Area. For this analysis both the Regional and Forest Plan Standards were incorporated to assure that the management of the soil resource is maintaining the long term nutrient cycling and soil productivity within each of the activity areas. To achieve this, soil quality standards and guidelines are used to measure effects and design activities to avoid compromising soil productivity.

Wildlife

Section 7 of the Endangered Species Act directs federal agencies to ensure that their activities are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification to their habitat. A number of species have been identified as sensitive within the geographic area of the Idaho Panhandle National Forests and within Region 1 of the Forest Service. NFMA directs federal agencies to manage for diversity of existing Sensitive species and to maintain and improve habitat of management indicator species (designated by the Forest Plan to represent important wildlife habitats). The analysis addresses effects to threatened, endangered, sensitive and management indicator species and their habitat. Indicators used to measure effects include snag availability, abundance and distribution of suitable habitat and mature/old stands, effects to existing ponderosa pine and dry-site early seral conifers, and wildlife security (affected by human access and uses).

Scenery

The Deerfoot Resource Area forms the backdrop to Hayden Lake and is within the middleground and background of the viewshed for the area. Maintaining the existing visual situation in a natural-appearing condition (so activities do not dominate the viewshed) is a concern identified by the Forest Plan, which classifies these areas as being critical to maintaining visual quality objectives. Analysis of the effects to scenery considered how proposed activities would appear when viewed from points of scenic sensitivity.

Recreation

There are a number of illegally-pioneered trails in the Deerfoot Resource Area. Activities under the Proposed-Action Alternative (using barriers and front-end road decommissioning) would discourage use of the illegal trails. The analysis addresses potential impacts to recreation use in the Deerfoot Resource Area.

Finances

The proposed activities have associated costs as well as the potential to generate revenues. Costs and revenues can be highly influenced by factors such as harvest methods. Finances would likely influence the implementation of any activities associated with this project, and therefore were used as a consideration when developing alternatives.

Issues Not Addressed in Detail

These issues are either already addressed through alternative design (such as transportation management, air quality and heritage resources) or are outside the scope of this project. Based on the assessment of potential effects and of public and agency comments, it was determined that other concerns could be adequately addressed by project design features, including TES plant species, noxious weeds, air quality, heritage resources, public safety, and sensitive wildlife species with no probability of occurrence (peregrine falcon, Townsend's big-eared bat, harlequin duck, common loon, black swift and Northern bog lemming). There is no detailed discussion of these issues in Chapter 3. See Appendix E for a complete listing and brief discussion of issues not addressed in detail.

2.4. ALTERNATIVE DESCRIPTIONS

A. Introduction

Development of alternatives was based on the existing condition of resources in comparison to desired future conditions, issues and concerns identified by the project team, other agencies and the public, and the purpose and need identified for the project.

The Proposed Action includes timber harvest practices and fuels treatments designed to meet particular silvicultural goals, fuels treatment to meet fire management goals, , and road access necessary to accomplish project activities. Activities that will occur under the Proposed Action are identified in the tables below. **No new activities would occur under the No-Action Alternative; therefore it is not displayed in the table.** Included in the alternative description is required monitoring, as provided under 40 CFR 1502.14. Additional activities that could occur if funding becomes available (identified as "opportunities") are also described. Please refer to the enclosed alternative map for locations of the proposed activities.

Specific unit information is provided in Appendix D. Additional information related to road access is provided in the Roads Analysis Process document (PF Doc. TRAN-01).

B. No-Action Alternative

The No-Action Alternative is required by NEPA and is the baseline for evaluating the effects of the proposed action. Under this alternative, none of the activities proposed in the Deerfoot Resource Area would occur. Implementation of the foreseeable activities (identified earlier in this chapter) may still occur.

C. Proposed-Action Alternative

The Proposed Action was crafted to meet the purpose and need while addressing two major concerns: the presence of allocated old growth and/or suitable flammulated owl habitat. The Proposed Action takes a cautious approach to managing allocated old growth and maintaining suitable flammulated owl habitat while reducing the risk of future loss to fire. No timber harvest activities are proposed in either old growth or suitable flammulated owl habitat. The only activity proposed in these habitats is prescribed burning, which would be implemented carefully with specific objectives to maintain the key characteristics of these habitats.

The proposed action includes vegetative treatments (prescribed burning, timber harvesting, and rehabilitation, associated road work, culvert installations, and the construction of barriers to illegal travel. More detailed descriptions of the activities follow.

Prescribed Burning

Prescribed burning reduces hazardous surface and ladder fuels that contribute to wildfire spread and intensity. Prescribed burning has been proven effective at slowing large wildfire spread and at reducing wildfire severity. The prescribed burning would occur on south-facing aspects, and would be conducted at times of the year when risk of escape is minimal and when soil productivity is protected. Burns would be implemented in a manner that would protect and enhance wildlife habitat. Prescribed burning in allocated old growth would reduce fuels without changing old growth allocation status. Prescribed burning would help restore stand structures more characteristic of dry-site stands shaped by periodic fire. Burning would be implemented in a manner that would comply with applicable regulations such as the Clean Air Act and the Inland Native Fish Strategy (INFS, 1995; PF Doc. CR-003).

Table 2-2. Summary of activities in the Deerfoot Resource Area under the Proposed-Action Alternative.

Vegetative Treatment		Acres
Prescribed Burning		1,257
Rehabilitation (Burn and Plant)		15
Timber Harvest		608
Regeneration harvest followed by burning and planting	*583*	
Mix regeneration/thinning harvest followed by burning and planting	*17*	
Thinning harvest followed by burning	*8*	
Yarding Method		
Helicopter (25%)		150
Skyline (57%)		347
Skyline Swing to Tractor Skid Road (5%)		33
Tractor (13%)		78
Roads		**Miles**
System Road Construction		0.6
Temporary Road Construction		0.6
Temporary Skid Road		0.4
Culverts		**Number**
Culvert Upgrade		1
Relief Culvert Installed		1
Barriers to Illegal Travel		**Number**
Debris barriers		12
Front-end road decommissioning sites		2
Ditch construction sites		1

Timber Harvesting

Timber harvesting would be used to re-establish long-lived early seral species such as ponderosa pine, white pine, and western larch, which have declined significantly over the last 80 years. Most stands are now dominated by Douglas-fir and grand fir, which must be harvested in order to regenerate the stand to long-lived early seral species. Without harvest of the overstory, the planted ponderosa pine, white pine and western larch will not survive. Once some of the overstory is removed, prescribed burning would reduce fuels and prepare the site for establishment of long-lived, early seral species. Where there are more ponderosa pine and western larch still on site, commercial thinning would be used to retain resilience. However, since there proportionately few ponderosa pine and western larch, the extent of thinning activities is very limited in this proposal. The result of all of the regeneration activities would be a reduction of hazardous fuels, increased long-lived seral species; appropriate structures and arrangement on the landscape.

Forest Service policy normally limits the size of openings created by even-aged silvicultural methods to 40 acres or less. With some exceptions, creation of larger openings is allowed with Regional Forester approval. In the Proposed Action, some units exceed the 40-acre openings size to create more effective fuel reduction treatments and to accomplish the goals of improving species composition, stand structure and landscape structure at meaningful scales.

Vegetative Rehabilitation

Vegetative rehabilitation is proposed for a 15-acre area where we want to re-establish long-lived early seral species. This rehabilitation would consist of prescribed burning to prepare the site prior to establishment of ponderosa pine and western larch.

Roads and Culverts

In order to complete the timber harvesting, road construction would be needed for six-tenths of a mile of new permanent road, six-tenths of a mile of temporary road, and four-tenths of a mile of temporary skid road. Timber harvesting would be completed using helicopter, skyline and tractor yarding systems. All timber harvesting and road building has been carefully planned to comply with all regulatory requirements such as the Forest Plan, Clean Water Act, Inland Native Fish Strategy, and the Endangered Species Act. Activities would be completed using Best Management Practices (BMP's) as identified in Idaho Water Quality Standards (Appendix A). Measures to reduce the spread of noxious weeds, protect wildlife security and protect soil productivity are incorporated into the Proposed Action. Reforestation is a crucial aspect of meeting the purpose and need of this project, and is also required by the National Forest Management Act.

In the past several years, a significant amount of watershed restoration such as road decommissioning, culvert upgrades and removal, and stream habitat improvement have been implemented in the Deerfoot Resource Area. Due to these past efforts, we are proposing the installation of one relief culvert and one culvert upgrade. This drainage work would allow for more water flow, reducing the risk of culvert failure and sediment delivery to the streams.

Barriers to Illegal Travel

We know there are problems with illegally-pioneered trails in the Resource Area. We plan on using barriers and front-end road decommissioning to discourage use of these illegal trails. Many of the targeted trails were pioneered to breach road closures, which in turn were put in place for a variety of reasons, including wildlife habitat security, maintaining watershed health and to provide a diversity of recreational experiences. The illegal trails have resulted in resource damage by directly contributing sediment into Nilsen Creek along a section of road, indirectly facilitating sediment delivery to Stump, Nilsen, and Mokins Creeks from trails located on steep ground, and causing additional soil compaction and displacement that is detrimental to site productivity. The illegal trails decrease wildlife security and encroach on ridges, which serve as travel corridors for many animal species. In addition, the pioneered routes contribute to the spread of noxious weeds. Bringing to an end to use of the pioneered trails will protect water quality, enhance wildlife security, protect habitat, and allow for a range of recreational experiences.

2.5. FEATURES OF THE PROPOSED ACTION

The following features were designed to protect natural resources in the Deerfoot Resource Area while implementing project activities.

A. Features Designed to Protect Forest Vegetation

Target stand descriptions and silvicultural diagnosis have been completed and approved by a certified silviculturist at the time of this analysis (PF Doc. VEG-3). All vegetative treatments would have silvicultural prescriptions approved by a certified silviculturist prior to treatment. Silvicultural prescriptions would consider site-specific factors such as the physical site, soils, climate, habitat type, current and future vegetative composition and conditions, as well as multiple resource objectives, NEPA decisions, other regulatory guidance, and Forest Plan goals, objectives and standards.

Temporary road associated with the helicopter landing for Units 23, 24 and 25 would go through about 525 feet (0.1 mile distance and less than one-third of an acre) of allocated old growth. Adjustment to the temporary road location would be made during implementation so as to minimize the removal of any trees that are 21 inches or greater in diameter at breast height.

Snag resources would be managed by following the "Regional Snag Management Protocol" (January 2000; PF Doc. VEG-R57), which provides the following guidelines for retention (PF Doc.VEG-22):

- *Moist forests: 6 to12 snags per acre with two to four snags per acre that are greater than 20 inches, as well as 12 live tree replacements per acre of the largest representative trees in half of Units 1, 4, and 25; and in all of Unit 3.*
- *Dry forests: 4 to 6 snags per acre (with four per acre that are over 20 inches in diameter) and 8 live tree replacements of the largest representative trees in all the remaining proposed commercial harvest units.*

Treatments would meet white pine retention guidelines (USDA, 1994; PF Doc. VEG-R58). Harvest unit layout would consider suitability limitations on a site-by-site basis on the ground. Harvest and site preparation treatments would consider the potential short- and long-term negative effects (including blowdown, fire mortality, etc) of proposed activities on adjacent trees and stands with site-specific prescription modifications, such as change in unit boundary or modification of prescribe burning prescriptions.

In areas treated with regeneration harvest; site preparation for regeneration and fuel abatement, and planting/regeneration would occur within five years of harvest completion. All regeneration areas would be regenerated with site-adapted species/seed source. To reduce shrub competition and fuels so that desired regeneration can be established, treatment areas would be prescribed burned (the preferred treatment), mechanically treated, or a combination of both.

B. Features Related to Fuels Management

Surface or understory fuels in harvest units would be treated through the use of prescribed burning. Because post-harvest fuel conditions cannot be completely predicted, assessments would be made by a fire/fuels specialist and a silviculturist after completion of harvest activities. A determination would then be made as to whether the burn could be implemented safely and effectively without further fuels treatment, or if some modification of the fuels using other methods is required to meet the objectives of the silvicultural prescription. These methods could include slash piling, leave tree protection, or slashing.

"Slashing" is the use of chainsaws to cut noncommercial undesirable trees in order to prepare a site for burning and reforestation with desired species.

C. Features Designed to Protect Threatened, Endangered & Sensitive Plants

Known Sensitive plant occurrences in the Deerfoot Resource Area would be buffered from harvest and other project-related activities by a minimum of 100 feet (there are no known occurrences of Threatened or Endangered plants in the Deerfoot Resource Area). Prescribed fire **ignition** would not occur within riparian habitats, although fire would be allowed to back down **into** riparian areas. Higher fuel moistures in riparian habitats during prescribed burning conditions would likely limit the spread of any prescribed fire. To limit ground disturbance, fire line would be minimized in riparian areas, to those occasions when fire line is needed to contain the burn. However, fuelbreaks would be used in riparian areas such that the total amount of fire line may be minimized while still allowing safe and efficient implementation of prescribed burning. Should rare plants be located during implementation, one or more of the following protective measures would be implemented: 1) drop the proposed unit from activity; 2) modify the proposed unit or activity, 3) implement a 100-foot slope distance buffer, and/or 4) implement Timber Sale Contract provisions for Protection of Endangered Species, and Settlement for Environmental Cancellation.

D. Features Designed to Reduce the Spread of Noxious Weeds

Noxious weed prevention strategies on the Coeur d'Alene River Ranger District are conducted based on the Noxious Weeds Final Environmental Impact Statement and Record of Decision (USDA Forest Service, 2000; PF Doc. CR-028 and CR-029). Measures to protect Threatened, Endangered and Sensitive plant population viability and habitat capability during noxious weed treatment would be implemented following guidelines provided in that document. All roads used for implementation of harvest activities would be treated for noxious weeds, both prior to and after project completion. To help reduce the spread of noxious weeds and prevent the introduction of new invader species, a contract clause related to equipment washing would be used in all construction and timber sale contracts. For further information regarding noxious weeds, please refer to Appendix E (Issues Not Addressed in Detail).

E. Features Designed to Protect Aquatic Resources

Best Management Practices (BMPs) – All activities would be designed to protect water quality and aquatic resources through the use of BMPs, which are the primary mechanism to enable the achievement of water quality standards. Forest Service Handbook 2509.22 (Soil and Water Conservation Handbook) outlines BMPs that meet the intent of the water quality protection elements of the Idaho Forest Practices Act. Site-specific best management practices that have been specifically designed for the action alternatives and are part of the design criteria are described more fully in Appendix A. The estimated effectiveness of BMPs is considered moderate to high; depending on the practice. A description of each practice and an estimate of its effectiveness are located in Appendix A. Research has evaluated the effectiveness of BMPs (USDA Forest Service Monitoring Reports 1995 – 2000; PF Doc. CR-004 through CR-016). 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 District aquatics staff would also do periodic monitoring to assess the effectiveness of these practices.

Inland Native Fish Strategy (INFS) – In development of the proposed action, standards and guidelines of the INFS (pages A-6 through A-15; PF Doc. CR-003) were used specifically to protect water and aquatic biota within the Resource Area with application of streamside buffers. If Threatened or Endangered fish species are located during project implementation, protective measures would be implemented in compliance with the Inland Native Fish Strategy, including implementation of Timber Sale Contract provisions for Protection of Endangered Species, and Settlement for Environmental Cancellation.

Protection Of Wetlands, Seeps, Bogs, Wallows and Springs – All known or discovered wetlands, seeps, bogs, elk wallows and springs less than one acre in size would be protected from timber harvest or road construction with an appropriate buffer for the species as prescribed by the District Botanist and Wildlife Biologist.

F. Features Designed to Protect Soils

To reduce the impacts to soils and soil productivity, the alternatives utilize Soil and Conservation Practices as described in the Soil and Water Conservation Practices (SWCP) Handbook (FSH 2509.22) (PF Doc. SOILS-R-72) and (Appendix A). This handbook and appendix outlines Best Management Practices (BMPs) that protect the soil resources at a higher level than do existing Idaho Forest Practices rules and regulations, thereby incorporating all Idaho state standards.

Fine organic matter and large woody debris would be retained on the ground for sustained nutrient recycling in harvest units, consistent with Graham et al (1994; PF Doc. SOIL-R21).

- *Downed woody retention levels would be maintained at the lowest levels due to concern for fire hazard in the wildland urban interface. For the moist forest habitat types where harvest is proposed in half of Units 1, 4, 25 and all of 3, Graham et al (1994) recommend retaining 17-33 tons of downed woody material greater than three inches in diameter. For the drier habitat types associated with the remaining harvest units, the recommended retention level is 7-15 tons (PF Doc. VEG-22).*
- *Slash left on the ground after harvest activities are complete and before fuel reduction activites start would be left to overwinter for nutrient recycling.*
- *The latest soil nutrient management recommendations from the Intermountain Forest Tree Nutrient Cooperative (IFTNC) and Rocky Mountain Research Station (RMRS) would be applied as appropriate to each activity area where organic material is removed. Slash would be left to recycle nutrients back into the soil until site-preparation occurs.*
- *Only log-length yarding would be allowed in harvest units to facilitate nutrient recycling (there would be no whole-tree yarding). The leading end of logs would be suspended during skyline yarding. Yarding across any designated RHCA would require full suspension.*
- *Yarding would meet IPNFs and Soil Nutrition guidelines.*
- *As this is a hazardous fuels reduction project within the wildland urban interface, determination of fire hazard where slash is left untreated for prolonged periods of time would be made by the District Fire Management Officer. Where fire hazard is considered high, especially along shared boundaries with private property or heavily-used roads, flexibility would be given to treat slash prior to it being left for several months.*
- *Prescribed burning and pile burning would occur only when the upper surface inch of mineral soil has a moisture content of 25 percent by weight, or when duff moisture exceeds 100 percent, or when other monitoring indicates soil productivity would be protected.*

In those units where tractor yarding would be used (Units 6, 11, 15, 23, and 28), the following specific guidelines would apply:

- *Ground-based yarding, processing, and harvester equipment would operate on slopes under 35 percent and utilize existing skid trails where possible.*
- *All new skid trails would be agreed upon and designated on the ground by the purchaser and the Forest Service before felling begins.*
- *Skid trails would be established at approximately 100-foot spacing on ground-skidded units to reduce overall soil compaction and displacement; skid trails would converge at landings.*
- *Post-harvest, all utilized skid trails would either be covered with slash and/or have logs randomly placed on the contour to reduce runoff; stabilized with waterbars; or a combination of both.*

- *Existing landings would be utilized where appropriate in order to maintain current soil compaction levels. Upon completion of activities, landings would be covered with some residual slash (within the guidelines provided by Graham et al. 1994 for coarse-woody debris by habitat type), and seeded.*
- *All scheduling of harvest activities in tractor units would occur when the soil profile is dry to reduce the effects from compaction (Poff, 1996, p. 482; PF Doc. SOIL-R-47).*
- *In Unit 11, which is a long slender unit with a previous entry in the adjacent area, an existing skid trail would be utilized and timber directionally felled toward the haul road to reduce or eliminate the majority of potential disturbance, keeping impacts well within the standards.*
- *During construction of temporary and skid roads in Units 23 and 28, five to seven inches of topsoil and organic material would be removed and stock-piled for later redistribution during road decompaction. Bulk density tests would be conducted prior to decompaction to determine how deep the compaction extends into the soil horizons. Decompaction would only occur to the depth of the compaction, in order to protect the unimpacted ash cap layer. Organic material and topsoil would then be placed over the decompacted surface in order to retain as much of the original soil physical properties as possible, and then seeded.*

G. Features Designed to Protect Wildlife Habitat

Snags would be retained to meet the Northern Region Snag Management Protocol (PF Doc. VEG-20 and VEG-21). Healthy western white pine, ponderosa pine and western larch of all sizes would be favored to retain on the site unless removal is unavoidable due to safety reasons or special circumstances. All roads closed to the public that are opened, constructed or reconstructed for the project would be closed with a gate or barrier during project activities. All of these roads would be effectively closed following project activities. At the end of project activities, all closure devices would be replaced in as good as or better condition than currently exists. Temporary roads would be recontoured following harvest activities. Incidental trees charred during prescribed burning operations would be retained on site to provide black-backed woodpecker habitat unless removal is unavoidable.

If any Threatened or Endangered wildlife species are observed in the resource area during implementation, the district wildlife biologist would determine any project modifications necessary under the timber sale contract provisions to protect the species and its habitat based on applicable laws, regulations and management recommendations for the species. If any Threatened, Endangered or Sensitive species is found to be nesting in an area scheduled for prescribed fire or silvicultural manipulation, activities would be delayed in the area as recommended by the wildlife biologist.

H. Features Designed to Protect Cultural Resources

Surveys to locate cultural resources have been completed in the Deerfoot Resource Area; a single Class I (National Register-eligible) site was identified (Site Number 10-KA-243). The Forest Cultural Resource Specialist has made a preliminary determination that the proposed activities would have *No Adverse Effect* based on the following design features:

- *The Class I site would be protected from project activity by a buffer of at least one tree length. The Forest Service archaeologist would consult with project planners and accompany marking crews to ensure that a sufficient buffer is established.*
- *Damage to a ditch feature would be avoided by utilizing directional felling so that no trees are dropped on or across the feature. In addition, designated skid trails would be established in areas where the ditch no longer exists, so that it is not damaged.*
- *A low-intensity prescribed fire is proposed for the area; steps would be taken to eliminate fire from being introduced to the site and damaging any features or artifacts. Prescribed*

fire would not cause an adverse effect to the ditch feature because of its location; there are no artifacts in or on the ditch; and the feature itself is not sensitive to a low-intensity fire.

For additional information, refer to Section 2.7, Monitoring Activities.

2.6. MITIGATION MEASURES

After analyzing the potential effects of proposed activities, no specific mitigation measures were needed to reduce impacts to natural resources.

2.7. MONITORING ACTIVITIES

Applicable monitoring has occurred in the past, and is described in Chapter 3 as appropriate (with supporting information in the Project Files, where available by resource). The following is future monitoring that would occur in the Deerfoot Resource Area.

Forest Plan Monitoring

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

Monitoring Specific to the Deerfoot Resource Area

In addition to the monitoring described above, monitoring activities would occur specific to this project. All timber sales are monitored by sale administrators and other contracting representatives to ensure that activities are conducted in accordance with contract specifications. For example, that activities occur where and when they should to protect resource such as soils and wildlife, that yarding is accomplished as planned and specified in the contract to protect soils, and that seedlings are established. All regeneration units and a sampling of underburning-only units would be surveyed post-treatment to determine compliance with prescriptions and/or need for prescription amendments to achieve objectives. Regeneration units would be monitored during at least the first and third growing seasons after planting, until it can be certified that reforestation and establishment in the unit is complete.

Temporary road design and all road maintenance would be reviewed by the hydrologist to assure compliance with Best Management Practices (BMPs). The engineering representative and District hydrologist would monitor all temporary and reconditioned roads to ensure that they were built or restored to specifications. A sale administrator would visit each active cutting unit at a frequency necessary to assure compliance with the BMPs and the timber sale contract. Minor contract changes or contract modifications would be agreed upon and enacted, when necessary, to meet objectives and standards on the ground.

Closures to deter illegally-pioneered roads would be checked periodically during the first year (and periodically thereafter if no problems are noted) to monitor effectiveness of erosion control, noxious weed control, and wildlife security.

A low-intensity prescribed fire is proposed near a Class I cultural resource site in the Deerfoot Resource Area (see Section 2.5, Part H). Post-burn monitoring would occur as a means for studying the effects of a low-intensity fire on this type of feature.

2.8. ALTERNATIVES CONSIDERED BUT ELIMINATED

☒ Scoping comments from WildWest Institute (on behalf of The Lands Council, Alliance for the Wild Rockies and Kootenai Environmental Alliance; PF Doc PI-006) suggested two alternative concepts which were considered but dismissed from further study. These alternatives were eliminated primarily because they did not meet the purpose and need for the project. The two suggestions are as follows:

1) *"We request the FS design a restoration/access management plan for project area streams that will achieve recovery goals. The task of management should be the reversal of artificial legacies to allow restoration of natural, self-sustaining ecosystem processes."*

2) *"We ask that the FS utilize the Roads Analysis Process and analyze travel management, including road obliteration, and include an alternative that would not leave any deferred or outstanding maintenance needs/BMP upgrades in the analysis area."*

The Roads Analysis Process (RAP) was used for this project (PF Doc. TRANS-01). Watershed restoration work (road decommissioning, culvert removal) has been accomplished in four of the six subwatersheds considered in the analysis (see Aquatic Resource, Section 3.4; and PF Doc. TRANS-01). The Proposed-Action Alternative includes the one culvert upgrade and installation of one relief culvert. Based on field surveys, no additional stream restoration opportunities were identified in the Deerfoot Resource Area; surveys will be repeated to track changes over time (Section 3.4.2).

The task of access (travel) management is currently being undertaken at the district level. There are no changes anticipated within the Deerfoot Resource Area as a result of this planning.

☒ An alternative that would not create openings larger than 40 acres was considered but dismissed from further study. This alternative was dismissed because it artificially restricted treatment activities from meeting the purpose and need for the project. In order to meet the purpose and need to reduce fuels, improve species composition and stand/landscape structure, activities need to be designed based on on-the ground conditions in the Resource Area, which are contiguous to many stands, and are larger than 40 acres in many cases. Refer to PF Doc VEG-24 for more information.

CHAPTER 3
EXISTING CONDITIONS & ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

Chapter 3 describes the components of the affected environment, the current condition of specific resources, and the changes (direct, indirect and cumulative effects) that would occur to each depending on the alternative selected for implementation. The methodology used to describe and predict effects is also provided. For each resource, the applicable regulatory policies and guidance and methodology used are discussed. The Forest Plan (PF Doc. CR-002) identifies specific standards designed to meet the requirements of these regulations; consistency with these standards and legal requirements or other policies is provided at the end of each resource section.

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

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

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

3.2 FOREST VEGETATION

3.2.1 Policy, Direction and Legal Guidance

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

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

Consistency with specific Forest Plan standards and vegetative/silvicultural requirements of RPA and NFMA is provided in Section 3.5 of this chapter.

3.2.2 Methodology Used in the Forest Vegetation Analysis

A. Scale of the Forest Vegetation Analysis Area

The analysis area for existing vegetative conditions and to assess effects to forest vegetation follows the Deerfoot Analysis Area boundary (portions of compartment 308 and all of compartment 309), except when discussing allocated old growth. The analysis area for allocated old growth follows the boundary of Old Growth Management Units (OGMUs) 321, encompassing all of Compartment 308; and 324, encompassing all of Compartment 309 (PF Doc. VEG-31). Where appropriate, information is provided at each of the analysis area, old growth management unit and Coeur d'Alene River Basin scales to provide an ecological landscape perspective.

B. Analysis of Forest Vegetation Conditions

Methodology for Analysis of Existing Forest Vegetation Conditions

This analysis relies on comparison of existing condition to desired conditions. The desired future condition was used for comparing the present condition of the Deerfoot Resource Area and anticipated conditions under the No-Action and Proposed Action alternatives over time. The difference between the existing and desired conditions generates the vegetative purpose and need for action.

The interaction of successional development (as represented by habitat types from: Cooper et al. 1991 PF Doc. VEG-R1; USDA 1994 PF Doc. VEG-R15; and Smith et al. PF Doc. VEG-R16) and disturbances such as fire, insects, diseases, and human influences result in the species composition, structure and landscape arrangement of an ecosystem (PF Doc. VEG-5 and VEG-11). Clearly, existing conditions reflect past natural disturbances and management activities.

The forest vegetation analysis compares the existing condition to the desired condition in the Deerfoot Resource Area, which was developed during the Ecosystem Analysis at the Watershed Scale analysis step (PF Doc. VEG-7). It is based on multiple resource objectives using direction of the Forest Plan and tiering to data and recommendations from the Geographic Assessment (USDA IPNF, 1998; PF Doc. CR-025), Columbia Basin Assessment (USDA, 2003 PF Doc. VEG-R11; ICBEMP, 1997, pages 37 and 59-67 PF Doc. VEG-R10); and the Northern Region Overview USDA, 1998, PF Docs. VEG-R8 and VEG-R9), Region 1 Integrated Strategy (PF Doc. CR-031), the Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy (PF Doc. FF-24) and Implementation Plan (PF Doc. FF-25) and Analysis of the Management Situation for the Revision of the Kootenai and Idaho Panhandle Forest Plans (USDA, 2003, Chapter 3; PF Doc.VEG-R21).

Methodology for Analysis of Effects to Forest Vegetation

This project focuses on the need for a healthy and resilient forest ecosystem in the Deerfoot Resource Area. No single indicator is definitive as to forest health. Landscapes are healthy when their components and processes are functioning properly. Healthy landscapes, which have adapted over time to have higher resilience to local disturbances and lower susceptibility to catastrophic events. Resilience is the amount of to change or the amount of change that a system can absorb before it undergoes a major shift in composition, structure or processes. A healthy and resilient forest ecosystem will supply both: resilient species composition, structure, landscape arrangement, growth; and will also meet the multiple resource objectives for this resource area including fire/fuels (in this wildland urban interface), wildlife, recreation, aquatics, etc. Much of the forest vegetation analysis compares the existing condition and the outcome of the proposed action to the desired condition in the Deerfoot Resource Area. The desired condition is specific to the Deerfoot Resource Area (PF Doc. VEG-7) and was developed with a historic view of Coeur d'Alene Basin and current restoration needs developed by the Geographic Assessment as well as some level of uncertainty to completely predict future conditions. Historical perspectives can reduce the chances of major future surprises (Veblen, 2003; PF Doc. VEG-R117). Forest composition and a few characteristics of forest structure are used in this resource area to assess trend toward or away from a healthy and resilient conditions.

The effectiveness of the alternatives in addressing forest composition objectives is indicated by:

- *Percent **forest cover type** (specifically from Douglas-fir, grand fir or western hemlock to the long-lived early seral species – ponderosa pine, western larch, and white pine), either by basal area dominance in stands of trees greater than 5 inches diameter at breast height, or by trees per acre in stands up to 5 inches diameter at breast height. This will be analyzed at the resource area scale comparing current to desired conditions.*

The effectiveness of the alternatives in addressing forest structure objectives is indicated by:

- *Percent of the area in each **structural stage** (shrub/seedling/sapling, small to medium timber, and mature/large timber) at the resource area scale to allow comparison of current and desired conditions.*
- ***Canopy cover** is used as a 'within stand' density indicator. With the emphasis of this project on 'dry' aspects, current canopy cover will be compared to no action and proposed action on both dry and moist habitat type groups for the current condition after the proposed action and 50 years into the future. Low percent canopy cover on these productive sites often indicates multiple vegetative canopy layers or ladders, which is not considered desired or resilient.*
- *Landscape arrangement is measured through changes in **patch sizes** of the structural stages. This will be analyzed to allow comparison of current and desired conditions as an indicator of resiliency.*

Forest health is a method to gauge how a forest is meeting specific management objectives. Simplistically, stands that are growing faster than they are dying are more likely to meet the Forest Plan management objectives (considered healthy) covering a full range from wildlife requirements for large trees, large snags and down wood to local commodity production. Positive growth is also interrelated with successional pathways and disturbance regimes; both are considered ecosystem functions (i.e. agents of change). The stand and landscape condition in which growth is greater than mortality is indicated by **positive growth** (volume growth minus mortality for the previous 10 year period that is greater than zero). This growth will be compared with current conditions to no action and proposed action on both dry and moist habitat type groups.

Old Growth is a common concern with all vegetative analyses. The definitions for old growth and the direction for allocation of old growth are from the 1987 Forest Plan (USDA, 1987; PF Doc. CR-002), the Regional Task Force Report "Old Growth Forest Types of the Northern Region" (Green and others, 1992, corrected 2/2005; PF Doc. VEG-R20), and Forest Supervisor letters of direction for implementing old growth standards (PF Doc. VEG-28). The old growth definition is considered valid when taking into account recent scientific information. The following table is a synopsis from Green and others, 1992 (corrected 2/2005) to display some of the minimum standards used as part of the definitions for old growth types in the OGMUs 321 and 324 — clearly these are not the only considerations for old growth allocation (see Green and others, 1992, corrected 2/2005; PF Doc. VEG-R20).

Table 3-VEG-1. Minimum standards for old-growth types in the Deerfoot Resource Area.

Forest Type	Habitat Group	Minimum # of trees per acre greater than threshold diameter (dbh)	Large tree threshold diameter (dbh)	Minimum age of large trees (years)	Minimum basal area (sqft/ac)
ponderosa pine, Douglas-fir, or western larch	warm-dry	8	21"	150	40
Douglas-fir, grand fir, western hemlock, western larch or white pine	moderately warm-moist	10	21"	150	80
subalpine fir and mountain hemlock	moderately warm-moist and cool-moist	10	17"	150	80
subalpine fir and mountain hemlock	cool-dry	10	17"	150	60

The review of OGMUs 321 and 324 used Forest Plan definitions and standards and followed a 4-step methodology which included:

1) *a detailed review of allocated old growth in OGMUs 321 and 324 in TSMRS (PF Docs. VEG-31, 32, and 33);*
2) *a detailed review of all stands in OGMUs 321 and 324 to search for stands not previously allocated that currently meet allocation definitions and could be allocated (PF Doc. VEG-32 and 34);*
3) *the wildlife biologist and silviculturist reviewed landscape arrangement and consistency with Forest Plan Old Growth Standards (PF Doc.VEG-36), before final allocation in each OGMU was made (see VEG-35). In addition, August 2004 National Agriculture Inventory Program (NAIP) imagery was used to determine if changes (natural or human caused) had occurred that may change allocation since the last field exam. (Current landscape arrangement info (patch/block analysis) and work maps of future potential old growth is found at PF Doc. VEG-36); and*
4) *as part of the effects analysis, a review of proposed treatment units for potential old growth definition criteria also was accomplished (PF Doc.VEG-37).*

A complete list of stands considered for old growth allocation, final allocated old growth, field exam dates for old growth and other old growth information is found in the Old Growth Crosswalk (PF Doc. VEG-32). Validation of the data items used for old growth allocation is provided in PF Doc. VEG-4. Field reviews are an important aspect of this validation (see PF Doc. VEG-44).

C. Information Sources, Models and Other Tools Used in the Forest Vegetation Analysis

Data Sources

The data sources for analysis of the existing condition and effects of alternatives on vegetation include field stand examination data from the 1980s to present (PF Docs. VEG-2, VEG-4, VEG-32) as summarized in TSMRS and FSVeg; silvicultural field reviews in 2003 and 2005 (PF Doc. VEG-44); aerial photos interpretation with ground verification during field site visits (PF Doc. VEG-44); Forest Service Forest Health Protection aerial detection surveys (PF Doc. VEG-40); ArcView/ArcMap spatial computer software; a patch analysis to describe landscape pattern, arrangement and patch size (PF Doc. VEG-10) and forest succession predictions using the Forest Vegetation Simulator (FVS) (PF Doc. VEG-6).

Field stand examinations were accomplished using accepted, standard protocols (regional and national). **TSMRS, R1Edit, FSVeg and FACTS** are databases used to store basic stand information; they have various summation reports. These databases can be 'linked' to map locations and also consist of 'stand folders', stored at the district that contain additional information. A detailed description of individual data items and their validation methodology for the Deerfoot vegetation analysis is found in PF Doc.VEG-4. Information regarding existing vegetative conditions on private lands within the resource area is based on information provided by aerial photo interpretation and observations made by the silviculturist and project team specialists. In addition to standardized protocol stand examinations, **silvicultural field reviews** in 2003 and 2005 (PF Doc. VEG-44) and **aerial photos** interpretation with ground verification were used. These facilitate full understanding of existing conditions, vegetative potential, likely successional development and serve as a validation of field exam summaries.

The **Forest Vegetation Simulator** (FVS) model and the suite of tools that support it were developed from the Prognosis model. FVS was originally developed in 1973 and has been used extensively across the U.S for vegetative analysis since 1983. The FVS analysis for the Deerfoot Resource Area used the forest pest and fire/fuel extensions to predict forest stand dynamics through time given variable management regimes (PF Doc. VEG-6). FVS provided a variety of information for the analysis, including species composition, size of trees and fire/fuels parameters.

ArcView/ArcMap spatial computer software was used extensively to analyze existing conditions and compare alternatives. Copies of the base maps used (along with data associated with map polygons) are found in PF Doc. VEG-2. In addition, a stand base map and basic stand data as well as explanations on how to use available IPNF GIS data sets is found at http://www.fs.fed.us/ipnf/eco/yourforest/gis/index.html#veg.

A patch analysis was used to describe and compare landscape pattern, arrangement and patch size. This analysis is found in the project file (PF Doc. VEG-10). A separate patch analysis was completed for old growth related Forest Plan Standards and analysis and is found in the project file (PF Doc. VEG-36).

Various silviculture, ecology, fire/fuels and insect and disease **references** were used to develop this analysis and many are listed in the list of references and/or the project file. These references, in addition to specialist experience, were used to allow a full range of vegetative information and understanding.

3.2.3. Affected Forest Vegetation Environment

A. Vegetative Overview

The vegetation in northern Idaho is a result of the productive ash cap soils and the prevailing climatic pattern. The climatic pattern is characterized by westerly winds that carry maritime air masses from the northern Pacific across the northern Rocky Mountains during winter and spring. Precipitation occurs mainly between November and February, with only 12 percent of the annual precipitation occurring between July and September (Geographic Assessment, page 12). The inland maritime airflow provides northern Idaho with abundant moisture (25-55 inches per year) and moderate temperatures. The Deerfoot Resource Area's location on the western edge of the Coeur d'Alene Mountains and the adjacent Rathdrum Prairie seasonally results in approximately 30-40 inches of moisture locally (PF Doc. VEG-15) and warmer/drier air from the Columbia Basin when compared to the more moderate conditions found in the rest of the basin.

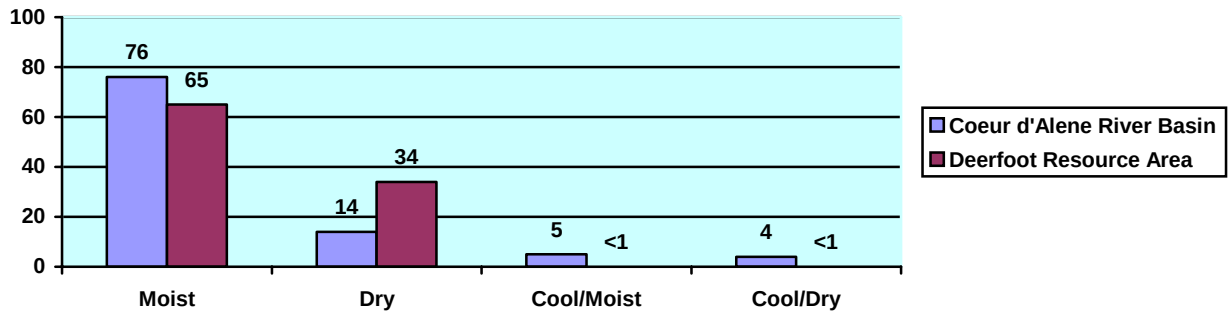
B. Vegetative Agents of Change

Vegetation is a fundamental part of terrestrial ecosystems. Vegetation is a basic element of wildlife habitat and is a critical factor regulating hydrologic regimes. The vegetation structures that exist in the ecosystem are a function of climate, the physical site, plant species available in an area, the disturbance history and the successional processes that follow disturbance. Most landscapes are a mosaic reflecting the interaction between disturbance history and succession. This interaction is a keystone process shaping the landscape vegetation mosaic (Zack and Morgan, 1994; PF Doc. VEG-R14).

Successional Patterns

The vegetation in the Coeur d'Alene sub-basin reflects the climatic conditions discussed above and disturbances discussed below. Habitat types are part of a land classification system based on the potential climax natural vegetation that could occupy a site. They serve as a land unit and classification to discuss successional patterns and development. This analysis uses a biophysical classification developed for Northern Idaho and Western Montana, used for sub-regional and landscape assessments and analysis (USDA, 1997; PF Doc. VEG-R15).

Figure 3-VEG-1. Habitat Type Groups in Coeur d'Alene River Basin and Deerfoot Resource Area (see PF Docs. VEG-9 and VEG-11).



Moist Habitat Type Group: The habitat types of this group include the most moist of the grand fir series, and the majority of the western hemlock and cedar habitat types. This is the largest group represented in the Deerfoot Resource Area as well as the Coeur d'Alene River Basin. Currently this habitat group is dominated by the grand fir (49 percent) and Douglas-fir (28 percent) forest cover types. Historically, habitat types were dominated in the Coeur d'Alene Basin by white pine. White pine and western larch are long-lived tree species typically established after some major form of disturbance and have the potential to occupy a site for 200 to 300 years. Very high stocking and basal areas can be achieved on these types. Fire-free intervals within landscapes dominated by this habitat type group are 50 to 200 years or more with stand-replacing fire intervals of about 200 years. Stand-replacement fires, while infrequent and displaying high fire-severity variability, could be severe during times of drought.

Dry Habitat Type Group: These habitat types range from the driest occupied by ponderosa pine and Douglas-fir with grass and/or scattered shrub understories to the drier grand fir habitat types transitioning to moist types. The most common sites within this group in the Deerfoot Resource Area are the Douglas-fir/ninebark habitat types, which are characterized in naturally functioning ecosystems by relatively open-grown stands of ponderosa pine and Douglas-fir with shrub understories. In the Deerfoot Resource Area, this group is dominated by Douglas-fir cover types (68 percent), but also includes among others ponderosa pine (24 percent). This habitat type group tends to be found on south through southwest-facing slopes. Fire maintains ponderosa pine throughout its range at the lower elevations and kills ever-invading Douglas-fir and grand fir (Spurr and Barnes, 1980; PF Doc. VEG-R90 and Graham et al., 2004, p. iv; PF Doc. VEG-R13). The natural fire-free interval for underburning was 5 to 50 years, with severe-intensity fires likely occurring every 90 to 200 years.

Cool / Moist and Cool / Dry Habitat Type Groups: The major types of this group are subalpine fir and may have cover types ranging from western larch, and white pine, Douglas-fir to subalpine fir, Engelmann spruce and lodgepole. Because these habitat types cover such a small area (less than 1 percent) within the resource area, it is difficult to reasonably determine the natural disturbance regimes in this area. Where they occupy a larger component of the landscape, fire free intervals of 50 to 130 years or more and stand-replacing fire intervals of 90 to 150 years are found.

Fire

Prior to European settlement in the Coeur d'Alene River basin, fire was the most important disturbance occurring across the landscape. Zack and Morgan (PF Doc. VEG-R14) describes fire history within the Coeur d'Alene sub-basin and indicated that fires covering greater than five percent of this forest occurred on an average of once every 20 years. In terms of the landscape scale of fire, Zack and Morgan found great variation in fire frequencies and patterns with the variation in fire severity on the landscape scale allowing some large trees, patches, and snags to persist even through lethal fire episodes.

Historically, the Coeur d'Alene River drainage had a variable fire regime of long-interval, large, lethal fires combined with shorter return interval non-lethal and mixed severity fires. The fire history study of the Coeur

d'Alene River Basin (Zack and Morgan, 1994, p. 30; PF Doc. VEG-R14) found, for the period 1540-1992, the mean (average) fire return for lethal fires in the interior of the Coeur d'Alene River basin was 203 years (with an individual fire range of 18 to 452 years) and the mean return interval for all fires was 84 years (with an individual fire range of 4 to 322 years). Zack and Morgan (page 27) found that fires were significantly more frequent in watersheds on the periphery of the Coeur d'Alene Basin, adjacent to and downwind from the drier pine dominated Rathdrum Prairie (as is the Deerfoot Resource Area). These areas had a mean lethal fire return interval of 138 years and a mean return interval for all fires of 62 years. For the period 1540-1880, lethal fire interval means for the Deerfoot area were about 10 years longer and all fire means were about 10 years shorter.

Fire suppression became effective at the landscape scale in the 1930s. For a more detailed discussion of fire ecology, refer to the Fire/Fuels section of this chapter.

Insects and Diseases

In the absence of fire, forest insects and diseases can accelerate or reset forest succession by affecting tree species, size, and stand density. Approximately 46 percent of the Coeur d'Alene River basin has a moderate to high probability of insect and disease agents affecting the timber vegetation (Geographic Assessment, page 29; PF Doc. CR-025).

Root Diseases: Historically, root diseases were a significant factor in reducing the competition from Douglas-fir and grand fir to maintain western white pine, western larch and on some sites, ponderosa pine. Douglas-fir tended to regenerate readily in the early stages of stand development, but dropped out as a significant component due to high rates of mortality caused by root disease (Byler and Zimmer-Gorve; PF Doc. VEG-R17). Western white pine, ponderosa pine and larch have a higher level of resistance at this stage of stand development to root diseases and were able to capitalize on the increased availably of growing space. Fire exclusion and the loss of these species through logging and blister rust have reduced the opportunity for early seral species to become established in root disease areas. Root diseases are currently the most prominent landscape altering process in the Coeur d'Alene River basin (Geographic Assessment, page 30; PF Doc. CR-025). In terms of forest succession, when Douglas-fir dies in moist stands, the result is an effective 50-150 year acceleration of succession to grand fir and hemlock. On dry sites, stands tend become multi-storied and cycle with continual regeneration of Douglas-fir because another seed source is not available. This condition (root disease and ladder fuels) promotes and increases risk of stand-replacement fire (USDA 1998, p. 22; PF Doc. VEG-R8). This condition is displayed in the resource area with dominance of Douglas-fir stands, widespread moderate root disease mortality and an increasing number of multi-storied stands. Relevant root disease references for this project are found at Frankel, 1998, PF Doc. VEG-R4; Byler et al. 1990, PF Doc. VEG-R17, Byler et al. 2000, PF Doc. VEG-R34; Hagle 2005, PF Doc. VEG-R55; USDA 2006, PF Doc. VEG-R60; USDA 2004, PF Doc. VEG-R63; Hagle 2005, PF Doc. VEG- R67; WSU 2006, PF Doc. VEG-R69; Hagle 2006, PF Doc. VEG-R73; Hagle 2001, PF Doc. VEG-R78; Matthews 1992, PF Doc. VEG-R85; and Hagle et al. 1992, PF Doc. VEG-R86.

White Pine Blister Rust: White pine blister rust was introduced into this area in the early 1900's. Blister rust is a fungal disease that forms cankers on branches or stems of trees that eventually kill or weaken the tree. Weakened trees become susceptible to other disease or to insect attack. Eventually, white pine was infected over the entire Coeur d'Alene River basin; trees were either killed or there was an accelerated harvest to recover their economic value. The Geographic Assessment discusses in greater detail cover type changes in the basin. Loss of mature white pine and the continuing mortality of younger trees due to blister rust have led to the increase in Douglas-fir, grand fir and hemlock now seen across the landscape. There have been successes, both regionally and on the district, in planting white pine produced from parents with improved resistance to blister rust. Planting those trees and then using cultural treatments like pruning can improve white pine survival (Schwandt et al. 1994; PF Doc. VEG-R19). Likely white pine was common in the Deerfoot area in the moist habitat types now occupied by grand fir (up to 40 percent of the resource area). Relevant white pine and blister rust references for this project are found at: Neuenschwander et al. 1999, PF Doc. VEG-R18; Schwandt et al. 1994, PF Doc. VEG-R19; Byler et al. 2000, PF Doc. VEG- R34; Jain et al.

2004, PF Doc. VEG-R42; Rippy et al. 2005, PF Doc. VEG-R40; USDA 2003, PF Doc. VEG-R43; Schwandt and Zack 1996, PF Doc. VEG-R58; USDA 2006, PF Doc. VEG-R60; Jain 2001, PF Doc. VEG-R68; and Jain et al. 2002, PF Doc. VEG-R81.

Dwarf Mistletoe: Dwarf mistletoes on western larch and Douglas-fir are present but generally not considered problems in the Coeur d'Alene River basin; however, they are very common in the Deerfoot Resource Area. This is likely due to the number of mistletoe-infected trees that survived mixed severity fires historically occurring on the drier habitat type group areas of the resource area. These mistletoe-infected trees then infected natural regeneration that resulted from the opening of growing space by fires. Mistletoe causes growth loss and sometimes mortality (PF Doc. VEG-R60).

Insects*:* Major insect pests of the Coeur d'Alene River Basin include mountain pine beetle, western pine beetle, Douglas-fir beetle and fir engravers. Historically, mountain pine beetle played a major role in mature white pine or lodgepole forests (Geographic Assessment, p. 29). White pine and lodgepole pine are currently rare in the Deerfoot Resource Area. Western pine beetles were common on the Rathdrum Prairie and drier portions of the upland forest (such as the Deerfoot Resource Area), killing individual trees or small groups of ponderosa pine. In particularly dry years mortality could increase dramatically. While western pine beetles are no longer as prominent because ponderosa pine has been reduced overall in the ecosystem, areas with a high component of ponderosa pine, site-specific areas stressed by drought and/or dense stand conditions can lead to high mortality. Douglas-fir beetle and fir engravers have always been present throughout the Coeur d'Alene sub-basin. The substantial increase in grand fir and Douglas-fir across the landscape have led to increased endemic levels of insects. The presence of root disease in many of the Douglas-fir forest types has resulted in even higher endemic levels of the Douglas-fir beetle and the propensity for rapid beetle population buildups during favorable conditions (Lockman and Gibson 1998, PF Doc. VEG- R28). Douglas-fir beetle outbreaks occur following disturbances such as windfall, snow breakage or fire. This was the case in the Deerfoot Resource Area as well as throughout the Coeur d'Alene River basin following the 1996 ice storm. In particularly dry years, insect infestations and mortality could increase dramatically. Short-term increases in fuel loading may have led to increased crowning of moderate intensity fires and created small to large openings for the reintroduction of seral species. In some cases, insect infestations may have contributed to large stand-replacing fires (Geographic Assessment, p. 30). Relevant forest insect references for this project are found at: Byler et al. 1990, PF Doc. VEG-R17; Lockman and Gibson 1998, PF Doc. VEG-R28; Randall 2003, PF Doc. VEG-R29; Byler and Hagle 2000, PF Doc. VEG-R34; Pederson and James 2005, PF Doc. VEG-R39; Their 2003, PF Doc. VEG-R48; USDA 2006, PF Doc. VEG-R60; and WSU 2006, PF Doc. VEG-R69.

Harvest

While human influence to the ecosystem has occurred at some level over the last few hundred years, European settlement (and related harvest and fire suppression) has had visible influence on vegetation in the Coeur d'Alene River basin overall for about 100 years. The existing condition reflects past actions. Known past harvest in the Deerfoot Resource Area is catalogued in Appendix C, PF Doc. VEG-16 and summarized below. At the Coeur d'Alene Basin and Deerfoot Resource Area scales overall, the early 1900's harvest was quite selective, removing only the larger highly valued trees and leaving stands of lower value trees that often sustained logging damage. By the mid 1900's, timber harvest in the Coeur d'Alene Basin focused on salvage of white pine blister rust mortality and tended to remove the lower quality species (for example, grand fir and hemlock) as well as the more valuable ones. The growing space that resulted from these harvests often was not sufficient to regenerate the long-lived shade intolerant seral species of white pine, ponderosa pine and larch, so, sites became increasingly occupied by shade tolerant Douglas-fir and grand fir. Where white pine did regenerate, it was susceptible to blister rust with few trees surviving to maturity. On all sites, and most significantly the drier sites, the suppression of fire allowed for increases in numbers and density of the Douglas-fir and grand fir component in stands (PF Doc. CR-025). Within both the Coeur d'Alene basin and the Deerfoot Resource Area harvests were on a much smaller scale than natural historic disturbance regimes, creating a fragmented landscape of old structure patches (PF Doc. CR-025) adjacent to newly-regenerated stands 2 to 100 acres in size.

Because most of the Deerfoot Resource Area did not burn as large stand-replacement fires in the late 19th and early 20th centuries, there was an abundance of ponderosa pine on drier aspects and white pine and larch on more moist sites in the early 1900's (PF Doc. FF-59). The proximity of the Deerfoot Resource Area to population centers during that time likely increased the occurrence of selective harvest of high-valued trees. The Ohio Match rail line crossed the northern portion of the resource area around 1925-1940 (Strong and Webb, 1970; PF Doc. VEG- R88). This likely enhanced access for harvest in areas accessible to the rail line. This rail line later became a road that is still a main travel route accessing interior portions of the basin. Access was also probable from Hayden Lake up into areas of Yellowbanks, Jim, Nilsen and Mokins Creeks.

During the 1960's there was an increased emphasis on Douglas-fir management throughout the northwestern United States. Locally, there was increased desire to maintain a fully-forested view from the populated portions of the Hayden/Rathdrum viewshed. Both of these demands resulted in many stands with mature components of ponderosa pine and Douglas-fir to be selectively logged/commercially thinned/salvaged and managed for their under- and over-stories of Douglas-fir. In the 1990's it became clear that Douglas-fir in the north Idaho ecosystems was not resilient enough to replace the ponderosa pine or white pine forests of the past due to a combination of climate, insects and diseases. Once blister rust-resistant stock became available (in the 1980's) and the insect and disease problems of Douglas-fir were more fully recognized, planting and management objectives shifted to white pine, ponderosa pine and western larch and stands with a mixture of site-adapted species to increase overall resiliency. The Deerfoot Resource Area has had about 275 acres of planted regeneration harvests (PF Doc. VEG-20) Planted regeneration included rust-resistant white pine, ponderosa pine, western larch, lodgepole pine and western red cedar.

Also during the winter of 1996-97, an extensive ice storm damaged many stands in north Idaho with heavy damage in the Deerfoot Resource Area. The dead and down material, likely combined with the high endemic levels of root diseases, resulted in a Douglas-fir beetle epidemic throughout North Idaho and leading to substantial mortality and some harvest (mostly salvage) in the resource area. This epidemic has subsided, however mortality is still fairly common due to root diseases and Douglas-fir beetles.

The timber stand management resource system (TSMRS) database contains information concerning harvest in the Deerfoot Resource Area from about the 1920's to the present (PF Doc. VEG-16). Existing conditions clearly reflect past harvest (acre figures in the database represent harvest activity acres, not stand acres). Two items are of special note: Many stands have had multiple harvests (some stands as many as four entries); no harvest occurred in over two-thirds of the resource area during this period; and regeneration harvest accounts for about 275 acres (3 percent of the resource area). Multiple entries into stands for stand tending, commercial thinning, salvage, etc. is considered silviculturally sound and should be expected in managed stands. While stands may have had multiple entries, it is not possible to track in the current database if the same acres were harvested on the re-entries because stands are often larger than recorded activity acres. The following table displays the database activity acres of all known harvest on National Forest System lands without consideration of multiple entries to the same stand.

Table 3-VEG-2. Acres of harvest in the Deerfoot Resource Area from 1960 to present.

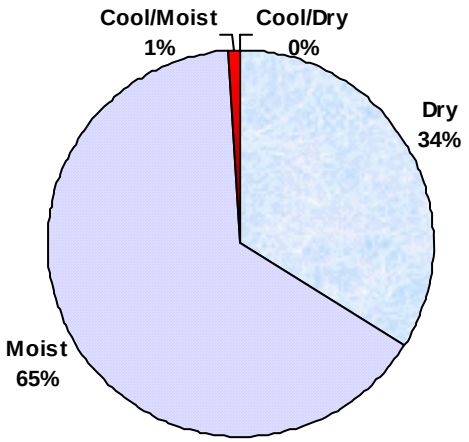
HARVEST TYPE	1921-1930	1941-1950	1951-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2006	Total
Clearcut				9		80	23		112
Liberation	38			104					142
Seed Tree Seed Cut							4		4
Shelterwood Removal			398						398
Shelterwood Seed							144		144
Commercial Thin				1,960	12		301		2,273
Special Cut							18		18
Permanent Land Clearing							1		1
Total	**38**	**0**	**398**	**2,073**	**12**	**80**	**491**	**0**	**3,092**

C. Current Vegetative Conditions in the Deerfoot Resource Area

Biophysical

Elevations in the Deerfoot Resource Area range from around 4,700 feet on the eastern-most edge along the Huckleberry to Spades ridge to 2,200 feet along the western most edge of the resource area. While moist habitat types of western hemlock and grand fir dominate the resource area, there is a higher proportion of dry habitats and an absence of subalpine habitats when compared to the rest of the Coeur d'Alene River Basin as a whole. This mixture of habitat types is indicative that biophysically the resource area represents the dryer and warmer segment of the Coeur d'Alene River Basin. Detailed discussions related to biophysical characteristics and disturbance agents are also found Forest Habitat Types of Northern Idaho: A Second Approximation (Cooper et al. 1991; PF Doc. VEG-R1) and Fire Ecology of the Forest Habitat Types of Northern Idaho (Smith et al. 1990; PF Doc. VEG-R16).

Figure 3-VEG-2. Habitat Type Groups in the Deerfoot Resource Area (PF Doc. VEG-11).



An analysis of suitability for resource management was completed for the Deerfoot Resource Area (PF Doc. VEG-17). Guidelines for determining suitability are found in the Forest Plan (USDA, 1987; PF Doc. CR-002, and FSH 2409.13 (PF Doc. VEG-17) and 36 CFR 219.28 (PF Doc. VEG-17). The suitability analysis found 4.5 percent (412 acres) of the resource area was not suitable for resource management because of regeneration concerns. These areas average less than 10 acres in size. The arrangement of the unsuitable areas is scattered across the resource area. No change to Forest Plan suitability will be required. Timber harvest will not occur in unsuitable sites.

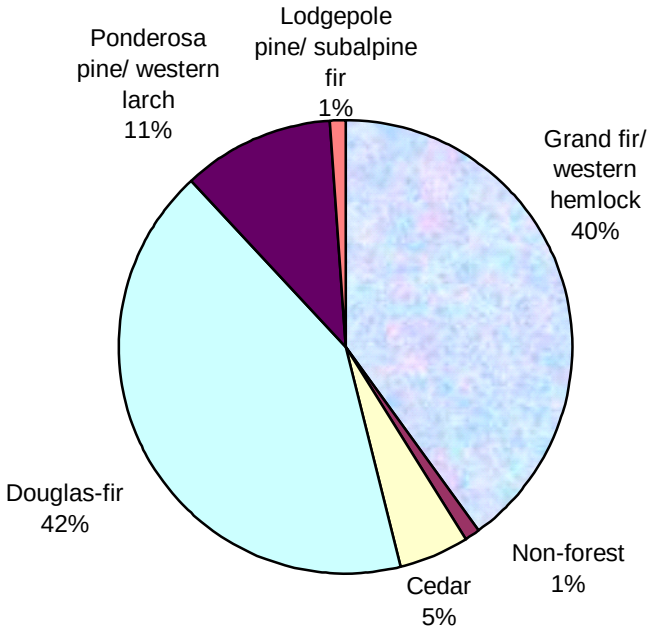
An analysis was completed as to the success of regeneration of harvests that occurred from 1976-1999 on the Coeur d'Alene River Ranger District (PF Doc. VEG-19). Overall regeneration success on the Coeur d'Alene River Ranger District is 97 percent, with 82 percent success within 5 years of regeneration harvest (PF Doc. VEG-19). The 2003 Forest Plan Monitoring and Evaluation Report (USDA, 2003, page 10; PF Doc. CR-022) states, "Over the last 16 years (1983-1998) of monitoring, our reforestation success rate has averaged 88 percent." The analysis also reviewed the District's success in rehabilitating sites with site preparation and planting without removal of timber volume (PF Doc. VEG-21). All sites with rehabilitation activities were successful. Clearly, success of this rehabilitation is conditioned on thorough site diagnosis along with silvicultural experience and judgment to assure success while minimizing expense. Given these conditions, the district has had success at improving species compositions toward long-term resiliency with this type of rehabilitation on approximately 350 acres over the last 10 years. At the request of the public this analysis also includes information related to the tree species planted in past in the Deerfoot Resource Area at PF Doc. VEG-20. Planted regeneration since 1947 has included white pine, ponderosa pine, western larch, lodgepole pine and western red cedar.

Forest Cover Types

Forest cover types describe the dominant tree species present in a stand. The existing and desired forest cover types in the Deerfoot Resource Area are displayed in the following figure (see PF Doc. VEG-7, VEG-12 and VEG-23). There are no western white pine cover types in the resource area.

Given the disturbance history (and change in disturbance agents over the last 100 years) in the area, the current forest cover types likely contain more Douglas-fir and less white pine than those of the past. Also of importance are the forest cover types found on particular habitat type group landscapes. Currently, Douglas-fir and grand fir dominate 75 percent of the dry habitat type landscapes, with ponderosa pine at 24 percent. Douglas-fir and grand fir also dominate 77 percent of the moist habitat type landscapes, with cedar/western hemlock at 16 percent.

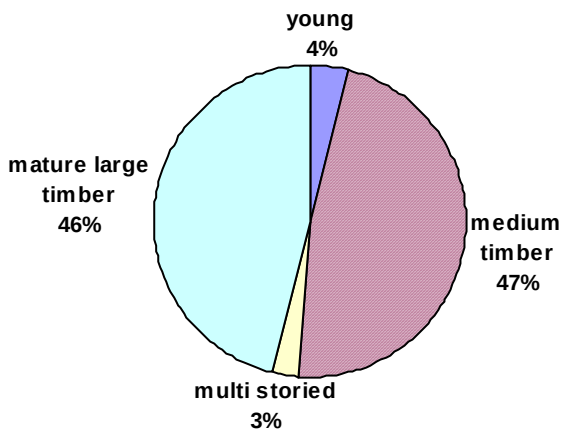
Figure 3-VEG-3. Existing Forest Cover Types in the Deerfoot Resource Area.



Structure

The structural stage categories used for this analysis are quite broad and are based on size class, age and/or successional development of stands. Past harvest as well as insect and disease mortality within the resource area has done much to shape the structural stages found as compared to fire disturbances previous to the 1900's. The current and desired structural stages in the resource area are displayed below.

Figure 3-VEG-4. Structural Stages in the Deerfoot Resource Area (PF Docs. VEG-7, 13 and 23).



Desired Condition:

Young	10-30%
Medium	20-40%
Mature Large	40-55%

Structural Stages:

Young = Shrub, seedling, sapling and forb/sod (usually less than35 years of age)

Medium = Pole and immature sawtimber (usually 35 to 100 years of age)

Mature large = Mature sawtimber and old growth (usually more than 100 years of age)

Allocated old growth is a subset of the mature/large timber structural stage. Allocation of old growth within the OGMUs involved in the Deerfoot analysis area (boundary of OGMUs 321 and 324) is based on current and widely accepted science and follows the current Forest Plan old growth definitions. OGMU 321 currently has 6.7 percent allocated old growth and OGMU 324 has 9.6 percent. A complete list of allocated old growth in OGMUs 321 and 324 is found at PF Doc. VEG-31, VEG-32 and VEG-35. When considering only the Deerfoot Resource Area, 1,021 acres are allocated old growth, representing about 11 percent of the resource area. An explanation of the methodology used for the allocated old growth analysis is found in PF Doc. VEG-27. A complete list of stands considered for old growth allocation, final allocated old growth, field exam dates for old growth and other old growth information is found in the Old Growth Crosswalk (PF Doc. VEG-32). Validation of the data items used for old-growth allocation is provided in PF Doc. VEG-4. Field reviews are an important aspect of this validation (see PF Doc. VEG-44). A review of the Deerfoot Resource Area for potential additions to the old growth allocation was completed. No areas were found to add to the allocation. This information as well as screening for old growth characteristics of all units involved in alternatives is found in the project file (PF Doc. VEG-37). In addition a patch analysis of allocated old growth was completed and areas of future potential old growth were identified (PF Doc. VEG-36). No alternative proposes harvest of allocated old growth. The Proposed-Action does not propose timber harvest in stands allocated for old growth management; there would be 512 acres of prescribed burning within allocated old growth. This activity would not change old-growth allocation status.

Table 3-VEG-3. Allocated Old Growth in OGMUs 321 and 324.

OGMU	Compartment	Total acres in the OGMU	Acres in OGMU allocated for old-growth management	% of OMGU acres allocated for old-growth management
321	308	8,329	557	6.7
324	309	8,585	825	9.6
Total	NA	**16,914**	**1,382**	**8.1**

Canopy Cover

Canopy cover is used as a within-stand density indicator. Canopy cover is derived from the FVS growth model (PF Doc. VEG-6). For this report, when canopy is measured or estimated it refers to canopy cover (Jennings et al. 1999, PF Doc. VEG-R32; Fiala et al. 2006, PF Doc. VEG-R115; and Christopher et al. 2008, PF Doc. VEG-R116). The findings for current condition are similar to those observed and similar to canopy numbers used for the fire FRCC analysis (PF Doc. FF-51 and FF-100). Overall canopy cover across all of the Deerfoot Resource Area is 53 percent; with dry habitats displaying 49 percent and moist habitats displaying 55 percent. The 53 percent canopy cover indicates current dominance and increasing representation of stands with multiple stories, ages and ladders. However, with 93 percent of the resource area in medium and mature/large timber, professional experience would indicate that the expected canopy cover would more likely be 60 to 65 percent. The lower figures likely represent overstory losses due to a combination of factors over the last couple of decades, such as bark beetles and ongoing mortality due to root diseases and severe weather events.

Landscape Arrangement

Of equal importance to the amount of each structural stage is the arrangement of these structures on the landscape. The landscape arrangement of structures has influence on how some types of fire, insects, or wildlife will move across the landscape. Managing for connected landscapes is seen as way to increase a landscape's resilience to change as well as allow animal and in some cases plant movement. Because there have been few stand-replacement disturbances in the Deerfoot Resource Area over the last 100 years, patch size has changed little in that time frame. Previous to 1900, the arrangement of dry and moist habitat types in the resource area likely generated more low- and mixed-severity fires in this area than was seen in the more moist interior Coeur d'Alene River Basin. A patch analysis was completed for the Deerfoot Resource Area (PF Doc. VEG-10). The mean and range in patch sizes are displayed in the following table. The desired condition strives for patch sizes from hundreds of acres up to one thousand acres, minimum patch sizes would be 150 to 300 acres with connectivity where possible (PF Doc. VEG-7).

Table 3-VEG-4. Current structural conditions based on patch analysis in the Deerfoot Resource Area.

Current Condition/Structural Stage	Mean Patch Size (acres)	Range of Patch Sizes (acres)
Young	16	4 to 35
Medium	179	3 to 2,479
Mature / Large	258	11 to 1,441
Multi	33	10-82

Growth

When considering the broad range of Forest Plan management objectives and as a representation of some of the relationships between these objectives with current successional pathways and disturbance regimes, **positive stand growth** (volume growth minus mortality over a 10-year period) is disclosed. As discussed earlier at the Coeur d'Alene River Basin and Deerfoot Resource Area scales (based on the Geographic Assessment), species compositions, structures and agents of change (succession, insects, diseases, fire, etc.) are outside of the historic and desired range. This situation is considered a sign that the ecologic functions are not resilient over the long term. A positive condition would have growth greater than mortality and a negative condition would have mortality greater than growth at the landscape scale. Overall for the resource area, growth is positive; with the dry habitats displaying negative growth and the moist habitats displaying positive growth (PF Doc. VEG-6).

Forest Characteristics on Private Lands

Private lands make up about 13 percent of the resource area. In addition, most of the western edge of the resource area borders private land. The habitat types are drier than on National Forest System lands, with a mixture of drier Douglas-fir and grand fir series on the southerly aspects and moist grand fir and hemlock

series elsewhere. Forest cover types are generally Douglas-fir, grand fir with ponderosa pine both as single trees and small stands. Structural stages tend to be dominated by young stands due to harvest over the last 20 years.

Fire has not been a major disturbance factor on adjacent private lands over the last century. Harvest has occurred on close to 70 percent of private lands over the last few decades in the resource area and overall canopy is about 30 percent (PF Doc. VEG-6). In addition, it is known that the 1996 Ice Storm and the 1997 to 2001 Douglas-fir beetle mortality outbreak has been as extensive on private lands within the Deerfoot Resource Area as it has been on National Forest System lands in the area (ranging from very broad areas of single trees to pockets of trees killed).

3.2.4 Environmental Consequences to Forest Vegetation

A. Direct and Indirect Effects at the Treatment Unit Scale under the No-Action Alternative

Under the No-Action Alternative, there would be no activities to restore forest vegetation toward increased resiliency. Since the resource area has two relatively distinct habitat type groups (moist and dry), two general trends would be expected to occur (Cooper et al. 1991, PF Doc. VEG-R1; USDA 1997, PF Doc. VEG-R15; Smith et al. 1997, PF Doc. VEG-R16; and McGaughey 2002, PF Doc. VEG-R6).

Moist sites involve approximately 66 percent of the resource area. The short-term effects of the No-Action Alternative would include continued mortality of Douglas-fir and grand fir as root diseases, decay and insects continue to cause deterioration of stands dominated by these species. Even if fire were to create sites for regeneration of long-lived early seral species (such as white pine and western larch), mortality due to insects and diseases as well as past harvest often have eliminated seed sources. Over the long term, the limited component of western larch and white pine now present would continue to decline, and grand fir and hemlock would become increasingly dominant components in the Deerfoot Resource Area. Douglas-fir would gradually become less prevalent due to root disease and bark beetle mortality. This mortality would continue to increase as stands age, and as older stands trend toward more pure grand fir and hemlock. In the absence of natural disturbance such as fire, regeneration to fill gaps in the canopy would be limited to the same species as the overstory (grand fir and hemlock). The landscape would become more homogeneous, multi-storied and multi-aged. Over the next 50 years, canopies would become more open and multi-storied/aged with growth becoming negative (mortality greater than growth). In about 80 years growth would slowly approach current levels as species compositions change to hemlock and grand fir. Moist site allocated old growth is also expected to follow this pattern (PF Doc. VEG-6).

On **dry sites** (approximately 34 percent of the resource area), root disease, decay and insects would also continue to cause deterioration of the stands dominated by Douglas-fir. Douglas-fir would not necessarily become less prevalent on the dry sites, as the lack of moisture limits regeneration to Douglas-fir, ponderosa pine, lodgepole pine and some grand fir. Growing space opened by the recent Douglas-fir beetle mortality would likely become Douglas-fir as that is the only seed source, and growing conditions on site do not exist for a change in species. Even if fire were to create sites for regeneration of early seral species of ponderosa pine and in some cases western larch, the lack of seed source would greatly limit this regeneration. The landscape would become more homogeneous, multi-storied and multi aged. Over the next 50 years, canopies would become more open and multi-storied/aged with some areas less than 20 percent. Growth will continue to be negative (mortality greater than growth) and then in about 80 years slowly become barely positive as species compositions change to scattered open grown trees. Dry site allocated old growth is also expected to follow this pattern (PF Doc. VEG-6).

B. Direct and Effects at the Treatment Unit Scale under the Proposed-Action Alternative

Overview of Vegetative Aspects of the Proposed-Action Alternative

Under the Proposed-Action Alternative, treatments would focus on the drier habitat types in order to respond to the purpose and need for ponderosa pine (dry-site) restoration (86 percent of proposed treatments would occur on dry habitats, with 16 percent on moist habitat types). Regeneration treatments have been designed to trend stands and landscapes toward more resilient patterns and compositions in the face of future drought, fire, or wind events. Units where only underburning would occur are designed to reduce fuels on the drier landscapes of the resource area. Underburning would be used on all sites to prepare a suitable site for establishment and growth of planted seedlings, reintroduce fire to the site, and/or reduce fuels. The average unit size (harvest plus burn-only areas) is 152 acres (PF Doc. VEG-10). These areas are arrayed along most of the broad, dry south aspects in the resource area in patterns that would tend to slow large fire growth. From Graham, et al is stated, "no single thinning or management prescription will achieve multi-resource objectives across all stands within a landscape…silvicultural systems using density and species management, along with the judicial use of prescribed fire, are key to managing western forests,"(Graham, et al., page 23, 1999; PF Doc. VEG-R49).

Target stand descriptions are found at PF Doc. VEG-8. Draft timber sale marking plan is found at PF Doc. VEG-18. Components that meet overall objectives would be retained; where not present, they would be established. Variability will be substantial within treatment areas because the amount of retention would be based on available components. Following treatment, landscapes would be highly variable, with a range of treatments across the landscapes. Wildlife, aquatic and visual concerns also played a part in maximizing retention on sites while trending the area overall toward restoration.

The treatments proposed are consistent with the Forest Plan, which directs that prescribed fire be used to meet silvicultural objectives (Forest Plan, p. III-4). Ponderosa pine, western larch and to some extent blister rust-resistant white pine and lodgepole would be planted. This complies with Forest Plan direction that reforestation normally feature seral tree species, utilizing a mixture of species. (Forest Plan, p. II-32). Regeneration activities would promote stand structures and compositions, which reduce susceptibility to future insect and disease damage. Non-regeneration activities would reduce current fuel loadings.

Proposed treatment areas would require re-entries over the next 10 to 50 years for additional tending treatments (precommercial thinning, pruning, underburning, etc.) in proposed regeneration areas and/or underburning (along with potential vegetative work prior to underburning to assure success). The additional tending treatments would focus on maintaining growth of long-lived early seral species established with regeneration treatment occurring under the Proposed-Action Alternative. The additional underburning would focus on maintenance of the desired stand structures (and disturbance agents) initiated under the Proposed-Action Alternative. In addition, areas not treated under the Proposed-Action Alternative, which would continue to trend away from desired conditions, will warrant treatment. These actions would require additional analysis. Stand diagnosis is at PF Doc. VEG-3.

Distribution of Proposed Treatments

One objective of the Proposed-Action Alternative is to restore dry site vegetation composition and structure toward increased resiliency. This would be accomplished through: prescribed underburning (without harvest), regeneration harvest (94 percent shelterwood harvests and 6 percent clearcut), commercial thinning, a combination of commercial thinning with shelterwood harvest, and rehabilitation treatment (site preparation and planting).

Table 3-VEG-5. Distribution of treatments under the Proposed-Action Alternative.

Proposed Treatment	Acres	% of total treatment acres	% of resource area
Underburn only (no harvest)	1,257	67	14
Regeneration harvest	584	31	6
Commercial thinning	8	<1	<1
Combination of commercial thinning and shelterwood harvests	17	<1	<1
Rehabilitation treatment	15	<1	<1
No treatment	7,274	NA	79

Effects at the Treatment Unit Scale in Underburn Areas (Without Harvest) under the Proposed-Action Alternative

This proposed treatment does not involve harvest but rather reintroduces fire and reduces current fuel loadings. General characteristics of the treatment areas include:

- *Douglas-fir habitat types represent about two-thirds of the treated area with dry grand fir on the remainder;*
- *Douglas-fir cover types represent about two-thirds of the treated area with and ponderosa pine on the remainder;*
- *Mature/large structural stages represent about three-quarters of the treated area, medium stages represent about one-quarter, with the rest in multistoried or young stages;*
- *About 41 percent (512 acres) of underburning treatment is in stands allocated for old-growth management.*

The allocated old growth proposed for underburning represents dry Douglas-fir habitat types. The proposed low-intensity underburning is not expected to change cover type, structural stage or old growth allocation, since as less than 10 percent of the overstory would have mortality as a result of the underburn. Special attention would be made in every phase of implementation of these treatments, especially in allocated old growth, to assure desired success. Modeling on similar dry sites indicates that this activity would not change the length of time stands would maintain their old growth characteristics when compared to the No-Action Alternative (PF Doc. VEG-6). Recent prescribed burning on the Coeur d'Alene River Ranger District has met silvicultural objectives (PF Doc. VEG-59). On these dry habitat types, fire maintained ponderosa pine throughout its range at the lower elevations and killed ever-invading Douglas-fir and grand fir (Spurr et al. 1990; PF Doc. VEG-R90 and Graham et al., 2004, p. iv; PF Doc. VEG-R13). Unit openings in the harvest plus burn-only areas would average 152 acres, with burn-only unit openings averaging 90 acres (PF Doc. VEG-10). Canopy and growth resulting from this treatment would be similar to that occurring under the No-Action Alternative.

Effects in Regeneration Harvest Areas under the Proposed-Action Alternative

This treatment would establish and grow site-adapted ponderosa pine, western larch or white pine while maintaining available and healthy ponderosa pine, western larch and to a much lesser extent Douglas-fir.

Characteristics of shelterwood regeneration units include:

- *Half of the units are located on dry grand fir habitat types*
- *One-third of the units on moist habitat types, with the rest on dry Douglas-fir habitat types*
- *Over half of the units are located on Douglas fir cover types*
- *One-third of the units are in ponderosa pine, with 15 percent in grand fir*
- *Almost two-thirds of units are in the medium structural stage, with the rest in the mature/large stage*

Following shelterwood harvest, the arrangement of retained components would be a highly variable arrangement of components 'on the ground' that met overall objectives. The best visualization of this treatment comes from a research paper by Oliver and Ryker which states "ponderosa pine, while seemingly uneven-aged, is in reality a mosaic of even-aged groups" (Oliver & Ryker, 2002, p. 10; PF Doc. VEG-R36). This slumped into small groups arrangement is also described by Graham and Jain. (Graham & Jain, 2005, p. 9; PF Doc. VEG-R136). Franklin refers to similar types of harvest as a "variable retention harvest system" (Franklin et al, 1997, p. 115; PF Doc. VEG-R37). Multiple resources objectives are met in maximizing retention on sites while still silviculturally trending the units toward restoration. Shelterwood harvest treatment would retain approximately 20 to 30 overstory trees per acre in the unit overall as single trees and small groups (up to one to three acres in size). The best representatives available of ponderosa pine, western larch or Douglas-fir (in order of priority) would be retained to serve as shelter and in some cases serve as a seed source. Shelter is needed on harsh sites to assure regeneration success. Retained trees would remain over the long term for structure. The target stand is two-storied with trees retained at this time remaining on site over the long term for structural diversity. Estimated canopy retention would be 10 to 20 percent. Unit openings in the harvest plus burn-only areas would average 152 acres, with regeneration harvest openings averaging 88 acres (PF Doc. VEG-10).

Clearcutting would take place only where there is too much overstory to be considered a rehabilitation unit, there are no viable overstory trees for retention or all the potential retention trees will be lost in the prescribed burn treatment needed for the site preparation required to establish desired species. The only unit with this potential condition is Unit 29. This unit would be reviewed by the silviculturist during layout/marking. Characteristics of areas proposed for clearcut include: dry grand fir habitat type; Douglas-fir forest type and mature/large structural stage. Up to 5 overstory trees would be retained, representing the best ponderosa pine, western larch or Douglas-fir available. Reasonably only about 5 to 10 percent canopy would be retained. Overstory retention would be highly variable. Beyond differences in retained stocking, this treatment would have the same treatment scenario and effects as the rehabilitation treatment (described below).

Prescribed fire would be used to prepare site and reduce shrub competition sufficiently to establish planted seedlings as well as to reduce post-harvest fuel loading. Overstory mortality over the last 25 years has permitted a dense, long-persisting layer to develop that will compete with establishing tree seedlings (Cooper et al. 1991; PF Doc. VEG-R1). Special attention would be made in every phase of reforestation on these brush-prone sites to assure desired seedling establishment and growth success.

An estimated 10 percent (and in rare cases up to 25 percent) of leave trees in a treatment unit would be expected to die within five years as the result of prescribed burning. Trees retained would not be removed regardless of whether or not they survive underburning. During prescribed burning, fire may spread outside of treatment units, but based on the district prescribed burning program experience (PF Doc.VEG-59), the degree of fire spread outside fire units is insignificant more than 90 percent of the time.

Following shelterwood harvest, stands will have overstory dominated by the ponderosa pine and Douglas-fir (and western larch if present) with the best physical characteristics on the site and, for all regeneration stands,

an understory dominated by mixture of ponderosa pine, western larch, Douglas-fir and grand fir seedlings. In the next 15 to 20 years, sites will be considered for precommercial thinning or other tending treatments designed to maintain attainment of multiple resource objectives. Administrative access to accomplish regeneration and long term tending activities are vital to economically attain desired stand conditions.

Future stand treatments that focus on species compositions dominated by ponderosa pine, western larch and white pine would put sites on a trend toward attainment of old-growth characteristics.

Effects in Commercial Thinning Units under the Proposed Action Alternative

Current characteristics of stands proposed for commercial thinning include: moist habitat type; grand fir with Douglas-fir cover type and; mature/large structural stage. Within the thinned areas, approximately 75 to 100 overstory trees would be retained per acre favoring ponderosa pine, western larch and the best Douglas-fir and grand fir. An estimated 40 to 70 percent of canopy cover retained. Following harvest, prescribed fire would occur throughout these treatment areas to reduce fuels and reintroduce fire as a change agent.

This treatment will result in a slight improvement in species composition over no action. Stand structure will be much as it is now, with reduction of the intermediate trees competing with the overstory. Fuel loadings will be reduced (with prescribed burning following harvest) and growth will remain positive as long as species composition is dominated by ponderosa pine and western larch and healthy Douglas-fir and grand fir (PF Doc. VEG-6). Mortality due to insects and diseases would continue to change canopy and structure over the long term, with areas needing consideration for regeneration treatment in the next few decades. Gradual changes in growing space and conditions will favor regeneration to Douglas fir and shrubs rather than ponderosa pine creating rather open, multi-storied stands. Stand treatments focused on species compositions dominated by ponderosa pine, western larch and white pine are most likely to put sites on a trend to attainment of old-growth characteristics.

Effects in Commercial Thinning/Shelterwood Harvest Combination Areas under the Proposed-Action Alternative

This proposed treatment takes advantage of pockets of mature long lived early seral components present in units while regenerating areas with sufficient insect and disease mortality to warrant regeneration treatment. Current characteristics include: dry grand fir habitat type; Douglas-fir forest type and mature/large structural stage. The arrangement of this treatment will resemble a shelterwood with heavy retention with the commercial thinned areas not being regenerated. Beyond this spatial difference this treatment will have the same treatment scenarios and effects as the commercial thinning and shelterwood regeneration.

Effects of Rehabilitation with Site Preparation and Regeneration Establishment under the Proposed-Action Alternative

This site has had previous harvests and mortality due to bark beetles and root diseases. Currently, the site has about 5 to 10 overstory trees per acre. Overstory stocking arrangement of this stocking is highly variable. Understories are dominated with shrubs and in some cases Douglas-fir and grand fir regeneration. Slashing understory sufficient to carry prescribed fire through the unit would occur. Prescribed fire would reduce shrub competition to allow establishment of planted seedlings. In addition, prescribed fire will reduce fuel loading. Overstory mortality over the last 15 years has permitted a dense, long-persisting layer to develop that will compete with establishing tree seedlings (Cooper et al. 1991; PF Doc. VEG-R1). Special attention would be made in every phase of reforestation on these brush-prone sites to assure desired seedling establishment and growth success. Residual overstory would be patchy, ranging from single trees to small patches. Overstory trees, where they exist, would serve as shelter, which is needed on these harsher sites to assure regeneration success, and would be retained over the long term for structure. Reforestation would focus on establishment of site-adapted ponderosa pine, western larch or white pine. Where planted trees become established, species composition in 100 years would be dominated by maturing ponderosa pine and western larch mixed with Douglas-fir. With tending treatments, these sites would display canopies in the 50- to 65-percent range of more or less single-story stands with open understories. Growth would be positive (PF Doc. VEG-6). Future stand treatments that focus on species compositions dominated by ponderosa pine,

western larch and white pine would put sites on a trend toward attainment of old-growth characteristics typical of dry sites in this area.

Table 3-VEG-6. Summary of treatment acres in the Deerfoot Resource Area trending toward desired conditions under the Proposed-Action Alternative.

Indicator	Acres of change needed to meet desired conditions	Acres that would trend toward desired conditions	Acres that would not trend toward desired conditions	Acres where there would be no change in the listed indicator
Forest cover types*	2,000-4,000 acres increase in ponderosa pine, western larch, white pine; 2,000-4,000 acres decrease other species	417 acres with regeneration, rehabilitation, and thinning treatments		1,257 acres where burn-only would occur; 207 acres where treatments will occur but which are already ponderosa pine, and western larch
Structural stages**	500 acres or more increase in the young stage; 600 acres or more decrease in the medium stage	594 acres where treatment would convert medium and mature/large classes to young two-storied stands	562 acres where burn-only would occur and stands are more likely to change to multi-storied over next 20 years	561 acres where burn-only would occur; 30 acres where regeneration, rehabilitation, and thinning treatments would not change the structural stage
Canopy cover		624 acres where regeneration and rehabilitation treatments would improve over the long term		1,257 acres where underburning would occur
Patch size	100s to 1,000 acres (minimum 150-300 acres)	harvest plus burn only average unit size is **152** acres with largest **315** acres and smallest **33** acres		NA
Growth		624 acres where regeneration, rehabilitation, and thinning treatments would improve growth over the long term		1,257 acres where underburning would occur

** not all regeneration harvest (regen) and rehabilitation (rehab) stands improve in species composition because they were long lived early seral at start of project (see PF Doc. VEG-23)*

***about half of the burn-only units are dry and are expected to have no change in overstory structure The other half are are grand fir or moist habitat types that are expected to become more multistoried (PF Docs. VEG-6 and VEG-23).*

C. Direct and Indirect Effects at the Resource Area Scale under the Proposed-Action Alternative

This discussion addresses only the National Forest System lands within the Deerfoot Resource Area (which encompasses portions of compartment 308 and all of compartment 309), except when discussing allocated old growth. The analysis area for allocated old growth follows the boundary of OGMUs 321 and 324. Indicators to be discussed in this section include: forest cover types (reflecting species composition), structural stages; canopy cover (reflecting within-stand structure), patch size, and overall growth. In most cases these are compared to the desired conditions (PF Doc. VEG-7 and VEG-8). The desired conditions discussed above would trend the landscape toward increased resiliency. Current conditions reflect all past natural disturbances and management activities and while this discussion considers those current conditions, it will only specifically address the effects of the Proposed-Action Alternative.

Direct and Indirect Effects to Forest Cover Types

Forest cover types are strongly dominated by Douglas-fir and grand fir with very limited representation of the long-lived early seral species (ponderosa pine, western larch and white pine). The Proposed-Action Alternative would result in a trend toward the desired condition (which represents more resilient vegetative conditions); however conditions would still fall well below the desired condition for white pine, western larch and ponderosa pine, and continue to be well above the desired condition for Douglas-fir, grand fir and western hemlock (PF Doc. VEG-23).

Table 3-VEG-7. Summary of direct and indirect effects to forest cover types under the Proposed-Action Alternative.

Forest Cover Type	% Desired	% Current	% Under Proposed-Action Alternative
Douglas-fir	20-30	42	39
Grand fir/western hemlock/cedar	10-20	45	44
White pine/western larch/ponderosa pine	35-55	11	15
Lodgepole pine/ subalpine fir	<1	1	1
Non-forest	NA	1	1

Direct and Indirect Effects to Structural Stages

The Proposed-Action Alternative would trend structural stages within the desired condition range for young and medium stages (the desired condition represents more resilient vegetative conditions). However, it would also trend the mature/large class outside of the desired range, and increase the multi-storied structure (PF Doc. VEG-23). The increase of the multistoried structure (along with the increased representation of ponderosa pine, western larch and white pine) on the landscape decreases stand resiliency given likely disturbances.

Harvest would not occur in allocated old growth under the Proposed-Action Alternative; there would be no change in stand structural stage or old growth allocation characteristics (PF Doc. VEG-6 and VEG-59).

Table 3-VEG-8. Summary of effects to structural stages under the Proposed-Action Alternative.

Structural Stage	% Desired	% Current	% Under Proposed-Action Alternative
Young	10-30	4	10
Medium	20-40	47	39
Mature/large	40-55	46	35
Multi-storied	NA	3	15

* *Multi-storied stands are identified as a desired condition.*

Direct and Indirect Effects to Canopy Cover

Canopy is currently below the expected levels of 50 percent for dry habitats, 65-plus percent for moist, and 60 to 65 percent overall (PF Doc. VEG-6). Canopy cover would be lower following implementation of the Proposed-Action Alternative because activities would reduce canopy in the short term. While canopies for the treated areas would improve over the next 50 years, at the resource area scale canopies would be lower than current due to deteriorating canopies in those areas without resilient compositions (which accounts for about 90 percent of the Deerfoot Resource Area).

Table 3-VEG-9. Summary of effects to canopy cover under the Proposed-Action Alternative.

Habitat Type Group	% Current	% Under the Proposed-Action Alternative	% in 50 years under the No-Action Alternative	% in 50 years under the Proposed-Action Alternative
dry	49	31	24	22
moist	55	52	37	37
all	53	48	33	33

Direct and Indirect Effects to Patch Sizes

The desired condition strives for patch sizes from hundreds of acres up to one thousand acres. Minimum patch sizes would be 150 to 300 acres with connectivity where possible (PF Doc. VEG-7). The current condition has patches of the desired size for the medium and mature/large structural stages, with smaller patch sizes than desired for the young and multi-stages. The average proposed action unit (harvest plus burn-only areas) is 152 acres (PF Doc. VEG-10). The Proposed-Action Alternative would decrease overall patch size slightly; however the medium and mature/large stages would still meet desired conditions and the young and multi-storied patches would increase in size. Of importance are the young patches; with new establishment of ponderosa pine, western larch and white pine, there would be increased long-term resiliency and greater potential to contribute to desired patch sizes in the future.

Table 3-VEG-10. Summary of effects to patch sizes under the Proposed-Action Alternative.

Structural Stage	Average Patch Size (acres) Currently	Range of Patch Sizes (acres) Currently	Average Patch Size (acres) under the Proposed-Action Alternative	Range of Patch Sizes (acres) under the Proposed-Action Alternative
Young	16	4-35	36	4-161
Medium	179	3-2,479	158	3-2,166
Mature / Large	258	11-1,441	205	8-1,171
Multi-storied	33	10-82	70	10-309

Direct and Indirect Effects to Growth

Current growth is positive overall with negative growth on the dry habitat types and positive growth on the moist sites (PF Doc. VEG-6). Growth remains the same as current following the proposed action. While growth for the treated areas would improve over the next 50 years, at the resource-area scale growth would remain negative due to conditions in areas without resilient compositions (about 90 percent of the resource area).

Table 3-VEG-11. Summary of effects to growth under the Proposed-Action Alternative.

Habitat Type Group	Current growth	Growth under the Proposed-Action Alternative	Growth in 50 years under the No-Action Alternative	Growth in 50 years under the Proposed-Action Alternative
dry	negative	negative	negative	negative
moist	positive	positive	negative	negative
all	positive	positive	negative	negative

D. Cumulative Effects at the Resource Area Scale

The cumulative effects analysis area includes lands within the Deerfoot Resource Area boundary. While the analysis area for allocated old growth in direct and indirect effects analysis was the boundary of OGMUs 321 and 324, allocated old growth for the cumulative effects analysis is the Deerfoot Resource Area. This cumulative effects analysis includes **all ownerships within the resource area**. National Forest System lands represent about 87 percent of the resource area and private lands represent about 13 percent of the resource area.

The cumulative effects analysis area for allocated old growth is the Deerfoot Resource Area. There are 1,021 acres of allocated old growth within the resource area. This is the same total number of acres disclosed in the direct and indirect analysis above, as there are no areas of allocated old growth on private lands in the resource area. The percentage of the resource area allocated as old growth does change for cumulative effects as both National Forest System and private lands are considered. Approximately 10 percent of the cumulative effects area is allocated for old growth management. Since Forest Plan standards related to allocation of old growth apply to National Forest System lands only (not private), they are not relevant to this cumulative effects analysis.

Table 3-VEG-12. Distribution of habitat types in the cumulative effects analysis area.

Habitat type group	% on NFS lands	% on Private lands	% on combined ownership
dry	34	56	37
moist	65	44	63

Indicators to be discussed in this cumulative effects section include: forest cover types, structural stages, canopy cover, patch size, and overall growth. These are the same indicators for the National Forest System lands in the vegetative direct and indirect effects analysis above. These indicators will be compared in most cases with the desired conditions (see analysis above) and the Forest Plan. The desired conditions for the cumulative effects area are the same as for the National Forest System lands discussed a as this desired condition trends the landscape toward increased health and resiliency.

Vegetative activities that effect the cumulative effects analysis indicators include timber harvest (which can change forest type and structural stage as well as decrease stand canopy cover), and the stand establishment of ponderosa pine, western larch and white pine. These activities alter successional development and affect vegetative analysis indicators (PF Doc. VEG-6). The successional trends of all areas are reflected by broad habitat types groups. Actions such as stand exams, culvert replacement, noxious weed treatments or closure of illegal trails would not affect the vegetative indicators used for this cumulative effects analysis. The current condition reflects the effects of all past natural disturbances and management activities. This cumulative effects analysis represents the point in time when proposed vegetative activities on National Forest System lands would be complete (about 10 years from now). The status of future actions on National Forest System lands is disclosed at PF Doc. VEG-55, where a complete list of planned activities is reviewed based how each item potentially effect the vegetative indicators listed above. Since there are no known foreseeable activities on private lands (see Chapter 2), the current condition on these lands is used. All of the calculations related to analysis of cumulative effects to forest vegetation are part of the project files (PF Doc. VEG-55).

In summary, past activity effects are represented by the current condition; the proposed action is described in Chapter 2 and foreseeable actions that have potential vegetative indicator effect are at PF. Doc. VEG-55.

Cumulative Effects to Forest Cover Types

Forest cover types in the cumulative effects area would be strongly dominated by Douglas-fir and grand fir with very limited representation of ponderosa pine, white pine and western larch. The desired condition represents more healthy and resilient vegetative conditions. The combined ownerships are outside the desired conditions, and the Proposed-Action Alternative would not improve species composition on enough acres to offset the dominance of Douglas-fir on both National Forest System and private lands.

Table 3-VEG-13. Distribution of forest cover types in the cumulative effects analysis area.

Forest cover type	% Desired	% on NFS lands	% on Private lands	% on combined ownership
Douglas-fir	20-30	39	82	45
Grand fir/western hemlock/cedar	10-20	44	13	40
White pine/western larch/ponderosa pine	35-55	15	0	13
Lodgepole pine/subalpine fir	<1	1	0	1
Non-forest	NA	1	5	1

Cumulative Effects to Structural Stages

The desired condition represents more resilient vegetative conditions. Different from other indicators, structural stages in the cumulative effects area would be closer to mid-range of the desired condition for the young and medium stages. This is because of the high proportion of the private lands now in the young class. The mature/large structural stage would still be well below the desired range (PF Doc. VEG-6).

Table 3-VEG-14. Distribution of structural stages in the cumulative effects analysis area.

Structural stage	% Desired	% on NFS lands	% on Private lands	% on combined ownership
Young	10-30	10	70	18
Medium	20-40	39	0	34
Mature/large	40-55	35	16	33
Multi-storied	NA	15	14	15

***** *Multi-storied stands are not identified as a desired conditions.*

Cumulative Effects to Canopy Cover

The canopy cover on combined ownership (National Forest System and private) would be below 50 percent (PF Doc. VEG-6). Canopy cover is lower on private land than on National Forest System lands because a high portion of the private lands has had more canopy removed due to harvest over the last 20 years. The low canopy and more multi-storied structures reflect the dominance of Douglas-fir and grand fir (both on National Forest System and private lands) with ongoing moderate levels of disease and insect activity/mortality. This will continue until species compositions trend toward resiliency (increased levels of ponderosa pine, western larch and white pine).

Table 3-VEG-15. Distribution of canopy cover in the cumulative effects analysis area.

Habitat type group	% on NFS lands	% on Private lands	% on combined ownership
dry	45	18	36
moist	53	47	51
all	50	31	46

Cumulative Effects to Patch Sizes

The desired condition strives for patch sizes from hundreds of acres up to one thousand acres. Minimum patch sizes would be 150 to 300 acres with connectivity where possible (PF Doc. VEG-7). The cumulative condition would have patches of the desired size for the medium and mature/large structural stages, with smaller patch sizes than desired for the young and multi-storied stages (PF Doc. VEG-6 and VEG-10). The largest medium and mature/large stage patches generally occur on National Forest System lands. Private lands generally have largest patch sizes in the young stage, which increased the cumulative trend when compared to the proposed action on National Forest System lands. Of importance is that only the young patches on National Forest System lands will have establishment of ponderosa pine, western larch and white pine as private lands generally do not plant/establish these species. Ponderosa pine, western larch and white pine will have increased long term resiliency and greater potential to contribute desired patch sizes in the future.

Table 3-VEG-16. Distribution of patch sizes on combined ownership (National Forest System and private lands) in the cumulative effects analysis area.

Structural Stage	Average patch size (acres)	Range of patch size (acres)
Young	59	3-490
Medium	158	3-2,166
Mature / Large	183	8-1,171
Multi-storied	69	6-309

Cumulative Effects to Growth

The Forest Plan productive potential for this area is considered good and in the range of 109 cubic feet per acre per year (PF Doc. VEG-6 and VEG-26). The landscape is currently dominated by Douglas-fir and grand fir (both on the National Forest System and private managed lands) with ongoing moderate levels of disease and insect activity/mortality. This is reflected in overall growth close to zero on both National Forest System and private lands. This will continue until species compositions trend toward resiliency (increased levels of ponderosa pine, western larch and white pine).

Table 3-VEG-17. Summary of growth in the cumulative effects analysis area.

Habitat type group	NFS lands	Private lands	Combined ownership
dry	negative	negative	negative
moist	positive	negative	positive
all	positive	negative	positive

3.2.5 Consistency with Policy, Direction and Legal Guidance for Forest Vegetation

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

A. Forest Plan Standards for Old Growth

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

This standard would be fully met under either alternative. Allocation of old growth within the Deerfoot Resource Area is based on current and widely accepted science and follows current old growth definitions from the Forest Plan (page II-29), the Regional Task Force Report including "Old Growth Forest Types of the Northern Region" (Green et al, 1992; PF Doc. VEG-R20) and Forest Supervisor letters of direction for implementing Forest Plan old growth standards (PF Doc. VEG-28).

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

Either alternative would be consistent with this Forest Plan standard. The IPNF old growth allocation of 10 percent (231,000 acres) was distributed among the districts as documented in the Forest Supervisor's May 7, 1991 letter concerning the subject "Forest Plan Explanation: Implementing Old Growth Standards (PF Doc. VEG-28). The Coeur d'Alene River Ranger District was responsible for allocating 56,000 acres for old growth management (with 18,000 acres on the former Fernan Ranger District and 38,000 on the former Wallace Ranger District).

The 2004 Forest Plan Monitoring and Evaluation Report (USDA, 2004, PF Doc. CR-026) discloses that the IPNF total allocated old growth at the end of 2004 was 278,552 acres (12.1 percent of forested acres on the IPNF). The Forest Plan old growth allocation of 10 percent (231,000 acres) was distributed among the districts as documented in the Forest Supervisor's May 7, 1991 letter regarding the "Forest Plan Explanation: Implementing Old Growth Standards" (PF Doc. VEG-28). The Coeur d'Alene River Ranger District was responsible for allocating 56,000 acres for old growth management (with 18,000 acres on the former Fernan Ranger District and 38,000 on the former Wallace Ranger District). The Coeur d'Alene River Ranger District had a total of 65,260 acres (USDA, 2004, p. 71; PF Doc. CR-026). The 2004 Forest Plan Monitoring and Evaluation Report states, "Clearly, the IPNF has allocated enough acres of old growth stands to meet and exceed Forest Plan Standard 10b," (USDA, 2004, p. 71; PF Doc. CR-026).

Updated TSMRS queries were run in 2007 for an upcoming Forest Plan Monitoring Report (PF Doc. VEG-28). Those queries indicated 283,727 acres of allocated old growth on the IPNF (12.3 percent of forested acres on the IPNF) and 67,471 acres of allocated old growth on the Coeur d'Alene River Ranger District (compared to the Forest Supervisor assigned 56,000 acres). These updated queries indicate this Forest Plan standard continues to be met at both the IPNF and ranger district scales.

The 2004 Forest Plan Monitoring and Evaluation Report also discusses the use of a multi-scale approach on the IPNF to monitor old growth based on two separate, independent tools:

1) *Forest Inventory and Analysis (FIA) data is used to calculate forest-wide and mid-scale old growth percentages; and*

2) *an IPNF stand map displays all stands allocated for old growth management, with old growth data recorded in the TSMRS database.*

Based on the FIA data summarized in the 2004 Forest Plan Monitoring and Evaluation Report, the IPNF proportion of old growth is 12.85 percent (with 90 percent confidence intervals of 10.55 to 15.27 percent). The FIA old growth estimate was revised in 2006 as part of the Draft Comprehensive Evaluation Report (USDA 2006; PF Doc VEG-R22) which is part of the set of documents for the IPNF Proposed Land Management Plan (see http://www.fs.fed.us/kipz/documents/plmp/index.php). The Comprehensive Evaluation Report document found 11.8 percent of the IPNF was old growth (with a 90 percent confidence interval of 9.5 to 14 percent). As discussed above, the amount of allocated old growth based on the IPNF stand map and recorded in TSMRS is 12.1 percent. Together, these two monitoring tools offer compelling evidence that the IPNF is meeting Forest Plan standards for the amount of old growth to be retained.

Full discussion of the multi-scale approach (including statistics) to assess old growth on the IPNF is found in the 2004 IPNF Forest Plan Monitoring and Evaluation Report, pages 66 through 74 (PF Doc. CR-026). In addition, the following items are included in the project file (PF Doc. VEG-28 and 29) to allow understanding of the assessments of old growth on the IPNF and the methodology and findings used for the FIA old growth findings: Review of Old Growth Assessments for the IPNF, Zack, 2006; Estimates of Old Growth Percentages and Snag Density on the IPNF, Bush and Lundberg, 2006; Application of FIA to Estimate Old Growth in Region 1, Czaplewski, 2004; Calculating Years to Grow to Breast Height for Estimating Old Growth Percentages from FIA Data, Zack, Berglund and Bush, 2006; and 1/10/06 table of findings for IPNF FIA Summary Database Landscape Areas and map.

In 2006 several wildfires burned in areas of allocated old growth on the IPNFs. These fires burned in mosaics which resulted in areas of total overstory/understory mortality, as well as areas of underburning with variable amounts of overstory/understory mortality. The effects of these fires to allocated old growth cannot yet be fully assessed. Field observations of areas burned in 2006 indicate significant areas of the allocated old growth within fire perimeters likely will still meet old growth definitions. However, given the worst case scenario that all areas of old growth within the fire perimeters could no longer be allocated as old growth, the 2004 Forest Plan Monitoring and Evaluation Report level of IPNF allocated old growth of 12.1 percent would drop to 11.9 percent (PF Doc. VEG-30). Even given this worst case scenario, this Forest Plan standard would still be fully met.

The Proposed-Action Alternative does not propose harvest of allocated old growth; however, underburn-only (without harvest) would occur on 512 acres within allocated old growth. The allocated old growth proposed for underburning represents the dry Douglas-fir habitat types. The proposed low-intensity underburn is not expected to change cover type, structural stage or old growth allocation as less than 10 percent of the overstory would have mortality resulting from the prescribed underburn. Special attention would be made in every phase of implementation of these treatments, especially in allocated old growth, to assure desired success. Modeling indicates that this activity on similar dry sites will not change the length of time stands would maintain old-growth characteristics when compared to the No-Action Alternative (PF Doc. VEG-6). Recent prescribed burning on the Coeur d'Alene River Ranger District has met silvicultural objectives (PF Doc. VEG-59). On these dry habitat types, fire maintained ponderosa pine throughout its range at the lower elevations and killed ever-invading Douglas-fir and grand fir (Spurr et al. 1980; PF Doc. VEG-R90 and Graham et al., 2004, p. iv; PF Doc. VEG-R13). This activity would not change old growth allocation status.

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

And

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

These standards would be met under either alternative. The Deerfoot Resource Area is within a portion of two OGMUs (see Table 3-VEG-3 for current allocations in these OGMUs). A thorough review of the Deerfoot Resource Area was conducted to possibly locate additional old growth that would meet Forest Plan old growth definitions and could be allocated. This review did not find additional stands in the Deerfoot Resource Area that meet old growth definitions. This review and additional old growth information is found in the project files (PF Doc. VEG-34).

Both OGMUs are above the minimum Forest Plan desired level of 5 percent allocated old growth. None of the alternatives would harvest old growth. The proposed action will prescribe underburn 512 acres of allocated old growth; however this action will not change the old growth allocation (see discussion of this proposed treatment in standard 10b above).

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

Either alternative would be consistent with this Forest Plan standard, which applies at the IPNF scale. A demonstration of compliance with this standard is found in the 2004 Forest Plan Monitoring and Evaluation Report (USDA, 2004; page 92, PF Doc. CR-026), which concludes, "Old growth on the IPNF does reflect approximately the habitat type series distribution of the forest…old growth distribution is less than proportional to habitat type series distribution only in the Douglas-fir and grand fir series, which occupy the driest 21 percent of the land…The low proportion of old growth in these dry habitat type series is a function of the combined effects of the huge, severe 1910 burn and other big early 20th century fires, subsequent suppression of low severity fires, early 20th century timber cutting, root diseases and bark beetles have contributed to the low proportion of old growth in these two habitat type series;" (USDA, 2004, page 72; PF Doc. CR-026).

The Proposed-Action Alternative would conduct underburning with no associated harvest on 512 acres of allocated old growth. This treatment strives to maintain old growth on dry habitat type types by reintroducing prescribed fire and/or managing the ingrowth of dense smaller trees and trending toward more resilient species composition. No change is expected in characteristics required for old-growth allocation (PF Doc. VEG-59). A more detailed discussion of these objectives and needs is found at USDA, 2004, page 72 and73; PF Doc. CR-026. The active restoration activities of the Proposed-Action Alternative would increase the resilience of current allocated stands and allow flexibility for future decisions about old-growth allocation.

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.

This standard would be met under either alternative, as displayed in the following table (PF Doc. VEG-36). A review of these OGMUs found no additional old growth to allocate within the resource area (see also VEG-34).

Table 3.-VEG-18. Disclosure of criteria to meet Forest Plan Standard 10(f).

Criteria	OGMU 321	OGMU 324
# patches	6	10
Smallest patch size	29	25
Largest patch size	185	165
# contiguous patches greater than or equal to 300 acres[1]	1	1
# of patches greater than or equal to 80 acres	2	5
# of patches greater than or equal to 25 acres	6	10

[1] Both OGMU's share a 463-acre patch for which all parts are greater than 100 acres each, and all are within one mile of each other.

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

This standard would be met under either alternative. Forest Roads 206 and 1535 currently go through some stands of allocated old growth in the resource area. These roads have been in place for more than 25 years and are open to all motorized use. No new roads through allocated old growth are foreseeable under the No-Action Alternative.

Under the Proposed-Action Alternative, no permanent road construction would occur in stands allocated for old-growth management. During project development, consideration was given to construction of a permanent road that would go through allocated old growth stand 30802035. However, the site of this road was relocated to the north and west of its originally-proposed site, thereby avoiding the allocated old growth.

The Proposed-Action Alternative would construct a temporary road to the helicopter landing for Units 23, 24 and 25. This temporary road would go through about 525 feet (about 0.1 mile distance and less than one-third of an acre) of allocated old growth (see PF Doc. VEG-39). The proposed route was designed to avoid harvest of large trees in allocated old growth due to the following design feature (see Chapter 2): "Adjustment to the temporary road location for units 23, 24 and 25 will be made so as to minimize the removal of any trees that are 21 inches or greater diameter at breast height." The temporary road would be closed after project activities are complete.

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

This standard would be met under either alternative. A small portion of the Iron Mokins North Fork Allotment is within the Deerfoot Resource Area. The entire allotment is about 40,000 acres. A map of the current grazing allotment is provided in PF Doc. VEG-58. The small portion of the allotment in the Deerfoot Resource Area is on the Mokins portion of the allotment. The full allotment is allowed 45 cow-calf pairs per season, with 1 cow-calf pair allowed per season in the Mokins portion of the allotment. It is unlikely that grazing would occur within mature or allocated old growth structures in the Deerfoot Resource Area since mature and old growth structures do not normally provide much forage for these animals. Activities under the Proposed-Action Alternative would not include any new domestic grazing allotments in the Deerfoot Resource Area nor in stands allocated for old-growth management.

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.

Either alternative would be consistent with this standard, which applies at the IPNF spatial scale. A demonstration of compliance with this standard is found in the 2004 Forest Plan Monitoring and Evaluation Report (USDA, 2004, pages 91-92; PF Doc. CR-026) where a table displaying both the goals by management area and current allocation of old growth in these management areas on the IPNF. "Only the four …management areas have specific Forest Plan old growth goals...Current old growth allocations meet and far exceed these Forest Plan goals."

B. Forest Plan Standards for Timber

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

This standard would be met under the Proposed-Action Alternative; it would not apply to the No-Action Alternative, which does not propose any silvicultural treatments. The silvicultural diagnosis considered a broad range of treatments (PF Doc. VEG-3 and 8). The Proposed-Action Alternative includes even-aged (single- and two-storied) regeneration and rehabilitation treatments. The proposed underburning (with timber harvest) and commercial thinning treatments are intermediate tending treatments that can be considered either even or uneven-aged.

Uneven-aged management was considered for treatments in the Deerfoot Resource Area. To be successful, uneven aged management (or individual tree selection/group selection) requires healthy stands with a high percentage of manageable long-lived early seral trees. Most stands in the resource area do not meet these criteria (see PF Docs. VEG-3, VEG-8 and VEG-12). While uneven-aged structures can be viable on many dry sites similar to this area, such treatments were not proposed given the current stand health concerns and lack of long-lived early seral stand species compositions.

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

This standard would be met under either alternative. Salvage of damaged timber is integrated into the silvicultural treatments under the Proposed-Action Alternative.

Timber Standard 3. Recommended changes in timber resource land suitability from the approved Forest Plan will be based upon the criteria contained in 36 CFR 219 and the rationale displayed in environmental assessments. Changes from suitability classification will be done in accordance with the procedures outlined in Appendix M.

This standard would be met under either alternative. Guidelines for determining suitability are found in the Forest Plan (USDA, 1987; PF Doc. CR-002, and FSH 2409.13 (PF Doc. VEG-17) and 36 CFR 219.28 (PF Doc. VEG-17). There would be no change in suitability classification under the proposed action (PF Doc. VEG-17).

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

This standard would be met under either alternative. All regeneration areas would establish seedlings from a site-adapted species/seed source, dominated by resilient, long-lived early seral species. All non-regeneration treatments would retain (to the extent possible) resilient long-lived early seral species.

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

This standard would be met under the Proposed-Action Alternative; it would not apply to the No-Action Alternative, which does not propose any treatments. Prescriptions under the Proposed-Action Alternative integrate fuels treatments in regeneration units with site preparation and attainment of desired stand conditions (PF Doc. VEG-18).

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

This standard would be met under the Proposed-Action Alternative; it would not apply to the No-Action Alternative, which does not propose any treatments. Access to private property in the Deerfoot Resource Area has and will continue to be coordinated (see PF Doc TRANS-01 for road information).

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

and

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

This standard would be met under the Proposed-Action Alternative; it would not apply to the No-Action Alternative, which does not propose any treatments. Forest Service policy FSM 2470.1 (PF Doc. VEG-25) directs land managers to normally limit the size of tree openings created by even-aged silvicultural methods to 40 acres or less. With some exceptions, creation of larger openings is allowable with Regional Forester approval. The Proposed-Action Alternative includes units that would exceed the 40-acre opening size (either by themselves or when considered with adjacent openings) as displayed in Table 3-VEG-19. In conjunction with the previously-regenerated areas, the proposed openings would create openings of the scale and pattern more closely resembling the historic disturbance regimes for this resource area. Prior to implementation of the Proposed-Action Alternative, Regional Forester authorization to exceed 40-acre harvest openings is required and would be attained (PF Doc. VEG-25).

The size of the proposed openings trend toward the scale and pattern comparable to the desired condition developed to attain increased fire resiliency in the wildland urban interface and immediately adjacent lands within the context of inherent landscape patterns (aspect, slope, habitat type, etc.) and fire history of both the Coeur d'Alene Basin and Deerfoot Resource Area (Zack et al. 1994 PF Doc. VEG-R14; Smith et al. 1997 PF Doc. VEG-R16; PF Doc. CR025, PF Doc. VEG-7 and PF Doc. VEG-8). One opening is a clearcut to be treated operationally with an adjacent shelterwood/thin. The area proposed to be clearcut has very few viable leave trees beyond snag retention. The rest of the proposed openings fit the definition of a shelterwood with reserves harvests; units would have 20 to 30 trees per acre retained in groups (1 to 3 acres in size) and single trees at irregular spacing. Following harvest and prescribed burning, the regeneration openings of the unit would have both individuals and areas of live and dead trees.

The management of fuels across large landscapes is required to effectively reduce the area and severity of fires, to increase recreation benefits, and to reduce negative effects such as smoke emissions, damage to wildlife habitat, stream habitat and fisheries (Graham et al., 2004, p. 33; PF Doc. VEG-R13). Treatments were designed to take advantage of the current landscape arrangement of resilient components (both on the stand and landscape scales) and treatments centered on areas where fuel treatment is a priority and areas with the highest concern in terms of insect and disease mortality, risk and location of man-made structures

(powerline, homes, egress roads, etc.). The spatial patterns of fuel treatments in landscapes would most likely determine effectiveness of fuel treatments in modifying wildfire behavior (Hessburg et al., 2000 In: Graham et al., 2004, p. 29; PF Doc. VEG-R13).

The Proposed-Action Alternative would treat a total of 1,880 acres (21 percent of the resource area), of which about 600 acres (7 percent of the resource area) would be regeneration treatments. The average unit size (harvest plus burn only areas) would be 152 acres (PF Doc. VEG-10). The average regeneration harvest patch size would be 88 acres and the average burn-only patch size would be 90 acres (PF Doc. VEG-10). Fuel treatments are expected to change fire behavior but not necessarily stop fire (Graham et al, 2003, p. 11; PF Doc. VEG-R35). Treating small or isolated stands without assessing the broader landscape would most likely be ineffective in reducing wildfire extent and severity (Graham et al., 2004, p. 29; PF Doc. VEG-R13). Random fuel treatment arrangements are extremely inefficient in changing fire behavior requiring perhaps 50 to 60 percent of the area to be treated compared to 20 percent in a strategic fashion (Finney, 2001 In: Graham et al., 2004, p. 30; PF Doc. VEG-R13).

The proposed regeneration units have a high Douglas-fir component with root disease mortality. The design and size of treatment units under the Proposed-Action Alternative focused on fire, vegetation, wildlife and visual objectives within other resource management objectives and constraints. Fire resource concerns included landscape arrangement of fuels over the short and long term in the wildland urban interface and areas immediately adjacent (refer to the Specialist's Report on Fire/Fuels). Vegetative objectives focused on areas where potential existing long lived seral species would be treated to increase resiliency and areas with high insect and disease mortality and risk.

The proposed units, in conjunction with previously regenerated areas, would create openings on the landscape of the scale and pattern that are similar to the historic disturbance regimes for this resource area.

Table 3-VEG-19. Units under the Proposed-Action Alternative with openings exceeding 40 acres.

Unit #	Unit Size (Acres)	Total Opening Size (Acres)	Additional Information
1 and 2	94	94	There are no adjacent openings; this is the proposed unit size.
4, 5, 6 and 30	124	124	There are no adjacent openings; this is the proposed unit size.
11, 12 and 14	53	53	There are no adjacent openings; this is the proposed unit size.
9, 10, 15, 16, 17, 20 and 31	155	197	This combined opening is adjacent to openings in adjacent stands. In 1994, seedlings were planted on **9** acres in adjacent stand 31701009; and on **9** acres in adjacent stand 31702023. Planting in both areas was certified as stocked in 1994. In 1994, seedlings were planted on **22** acres in adjacent stand 31701022, and certified in 2000. In 1998, seedlings were planted on **2** acres in adjacent stand 31702033, and certified in 2000.
23, 24 and 25	56	56	There are no adjacent openings, this is the proposed unit size.
28 and 29	169	169	There are no adjacent openings; this is the proposed unit size.

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

This standard would be met under the Proposed-Action Alternative; the No-Action Alternative does not propose harvest activities, therefore this standard would not apply. All vegetative treatments will have silvicultural prescriptions approved by a certified silviculturist prior to treatment implementation (PF Doc. VEG-3, VEG-18). Prescriptions will consider site-specific factors (such as physical site, soils, climate, habitat type, and current vegetative composition and conditions) as well as multiple resource objectives and Forest Plan goals, objectives and standards.

C. Forest Plan Standards for Forest Protection

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

and

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

This standard would be met under the Proposed-Action Alternative; the No-Action Alternative does not propose harvest activities, therefore this standard would not apply. As described earlier in this section, loss of the long-lived seral components (ponderosa pine, western larch and white pine) in the ecosystem is a major reason for the lack of vegetative resiliency. Use of various regeneration and intermediate treatments to trend toward species compositions with increased resilience is a major objective of the Proposed-Action Alternative (but not the No-Action Alternative). In combination with alternative design features (Chapter 2, Features Designed to Improve Vegetation Management), these treatments would minimize adverse effects and maximize a range of objectives. Based on the analysis of species composition, canopy and growth, the No-Action Alternative would not meet these Forest Plan Protection Standards.

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

This standard would be met under the Proposed-Action Alternative; the No-Action Alternative does not propose harvest activities, therefore this standard would not apply. Proposed vegetative treatments would utilize a combination of fire, hand treatment and natural and mechanical methods (see Chapter 2, Features Designed to Improve Vegetation Management). Forest vegetative treatment using chemicals is not proposed.

Consistency with the National Forest Management Act

Vegetation Manipulation (36 CFR 219.27(b)[1]. Assure that technology and knowledge exists to adequately restock lands within fire years after final harvest.

This standard would be met under the Proposed-Action Alternative; the No-Action Alternative does not propose harvest activities, therefore this standard would not apply. Restocking within 5 years of regeneration harvest is a required design item of the proposed action (see Design Features of the Proposed Action above). Technology and knowledge does exist to comply with this requirement. The IPNF Forest Plan Monitoring and Evaluation Report, 1998, page 7, states that "over the last 11 years (1983-1993, of monitoring, our reforestation success rate has averaged 88 percent". Regeneration success on the Fernan and Wallace districts combined is 97 percent overall for the period 1976 to 1999 with 82 percent within 5 years of regeneration harvest (see PF VEG-19). In addition PF VEG-8 discloses that all rehabilitation treatments similar to some in the alternatives of this analysis were successful over the last 10 years.

Vegetation Manipulation (36 CFR 219.27(b)[1]. Be chosen after considering potential effects on residual trees and adjacent stands. The Design Features of the Proposed Action (above) states 'harvest and site preparation treatments will consider the short and long term potential negative effects (including blowdown, fire mortality, etc) of proposed activities on adjacent trees and stands with site by site prescription modifications, such as change in unit boundary, modification of prescribe burning prescriptions, etc". Analysis included loss of 'less than 10 percent of the overstory.... from prescribed burning in the allocated old growth and 'an estimated 10 percent, and in rare cases up to 25 percent, of leave trees in' regeneration units (see Effects of the Proposed Alternative above). This standard is met under the proposed action.

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

This standard would be met under the Proposed-Action Alternative; the No-Action Alternative does not propose harvest activities, therefore this standard would not apply. Guidelines for determining suitability are found in the Forest Plan (USDA, 1987; PF Doc. CR-002, and FSH 2409.13 (PF Doc. VEG-17) and 36 CFR 219.28 (PF Doc. VEG-17). The proposed harvest units are within the productive habitat types as described by the Forest Plan (PF Doc. VEG-26). An analysis of suitability for resource management was completed for the resource area (see PF VEG-17). The arrangement of the unsuitable areas is scattered across the resource area. Timber harvest will not occur in unsuitable sites. Design Features (see above) includes 'harvest unit layout will consider suitability limitations on a site-by-site basis on the ground.' This standard is met under the proposed action.

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

This standard would be met under the Proposed-Action Alternative; the No-Action Alternative does not propose harvest activities, therefore this standard would not apply. The proposed action includes even-aged (single and 2 storied) regeneration harvest treatments. Commercial thinning harvest treatments are neither even nor uneven aged by definition but intermediate treatments. Other treatments proposed, such as prescribed burning only and rehabilitation do not include timber harvest. All vegetative treatments will have prescriptions prepared by a certified silviculturist. A draft marking plan that will lead to the final prescriptions is found at PF Doc. VEG- 18. Treatments were determined based on a silvicultural diagnosis (PF Doc. VEG-3) that compared of a broad range of treatment options to desired conditions as defined by target stand descriptions. These target stands (PF Doc. VEG-8) were developed using project-specific conditions and objectives based out of the Deerfoot Vegetation EAWS (PF Doc. VEG-7), the Forest Plan (PF Doc. CR-002), the Geographic Assessment (PF Doc. CR-025), the Columbia Basin Assessment (ICBEMP, 1997, pages 37 and 59-67; PF Doc. VEG-R10), the Northern Region Overview (USDA, 1998; PF Docs. VEG-R8 and VEG-R9), the Region 1 Integrated Strategy (PF Doc. CR-031), the Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy (PF Doc. FF-24), the Implementation Plan (PF Doc. FF-25), and Analysis of the Management Situation for the Revision of the Kootenai and Idaho Panhandle Forest Plans (USDA, 2003, Chapter 3; PF Doc.VEG-R21). All proposed treatments meet objectives and requirements of the Forest Plan.

Clearcutting is proposed on 33 acres in Unit 29. Clearcutting was the only viable option because 1) the area had too much overstory to establish desired tree species without additional canopy removal and 2) there are no viable overstory trees for retention or all the potential retention trees will be lost in the prescribed burn treatment needed for the site preparation required to establish desired species (see PF Doc. VEG-44 for more detailed information related to unit 29). To meet the intent of this standard, this unit will again be reviewed by the silviculturist during layout/marking to determine that clearcutting is optimal and no other viable option exists to establish desired long lived early seral species.

3.2.6. References Used in the Forest Vegetation Analysis

Bush, Renate and Lundberg, Renee. April 11, 2006. Estimates of Old Growth Percentages and Snag Density on the Idaho Panhandle National Forest. USDA Forest Service, Region 1. PF DOC. VEG-R71

Byler, James W. and Sara Zimmer-Gorve. 1990. A Forest Health Perspective on Interior Douglas-fir Management. In Interior Douglas-fir: The Species and Its Management. Washington State University, Dept. of Natural Resource Sciences, Cooperative Extension. page 103. PF DOC. VEG-R17

Byler, J.W. and Hagle, S.K. USDA, Forest Service. 2000, Successional Functions of Pathogens and Insects for Ecoregion Sections M332a and M333d in Northern Idaho and Western Montana- Volume 2-Results and Conclusions. Forest Service, State and Private Forestry, Forest Health Protection, Northern Region, FHP Report No. 00-11, July 2000. PF DOC. VEG-R34

Christopher, Treg A. and John M. Goodman. 2008. The Effects of Spatial Patterns on the Accuracy of Forest Vegetation Simulator (FVS) Estimates of Forest Canopy Cover. Western Journal of Applied Forestry, Society of American Foresters, Janary 2008, Volume 23, Number 1, pp 5-11. PF DOC. VEG-R116

Cooper, Stephen V., Kenneth E. Neiman, David W. Roberts, 1991. Forest Habitat Types of Northern Idaho: A Second Approximation. USDA Forest Service, Intermountain Research Station, General Technical Report INT-236. PF DOC. VEG-R1

Crookston, Nicholas L., 1999. Percent canopy Cover and Stand Structure from the Forest Vegetation Simulator. RMRS-GTR-24, USDA, Forest Service Rocky Mountain Research Station. PF DOC. VEG-R3

Czaplewski, Raymond L. 2004. Application of Forest Inventory and Analysis (FIA) Data to Estimate the Amount of Old Growth and Snag Density in the Northern Region of the National Forest System. November 5, 2004. PF Doc. VEG-R110

Dixon, Gary E., 2002. Essential FVS: A User's Guide to the Forest Vegetation Simulator. USDA, Forest Service, Forest Management Service Center, Fort Collins, CO. PF DOC. VEG-R2

Fiala, Anne C.S., Steven L. Garman and Andrew N. Gray. 2006. Comparison of five canopy cover estimation techniques in the western Oregon Cascades. Forest Ecology and Management 232 (2006) 188-197. PF Doc. VEG-R115

Frankel, Susan J, technical coordinator, 1998. User's Guide to the Western Root Disease Model, Version 3.0. PSW-GTR-165, USDA, Forest Service, Pacific Southwest Research Station. PF DOC. VEG-R4

Graham, Russell T.; Harvey, Alan E.; Jain, Theresa B.; Tonn, Jonalea R. 1999. The effects of thinning and similar stand treatments on fire behavior in Western forests. Gen. Tech. Rep. PNW-GTR-463. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. PF Doc. VEG-R49

Graham, Russell T., Technical Editor. Hayman Fire Case Study. USDA Forest Service, RMRS-GTR-114, September 2003. PF DOC. VEG-R35

Graham, Russell T.; Sarah McCaffrey, Theresa B. Jain (tech. eds.), 2004. Science bases for changing forest structure to modify wildfire behavior and severity. Gen. Tech. Rep. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. RMRS-GTR-120. PF DOC. VEG-R13

Graham, Russell T. and Theresa B. Jain. An Overview of Ponderosa Pine Ecosystems. 2005. Proceedings of the Symposium on Ponderosa Pine: Issues, Trends and Management. October 18-21 2004; Klamath Falls, OR. Gen. Tech Rep. PSW-GTR-198. Pacific Southwest Research Station, USDA.

Green, P.; Joy J. Sirucek, W. Hann; A. Zack, B. Naumann, 1992. Old Growth Forest Types of the Northern Region. USDA, Forest Service, Northern Region, Errata corrected 2/2005. PF DOC. VEG-R20

Hagle, Susan, James Byler, Susan Jeheber-Matthews, Richard Barth, Joyce Stock, Barbara Hansen and Connie Hubbard. March 1992. Root Disease in the CDA River Basin: An Assessment by Susan Hagle, Idaho Panhandle National Forest. PF Doc. VEG-R86

Hagle, Susan K. 2005. USDA, Forest Service. Forest Health Protection and State Forestry Organizations. Armillaria Root Disease: Ecology and Management. Available through: http://www.fs.fed.us/r1-r4/spf/fhp/ PF Doc. VEG-R55

Hagle, Susan K. 2006. Armillaria Root Disease and Management. USDA Forest Service, Forest Health Protection. Report 11.1. PF Doc. VEG-R73

Idaho Panhandle National Forests, 1998, Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin. Ecosystem Paper #4, United States Department of Agriculture, Idaho Panhandle National Forests. Pages 12, 28-33, and 36-42. PF DOC. CR-025.

Jain, Theresa B., Graham, Russell T., and Morgan, Penelope. Western white pine growth relative to forest openings. Can. J. For. Res. 34:2187-2198. 2004. PF DOC. VEG-R42

Jain, Theresa B.; Graham, Russell T. and Morgan, Penelope. 2002. Western white pine development in relation to biophysical characteristics across different spatial scales in the Coeur d'Alene River basin in Northern Idaho, USA. Canadian Journal of Forest Research, vol 32, 2002. pp. 1109-1125. PF DOC. VEG-R81

Jennings, S.B., N.D. Brown, D. Sheil, 1999. Assessing forest canopies and understory illumination: canopy closure, canopy cover and other measures. Institute of Chartered Foresters, Forestry, Vol. 72, No. 1, 1999. PF DOC. VEG-R32

Matthews, Anthony. March 1995. Root Disease in the CDA River Basin: A Timber Growth Simulation , Idaho Panhandle National Forest. PF Doc. VEG-R85

Millar, Constance I., Nathan L Stephenson and Scott L. Stephens. 2007. Climate Change and Forests of the Future: Managing in the Face of Uncertainty. Ecological Applications, 17(8), 2007, pp. 2145-2151, Ecological Society of America. PF DOC. VEG-R95

Neuenschwander, Leon F. et al, 1999. White Pine in the American West: A Vanishing Species- Can We Save It? Rocky Mountain Research Station General Technical Report RMRS-GTR-35. USDA Forest Service and University of Idaho. PF DOC. VEG-R18

Oliver, William and Russell Ryker. Forest Service Agriculture Handbook 654 Silvics of North America Volume 1. http://www.na.fs.fed.us/pubs/silvics_manual/table_of_contents.shtm (accessed January 2008).

Reinhardt, Elizabeth and Nicholas L. Crookston, 2005. The Fire and Fuels Extension to the Forest Vegetation Simulator. RMRS-GTR-116, January 2005. PF DOC. VEG-R5

Rippy, Raini C.; Stewart, Jane E.; Zambino, Paul J.; Klopfenstein, Ned B.; Tirocke, Joanne M.; Kim, Mee-Sook; Thies, Walter G. 2005. Root diseases in coniferous forests of the Inland West: potential implications of fuels treatments. Gen. Tech. Rep. RMRS-GTR-141. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. PF DOC. VEG-R40

Schwandt J.W., M.A. Marsden, and G.I. McDonald, 1994. Pruning and thinning effects on white pine survival and volume in northern Idaho. In: Baumgartner D.M. et al., Eds. Interior cedar-hemlock forests: ecology and management. 1993. March 2-4, Spokane. Washington State University Coop. Ext. p. 167-172. PF DOC. VEG-R19

Schwandt, John and Art Zack. 1996. White Pine Leave Tree Guidelines. USDA Forest Service, FHP-Report-96-3. PF DOC. VEG-R58

Smith, Jane Kapler; Fischer, William C.; 1997, Fire Ecology of the Forest Habitat Types of Northern Idaho. United States Department of Agriculture, Forest Service, Intermountain Research Station, General Technical Report INT-GTR-363. PF DOC. VEG-R16

Spurr, Stephen H. and Burton V. Barnes, 1980. Forest Ecology. The Ronald Press Company. Pages 350 and 381. PF Doc. VEG-R90

Strong, Clarence and Clyde Webb. White Pine: King of Many Waters. Mountain Press, Missoula MT, 1970. PF Doc. VEG-R88

USDA, Forest Service. 1994. Graham, Russell T.; Alan E. Harvey; Martin F. Jurgensen; Theresa B. Jain; Jonalea R. Tonn; Deborah S. Page-Dumroese. Managing Coarse Woody Debris in Forests of the Rocky Mountains. Research Paper INT-RP-477. PF DOC. VEG-R61

USDA Forest Service, 1997. Upper Columbia River Basin Draft Environmental Impact Statement: Volume 1. USDA Forest Service, Pacific Northwest Research Station; USDI Bureau of Land Management. Pages 37 and 59-67. PF DOC. VEG-R10

USDA Forest Service, Region 1, Landscape Ecology Peer Group, 1997 revised 7/2003. Biophysical Classification: Habitat Groups and Descriptions. USDA Forest Service, Missoula, Montana. PF DOC. VEG-R15

USDA, Forest Service, 1998, Northern Region Overview- Detailed Report. PF DOC. VEG-R8

USDA, Forest Service, 1998, Northern Region Overview- Summary Report. PF DOC. VEG-R9

USDA, Forest Service, 2000. Northern Region Snag Management Protocol. Northern Region. Missoula, Montana. PF Doc. VEG-R57

USDA, Forest Service, 2000. Successional Functions of Pathogens and Insects for Ecoregion Sections M332a and M333d in Northern Idaho and Western Montana- Volume 2-Results and Conclusions. Forest Service, State and Private Forestry, Forest Health Protection, Northern Region, FHP Report No. 00-11, July 2000. PF DOC. VEG-R34

USDA, Forest Service, 2003. Analysis of the Management Situation for Revision of the Kootenai and Idaho Panhandle Forest Plans. - at www.fs.fed.us/kipz/documents/ams/index.php PF DOC. VEG-R21

USDA Forest Service, 2003. The Interior Columbia Basin Strategy- A Strategy for applying the knowledge gained by the Interior Columbia Basin Ecosystem Management Project to the revision of Forest and resource management plans and project implementation. www.icbemp.gov under the 'what's new' button PF DOC. VEG-R11

USDA, Forest Service. Managing for Healthy White Pine Ecosystems in the United States to Reduce the Impacts of White Pine Blister Rust. USDA Forest Service R1-03-118. Available by clicking on "White Pine Blister Rust Report" at http://www.fs.fed.us/foresthealth/pubsindex.shtml. 2003. PF Doc. VEG-R43

USDA, Forest Service. 2004. Fuels Planning: Science Synthesis and Integration Forest Structure and Fire Hazard. Rocky Mountain Research Station Research Note. RMRS-RN-22-1-www. PF Doc. VEG-R63

USDA, Forest Service, 2004, Idaho Panhandle National Forest Plan Monitoring and Evaluation Report. PF DOC. CR-026

USDA, Forest Service. Forest Insect and Disease Management Guide. Available on-line at: http://www.fs.fed.us/r1-r4/spf/fhp/mgt_guide/index.htm PF DOC.VEG-R60

USDA Region 1 Integrated Strategy 2007 (PF Doc. CR-031)

Washington State University- Department of Natural Resource Sciences Extension, Forest Health Notes, 2006. An Overview of Forest Health. at http://ext.nrs.wsu.edu/forestryext/foresthealth/notes/overviewforesthealth.htm accessed 12/2/06. PF DOC. VEG-R69

Veblen, Thomas. 2003. Historic range of variability of mountain forest ecosystems: concepts and applications. The Forestry Chronicle, March/April 2003, Vol. 79, No. 2.

Zack, Arthur C.; Penelope Morgan; 1994. Fire History on the Idaho Panhandle National Forests. Moscow, Idaho: University of Idaho. 55 pages. Review Draft. PF DOC. VEG-R14

Zack, Art; Berglund, Doug and Bush, Renate. May, 9 2006. Calculating Years to Grow to Breast Height for Estimating Old Growth Percentages from FIA Data. USDA Forest Service, Region 1. PF DOC. VEG-R70

Zack, Arthur C. July 26, 2006. Old Growth Assessments for the Idaho Panhandle National Forest. USDA Forest Service, Region 1, IPNF. PF DOC. VEG-R72

3.3 FIRE/FUELS

3.3.1 Policy, Direction and Legal Guidance

The authority for fire management on National Forest System lands is described in Forest Service Manual (FSM) 5100 - Fire Management (PF Doc. FF-29). The objectives of fire management are (FSM 5140, PF Doc FF-30):

1. *To use fire from management ignitions or natural ignitions in a safe, carefully planned, and cost-effective manner to benefit, protect, maintain, and enhance National Forest System resources.*
2. *To reduce future fire suppression costs and unwanted effects.*
3. *To restore natural ecological processes.*
4. *To achieve desired conditions and attain management objectives adopted in approved forest land and resource management plans (forest plans).*

The Forest Plan objective for fire management is to implement efficient fire protection and use programs based on management objectives, site-specific conditions, and expected fire occurrence and behavior (CR-002). Forest-wide standards require that fire management plans are to be guided by management area standards. Management area standards and goals provide direction for appropriate use of prescribed fire and initial attack strategies. Human life and property are to be protected, and activity fuels should be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.

The Forest Plan identified four management area designations for National Forest System lands in the Deerfoot Resource Area (MA 1, MA 4, MA 9, and MA 16). Appropriate initial attack strategies (confine, contain and control) are to be used to achieve the best benefit based on commercial timber and big-game winter range values. Prescribed fire is to be used as needed to meet silvicultural objectives and the objectives of the management area.

The *Federal Wildland Fire Management Policy and Program Review* was chartered by the Secretaries of the Interior and Agriculture to examine the need for modification of and addition to Federal fire policy. The review recommended a set of consistent policies for all Federal wildland fire management agencies. In adopting the policy, the Federal Agencies recognized the role of wildland fire as an essential ecological process and natural change agent that will be incorporated into the planning process (USDI and USDA 2001a, PF Doc. FF-22). The severe wildfire seasons in recent years throughout the country have made it clear that fire cannot be excluded from fire-dependent ecosystems. On the other hand, because of developed areas and commercial forests, fire cannot be fully restored to its historic character without severe consequences to humans, except perhaps in a few of the largest wilderness areas (Brown et al. 1994, in Hardy and Arno 1996, PF Doc. FF-20).

After the record-breaking wildfire season of 2000, the President requested a national strategy for preventing the loss of life, natural resources, private property, and livelihoods in the wildland/urban interface. Working with Congress, the Secretaries of Agriculture and Interior jointly developed the National Fire Plan (NFP) ***(www.fireplan.gov)*** to respond to severe wildland fires, reduce their impacts on communities, and assure sufficient firefighting capabilities for the future. The NFP is a long-term commitment based on cooperation and communication among federal agencies, states, local governments, tribes and interested publics. The 10-Year Strategy Implementation Plan (2006, PF Doc FF-25) was recently updated, but the goals of the plan have remained the same:

- *Improve fire prevention and suppression*
- *Reduce hazardous fuels*
- *Restoration and post-fire recovery of fire-adapted ecosystems*
- *Promote community assistance*

As part of the National Fire Plan, private lands are being treated by Kootenai County's FireSmart Program. Land management agencies in Kootenai County are part of the Wildland Urban Interface Fire Mitigation Task Force of the Local Emergency Planning Committee. This group coordinates and guides fuel reduction and fire mitigation work for the participating agencies throughout Kootenai County. The group consists of the Forest Service, Bureau of Land Management, Idaho Department of Lands, Kootenai County Fire Chiefs, Office of Emergency Management, Planning Department, and the Panhandle Area Council.

3.3.2 Methodology for the Fire/Fuels Analysis

Several sources of information were used to assess the existing conditions in the Deerfoot Resource Area. The fire history of the Coeur d'Alene River Ranger District, including the Deerfoot Resource Area, has been recorded and mapped by the Forest Service since its inception. Fires were initially mapped with colored pencil on a district map, but are now digitized and placed in a GIS (geographic information system) coverage. A map of the recorded fire history for the Deerfoot Resource Area was used to make assumptions as to when effective fire suppression began (PF Doc. FF-55). Additionally, a fire history study of the Idaho Panhandle National Forests was conducted by Zack and Morgan (1994; PF Doc. FF-23). The information gathered by this study and the subsequent conclusions drawn from it are relevant to the Deerfoot watershed and were used to help characterize the existing condition of the area. An extensive literature search was completed in order to find the best, most current science applicable to the Deerfoot Resource Area.

Records of fire ignitions are compiled by the Forest Service (1960 to 2000) and Idaho Department of Lands (1981 to 2000), and kept in a national database. These records include the year, size, location, and cause of each fire reported. Records for fire ignitions in the Deerfoot Resource Area were used in this analysis (PF Doc. FF-54).

Fire Regime Condition Class (FRCC) was analyzed using the Fire Regime Condition Class software and direction outlined in the Interagency Fire Regime Condition Class Guidebook (PF Doc. FF-52). Field-verified LANDFIRE data was used as part of the FRCC analysis (PF Doc. FF-51, FF-57).

The Forest Vegetation Simulator (FVS), which is widely used by forest managers throughout the United States and Canada to predict the effects of various vegetation management actions on future forest conditions, was used for this analysis. The Fire and Fuels Extension to FVS (FFE-FVS) integrates FVS with elements from existing models of fire behavior and fire severity. Model output displays fuels, stand structure, snags, and potential fire behavior over time and provides a basis for comparing proposed fuel treatments (Reinhardt and Crookston 2003, page 12; PF Doc. FF-14). FFE-FVS was used in this analysis to describe the existing conditions of the forest stands in the Deerfoot Resource Area, as well as to compare the effects of proposed treatments within each alternative. Site-specific data gathered from field exams were used in the FFE-FVS model.

FFE-FVS was used to assess the risk of fire to a stand with indicators such as potential flame length, the probability of torching, and the critical wind speeds required to initiate and sustain a crown fire. This model is not intended to predict the probability of fire or the spread of fire between stands (Reinhardt and Crookston 2003, page 12; PF Doc. FF-14). It is used solely to assess the potential fire behavior and fire effects possible considering current and future stand conditions.

A total of four indicators were used in this analysis; three indicators of fire hazard were used to evaluate the changes in fire behavior at the stand scale, and the fourth was used to indicate landscape-level effects. First, the potential **flame length** (which is related to fuel loading and fuel arrangement) was used to determine the surface fire behavior potential, as well as the trend over time. Suppression tactics are directly related to flame lengths. For example, flame lengths less than four feet can be effectively attacked using hand crews constructing direct fire line, while flame lengths greater than four feet will likely have to be attacked using dozers, engines, and retardant aircraft (NWCG 1993, page B-59; PF Doc. FF-11).

Fire Behavior Indicators:

- ✓ Flame Length
- ✓ Probability of Torching
- ✓ Crowning Index
- ✓ Minimum Travel Time

The second stand-level indicator of fire hazard used in this analysis was the **probability of torching** (PF Doc FF-18, pg. 159) A torching situation is generally defined as one where tree crowns of significantly large trees are ignited by the flames of a surface fire or flames from burning crowns of small trees that reach the larger trees (Figure 3-FF-1). This index estimates the probability of finding a torching situation in a forest stand. The probability of torching is the proportion of small places where trees are present and torching is possible. To calculate this index, fire conditions such as surface fuels, fuel moisture, and windspeed are needed. The probability of torching is sensitive to the flame length and key processes in stand development – the development of an understory, the decline of overstory trees, and crown recession. Management actions that modify these key processes modify the predicted value of the probability of torching in realistic ways. The probability of torching can be very sensitive to flame length.

Figure 3-FF-1. Passive crown fire behavior or torching.

The third stand-level indicator of fire hazard used to compare alternatives was the **crowning index**. The crowning index is the wind speed 20 feet above the canopy at which active crowning is possible (Scott and Reinhardt 2001, page 17; PF Doc. FF-10). The crowning index reflects the density of canopy fuels. Active crown fire, also called a running or continuous crown fire, is one in which the entire surface/canopy fuel complex becomes involved, but the crowning phase remains dependent on heat from the surface fuels for continued spread. As depicted in Figure 3-FF-2, active crown fires are characterized by a solid wall of flame extending from the fuel bed surface through the top of the canopy (Scott and Reinhardt 2001, page 4; PF Doc. FF-10). Because active crown fires consume the crowns of trees, they result in complete mortality of the overstory. Sites that can initiate or sustain a crown fire at lower wind speeds are more prone to crown fire. Critical open wind speeds for crown fire initiation and active spread are stand-specific indicators of crown fire hazard. Although critical wind speeds were used as indices, the site conditions (surface and canopy fuels, slope steepness), not the weather, are being rated (Scott and Reinhardt 2001, page 16; PF Doc. FF-10).

All of the stand-level indices used (flame length, probability of torching, and crowning index) need to be considered in conjunction with one another. For example, just because the crowning index is increasing over time (meaning crown fire *hazard* is decreasing), it does not necessarily indicate a positive trend for potential fire suppression activities. Surface fuels and the associated flame lengths may be increasing at the same time, dictating different suppression tactics.

Fire behavior characteristics at the Resource Area scale were modeled using the **Minimum Travel Time** output from FlamMap (Finney, 2006 PF Doc FF-34). FlamMap uses 8 layers of information on fuels (PF Doc. FF-100), topography and static weather conditions to simulate fire behavior on a landscape. The results of this analysis were used to compare, at a landscape scale, the difference between the No Action and Proposed Action Alternatives.

As with all models, those used in this analysis are based on simplifying assumptions and all have limitations which are explained in the respective model description in the project file (PF Doc. FF-14, FF-18, FF-34)

Figure 3-FF-2. Active crown fire behavior.

3.3.3 Existing Conditions

A. Broad-scale Fire History

Fire is the dominant fact of forest history (Spurr and Barnes 1980, PF Doc FF-19). Fire is a major disturbance factor that produces vegetation changes in our ecosystems. Changing or removing the role of fire results in substantial changes in the ecosystem. Fire is a natural factor whose effects have long been incorporated into species' adaptations and ecosystem dynamics (Spurr and Barnes 1980, PF Doc FF-19). Fire maintained ponderosa pine on sites throughout its range at the lower elevations and killed ever-invading Douglas-fir and grand fir. Many ecosystems are regularly recycled by fire; life for many forest species literally begins and ends with fire (Spurr and Barnes 1980, PF Doc. FF-19). According to Zack and Morgan (1994; pages 19-22; PF Doc. FF-23) there are generally three types of fires that occur in forested ecosystems:

- ***Nonlethal fires -*** *fires that kill 10 percent 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 percent, but less than 90 percent 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 percent 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 (140-250+ years 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.*

> *"Severity" refers to the degree to which a site may be altered or disrupted by a fire which is often determined by the degree of soil heating.*
>
> *"Return interval" refers to how often a particular type of fire occurs.*
>
> *"Fireline intensity" is the energy release rate per unit length of fire line and is a physical parameter that can be related to flame length.*

The Coeur d'Alene River drainage historically had a variable fire regime of long-interval, large, lethal fires mixed with shorter return interval non-lethal and mixed-severity fires. Fires were more frequent in watersheds on the periphery of the Coeur d'Alene Basin, adjacent to and downwind from the drier, pine dominated Rathdrum Prairie (FF-23, Zack and Morgan 1994, page 34). Prior to Euro-American settlement (1880), the mean fire return interval within the Interior North Fork of the Coeur d'Alene River was 65 years, and the mean fire return interval on the Rathdrum Prairie face and the Hayden Lake watershed was 55 years (Zack and Morgan 1994, page 27; PF Doc. FF-23). However, Zack and Morgan (1994; PF Doc. FF-23) found great variability in stand mean fire return intervals; they ranged from 24 years to 228 years. The fire history analysis of the Coeur d'Alene Basin conducted by Zack and Morgan in 1994 (PF Doc. FF-23) drew the following conclusions:

- *In addition to cycling carbon and nutrients, the infrequent large lethal fires played a dominant role in resetting the successional sequence and structuring the vegetation matrix across the landscape. However, the nonlethal and mixed severity fires were also important. Most stands (within the Coeur d'Alene Basin) apparently experienced an average of one to three of these low severity burns between lethal fires. These lower severity fires would reduce ground fuels, reduce ladder fuels, thin stands, and favor larger individuals of fire resistant species (larch, Douglas-fir, and ponderosa pine), than if these mixed severity and nonlethal fires had not occurred.*

- *Lower severity fires structured how the landscape responded when a lethal severity fire did occur. The lower severity fires increased the proportion of the landscape with big trees and open canopies that would not sustain a crown fire. Reduction of ladder fuels would mean that even high intensity fire might not reach tree canopies in some cases. The larger trees that grew as a result of this thinning would be more likely to survive even intense fires. The net result would be that even lethal severity fires would be likely to leave more individual residual trees and patches of residual trees than if the lower severity fires had not occurred. The effects of lethal fire events would be less uniform as a result of the lower severity fires*

Zack and Morgan (1994, page 1; PF Doc. FF-23) found that since 1540 there was one major fire every 19 years, somewhere in the Coeur d'Alene River Basin. The last major stand-replacing fire of the 20th century in the Coeur d'Alene River Basin occurred in 1931. During the period from 1931 until recent years, fire control efforts were very effective. The primary impact of fire control has been to eliminate underburns and mixed severity fires which served as the thinning agents that favored larch and ponderosa pine.

B. Deerfoot Resource Area Fire History

The fire history within the Deerfoot Resource Area has followed the national and regional trends discussed previously. Fire suppression has been very effective since 1930, when the last fire large enough to be mapped occurred.

The Deerfoot Resource Area has a unique fire history as compared to the rest of the Coeur d'Alene basin. Zack and Morgan (FF-23, 1994, page 27) found that the mean fire return interval on the Rathdrum Prairie face and the Hayden Lake watershed (which includes the Deerfoot Resource Area) was 55 years, while the mean fire return interval within the Interior North Fork of the Coeur d'Alene River was 65 years.

Figure 3-FF- 3*. An open ponderosa pine forest in the Deerfoot Resource Area.*

Leiberg (1897, PF Doc. FF-59) described a "Yellow Pine Zone" in the lower elevations of the Coeur d'Alenes, presumably including the Deerfoot Resource Area. He described open forests, with trees far apart and a sparse undergrowth of shrubs and a fair to luxuriant growth of grass (Figure 3-FF-3). In these open forests, there was little fallen timber, and where the growth of ponderosa pine (or yellow pine) was pure, the forest was park-like and had a clean and open appearance. However, Leiberg noted that mixed forests of ponderosa pine, Douglas-fir, grand fir and lodgepole pine and western larch were more common. Fires in the "Yellow Pine Zone" spread with greater rapidity than in other zones, due to its more open nature and abundant grass. The duration of the fires was short, and neither the ponderosa pine or Douglas-fir suffered very much from the first few fires, while the grassy covering was replaced very soon after being burned. The burns of the largest extent were in the "Yellow Pine Zone." Leiberg stated that "it would be a difficult matter to find a body of 500 acres in the whole of this zone which has not been visited by fire within the past thirty-five years."

To supplement the fire history information provided by Leiberg and Zack, site-specific, fire scar samples were gathered from dry sites in the Deerfoot Resource Area during the 2002 field season. Seven fire scar samples were taken from trees in 3 different stands. Samples were taken using methods described by Arno and Sneck (FF-58, 1977, pages 11-14). The earliest fire scar recorded was in approximately 1682, while the last fire scar recorded was in approximately 1943 (FF-36). Effective fire suppression in the Deerfoot Resource Area began after 1930, when the last fire large enough to be mapped occurred. The fire in 1930 was approximately 73 acres in size (FF-55). For each fire scar collected, Fire Return Intervals (FRI's) were calculated for the time period before 1931 (before effective suppression), as well as for the entire life of the tree. This statistic is an indicator of how often

fire returned to the particular tree the sample was taken from. The shorter the FRI, the more often fire burned near that particular tree. Choosing 1930 as the date to close the fire intervals and calculate the FRI may artificially shorten the FRI, especially if a fire occurred very near 1930. In addition, the calculations of FRI include an extra fire, assuming that the ponderosa pine and western larch sampled originated soon after a fire. Zack and Morgan (FF-23, 1994, page 17) also used tree origin dates as evidence of a fire.

For the site-specific fire scar samples, fire return intervals for the period prior to 1931 ranged from 14 – 32 years, for an average of 22 years. For the entire life of the trees sampled, fire return intervals ranged from 24-50 years, for an average of 33 years (PF Doc FF-61). Considering these statistics, it is notable that the time since the last fire recorded on each tree ranged from 65 to 100 years ago, for fires occurring in approximately 1943 and 1908 (PF Doc. FF-61). Several of the trees sampled may have been influenced by fires started by the railroad, which lies below them. For these trees, it is possible that any fires recorded after the railroad was built in approximately 1924 were actually ignited by the railroad. However, trees were also sampled far away from the railroad, and similar results were found. In fact, the tree with the most fire scars (10), was presumably not influenced at all by railroad fires. It is important to note, again, that these samples were only taken on the relatively dry sites suitable for the treatments proposed as a part of this project. Considering these factors, as well as the bias that may be introduced with the calculation of FRI, it would be reasonable to estimate an average fire return interval for stands similar to those sampled of about 30 years, and in some cases closer to 20 years (prior to effective fire suppression).

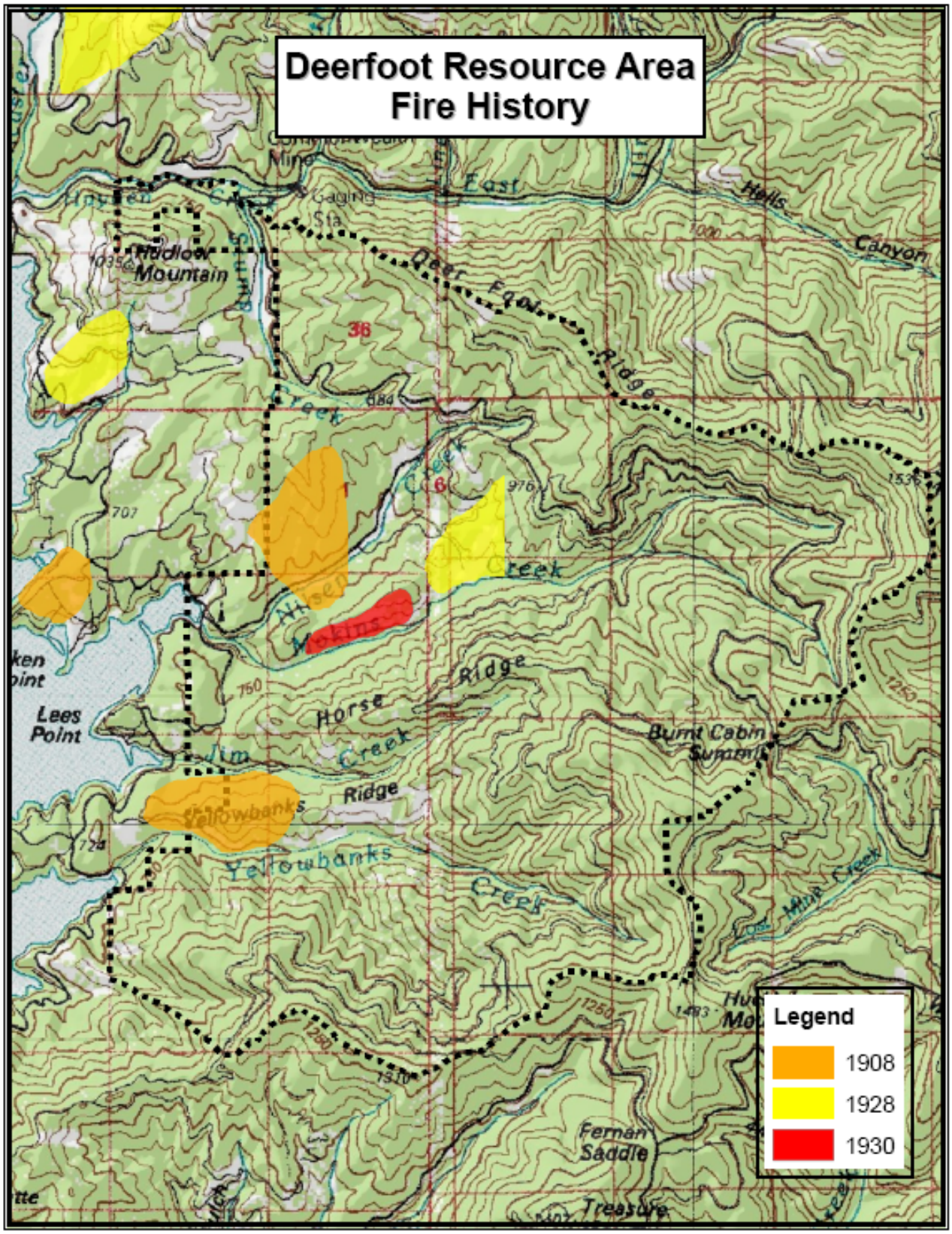
Baker and Ehle (2001, PF Doc FF-12) question current methods of calculating fire return intervals in ponderosa pine forests, arguing that they lead to biases and uncertainties. Their comments may be applicable to the site-specific samples, however, Zack and Morgan's fire history study of the Coeur d'Alene Mountains was not solely focused on surface fires, and uses different methods than those questioned by Baker and Ehle. Between Leiberg, Zack, and the site-specific fire scar samples, it is apparent that fires were more frequent on the dry sites in the Deerfoot Resource Area than in the interior of the Coeur d'Alenes, and likely returned every 30 years or less in the recent past.

Further evidence suggests that anthropogenic ignitions may have also played a significant role in fire history of the resource area. A band of Coeur d'Alene Indians was known to have a village near Hayden Lake (FF-33, Boas and Teit 1996, page 3); Indians are known to have used fire for many things; to improve grazing for horses, to facilitate ease of travel, for communication, stalking of game, as well as to promote many of their plant food sources such as camas and huckleberry, among others (FF-13, Boyd 1999, pages 52-64, 281-282). Coeur d'Alene Indians were also witnessed employing small surface fires to surround game and force them into the lake, where they could be easily dispatched by hunters in canoes (See Figure 3-FF-4).

Figure 3-FF- 4. *Circa 1840 painting by Father Nicolas Point depicting an Indian fire surround near Lake Coeur d'Alene. It is titled "Fall Deer Hunt."*

Since there is such a mix of habitat types in the Deerfoot Resource Area's, there has been a mix of low, mixed, and high severity fires in the past. The entire Resource Area could be characterized as a mixed-severity fire regime, likely with higher frequency of low-severity fires on the dry sites, with moist sites seeing more mixed and high-severity fires (Schoennagel et al. 2004 PF Doc FF-60). Site specific evidence indicates that low-severity fires were common in the dry habitat types, while high-severity fires also occurred. Zack and Morgan studied a range of habitat types and found that the FRI for lethal (or high-severity) fires in the Hayden Lake watershed was 149 years.

Figure 3-FF-5. *Recorded fire history of the Deerfoot Resource Area 1905-present.*



Baker and Ehle (2001) reach several conclusions that are likely applicable to the resource area; such as longer fire rotations and spatially patchy fires suggest that a greater diversity of forest structures probably existed in the pre-Euro-American ponderosa pine landscape, (e.g. mixed and young forests as Leiberg described), possibly leading to some crown fires. Dense thickets of regenerating trees or dense old patches of trees may have been a part of the pre-Euro-American ponderosa pine forest landscape.

Although it is likely that there were fire-free periods in the Resource Area in the past, it is very unlikely that the fire-free period we have today would have occurred under the current climate, without fire suppression, considering natural fire ignitions. In fact, there have been 25 lightning-caused fires since 1960 in the area between Hayden Lake and Deerfoot Ridge (PF Doc. FF-54, FF-55), which accounted for less than 15 acres burned. Fire suppression has led to the near complete absence of fire in the Resource Area for nearly 80 years. Considering both wildfires and prescribed burning, records show that about 1115 acres has burned since 1931 (PF Doc FF-54, FF-41). Based on the average fire return interval from Zack and Morgan, during that same period approximately 19,000 acres would have burned in the resource area; some areas being visited more than once by fire. A deficiency of that magnitude has likely had considerable effects on the vegetation in the resource area. This conclusion is supported by both research applicable to the Inland Northwest and site-specific evidence. When fire is excluded, ponderosa pine loses competitive advantage relative to Douglas-fir (MacKenzie et al. 2004, PF Doc FF-36). Early forest surveys in the 1930's show that nearly 30 percent of the Deerfoot Resource Area was ponderosa pine forest, when only 10 percent is today (PF Doc FF-56, Forest Vegetation Section).

Baker et al. (2006, PF Doc FF-102) state that evidence does not support the hypothesis that the cessation of frequent surface fires is allowing Douglas-fir to invade ponderosa pine stands; however this conclusion is only relevant to the northern Colorado Front Range. Changes in species composition from ponderosa pine to Douglas-fir and grand fir have been found throughout Inland Northwest forests (Hessberg et al. 2005, PF Doc FF-37). Keeling et al. (2006, PF Doc. FF-38) found increases in overall tree density and density of shade-tolerant, late succession tree species in unburned stands compared to burned stands. Mackenzie et al. (2004, PF Doc. FF-36) found Douglas-fir basal area and total basal area increased with time since fire. A shift in forest structure and composition to higher densities of shade-tolerant, late succession tree species is perhaps the most extensively documented effect of fire exclusion in fire-adapted forests (Keane et al., 2002, PF Doc FF-32). Previous studies in northwestern ponderosa-pine/Douglas-fir forests have found densities of shade-tolerant species to increase three- to five-fold with fire exclusion (Habeck, 1994 and Arno et al., 1995b as cited in Keane et al., 2002).

The absence of fire has had many effects on the composition and structure of the vegetation of these dry stands. To illustrate this change, historical photos from the resource area were obtained courtesy of the Museum of North Idaho. Figure 3-FF-6 shows a ponderosa pine forest as it existed in 1924. There are several notable features of this picture. Most of the trees in the picture are widely-spaced ponderosa pine. It is possible to look through the canopy of the trees to the sky beyond, even though there is little evidence of logging in the picture. Ladder fuels are almost non-existent; the lower branches of the large trees are not present, likely due to pruning by frequent surface fires, and little conifer regeneration is present. Surface fuels are light, consisting mainly of grass and small shrubs, with little downed woody material.

Figure 3-FF-6. A 1924 photo taken in the Deerfoot Resource Area.

Figure 3-FF-7 shows the same area as it existed in August of 2002. The picture now depicts private land, which has likely been logged several times, reducing the potential density of trees. However, there are still some very evident changes that have taken place since 1924. The crowns of the trees are now dense enough to restrict visibility of the sky beyond. The ponderosa pine trees are still fairly widely spaced (although historic harvest may have influenced this), but their branches now grow almost to the ground, creating ladder fuels.

Figure 3-FF-7. A 2002 photo of the same location in the Deerfoot Resource Area as shown in Figure 3-FF-6.

Dwarf mistletoe is present in the Douglas-fir trees on the site, which causes an increase in the crown bulk density as well as ladder fuels. Fire historically reduced dwarf mistletoe infection by pruning dead branches and consuming individual tree crowns that had low-hanging witches' brooms (PF Doc. FF-2, Harrington and Hawksworth 1990; Koonce and Roth 1980; in Agee 1994 page 16). Young conifers are common, which will create a more dense stand in the future if fire continues to be excluded. Surface fuels, which were once light, have now accumulated for over 80 years and are most likely heavier than they were in 1924. Downed woody material is now common, either from past logging operations or damaged trees. Although some grassy areas still exist, brush is now dense and 6 to 10 feet tall in many places (PF Doc FF-61, page 9).

Consistent with the photo point and historic observations (Leiberg, 1897; PF Doc. FF-59) in the Resource Area, MacKenzie et al. (2004, PF Doc. FF-36) believe that in Inland Northwest forests, grass-dominated, fire dependent understories are replaced by shrubs with increasing time since disturbance. Changes in the overstory related to absence of fire may indirectly affect the understory by increasing shade, altering soil moisture, or altering forest floor litter quality and composition. Keeling et al. (2006; PF Doc. FF-38) found that mesic understories were associated with Douglas-fir/Grand fir/mixed overstories, while xeric understories were associated with ponderosa pine overstories with no other environmental or soil chemistry variables explaining the association.

The frequent low intensity surface fires that occurred on the drier sites may have spread into the more moist sites occasionally and burned as mixed severity fires, even turning into lethal fires as the fire season progressed. On the other hand, in wetter conditions, fires that spread through the ponderosa pine forests may have slowed considerably or even stopped when they reached the moist forests. Moist forests can be relatively resilient to wildfire, likely due to higher moisture content of surface fuels (Jain et al. 2006, PF Doc FF-62). Because the moist forests have a longer fire return interval, they have probably changed less as a result of fire suppression (Schoennagel et al., 2004; PF Doc. FF-60). Although lower severity fires affected the structure of moist forests, they were not as dependent on low severity, frequent fire to maintain a sustainable structure than were dryer ponderosa pine forests. The structural changes that have occurred due to fire suppression are far more pronounced in dry forests than they are in more moist forests. In dry forests of the Inland Northwest, low-severity fires favored fire-tolerant forest structures by removing the lower crown classes (Hessburg et al. 2005; PF Doc. FF-37). These fires also cycled nutrients from foliage and branches into the soil, promoted the growth of a low and patchy shrub and herb cover, reduced the threat of running crown fires by continually thinning stands, eliminating fuel ladders, elevating crown bases, and reduced competition for site resources among surviving trees, shrubs, and herbs (Hessburg et al. 2005; PF Doc. FF-37).

The documented changes in both overstory and understory composition and structure have in turn changed the fire behavior in these stands. As Leiberg (1897; PF Doc. FF-59) described, fires moved quickly through the grassy fuels, were of short duration, and there was little mortality in the ponderosa pine and Douglas-fir. The

stand in Figure 3-FF-3, similar to what Leiberg described, would not support crown fire until the winds reach approximately 55 miles per hour. This stand condition, however is relatively uncommon in the Resource Area. In contrast, with the dense canopies of today, many of the stands proposed for treatment would support active crown fires at 20-25 miles per hour (PF Doc FF-44). Surface fuels have undoubtably increased due to fire exclusion (Keane et al. 2002, PF Doc FF-32), leading to increased fire intensity and flame lengths. Fire exclusion has also led to increased vertical fuel continuity through regeneration of shade-tolerant species with branches low to the ground, and tall, decadent brush with a high proportion of dead stems (Figure 3-FF-8). These ladder fuels facilitate the transitioning of a fire from the forest floor to the canopy, resulting in an increased occurrence of passive and active crown fire behavior.

Figure 3-FF-8. Conditions in the Deerfoot Resource Area. *Dense trees, thick, tall brush, ladder fuels, and dead surface fuels are visible protruding from the heavy surface vegetation.*

With fire suppression, forests that historically experienced mixed severity fire regimes have developed a more homogenous forest structure across the landscape, resulting in larger areas of continuously dense forest and perhaps in larger patches of crown fire than were witnessed historically (Schoennagel et al. 2004, PF Doc. FF-60; Keane et al. 2002, PF Doc FF-32). This is true for the Deerfoot Resource Area, as evidenced by the lack of young structural stages (refer to Forest Vegetation Section)

Site-specific evidence in the Deerfoot Resource area supports conclusions drawn by Hessburg et al. (2005; PF Doc. FF-37) that fire suppression and other changes in disturbance processes have led to:

(1) elevated fuel loadings and increased connectivity of high fuel loading

(2) increased potential for running crowning fires

(3) increased vulnerability to many insect and disease disturbances of fire-intolerant tree species

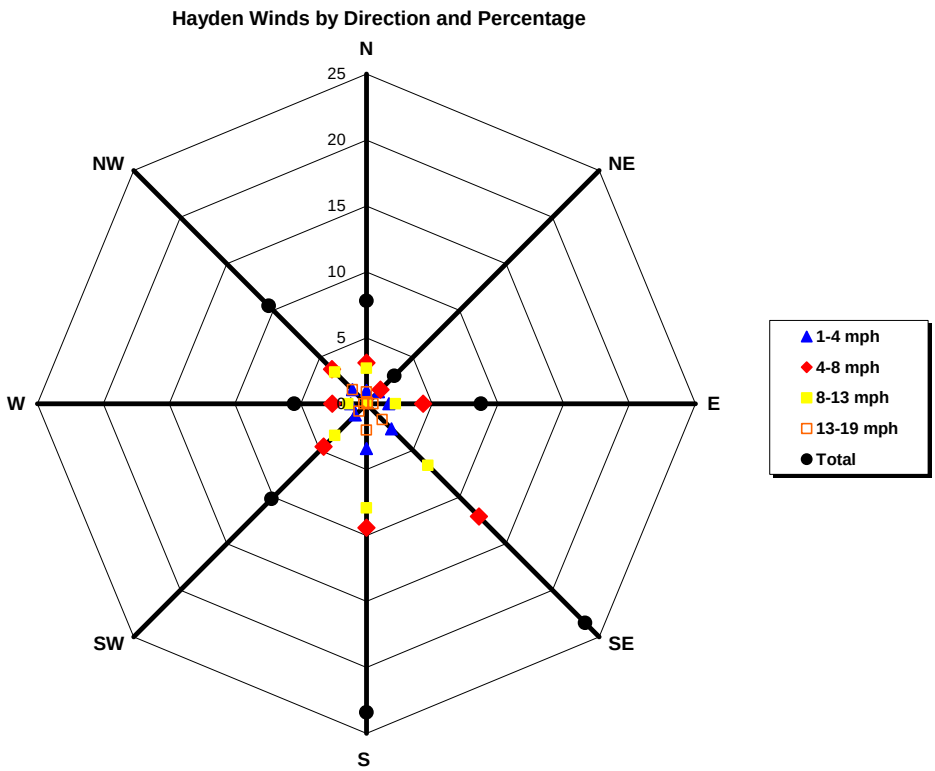
(4) increased likelihood of severe fire behavior in forest stands or patches with respect to flame length, rate of spread, and fireline intensity

(5) increased contagion or spatial aggregation of vulnerability to severe fire and insect and disease disturbances

Winds and Ignitions

A remote automated weather station (RAWS) was located at the Coeur d'Alene Airport, 6 ½ miles due west of the Deerfoot Resource Area, for the years 1989-2004. The Hayden RAWS was located on the Rathdrum Praire, so it provided wind data representative of the general winds affecting the Resource Area. Local, diurnal, and other terrain influenced winds in the Resource Area are highly variable and would differ from those recorded at the Hayden RAWS. The weather station reports 10-minute average windspeeds, which are summarized in the next graph (Figure 3-FF-9). As the graph shows, winds during the fire season most commonly come out of the south and southeast (each about 23 percent of the time). Winds over 20 miles per hour are relatively uncommon, but when they do occur during the fire season, a conditional probability analysis shows that they are most likely to be out of the south and southwest. (PF Doc. FF-63). Records show that during fire seasons from 1989-2004, 10-minute average windspeeds reached at least 20 miles per hour 19 times (PF Doc. FF-63). Unfortunately, the station was down October 16, 1991, the day strong winds blew down powerlines and pushed fires into the event that is referred to as Firestorm '91. It is likely that winds topped 20 miles per hour at least 20 times during the fire season in the 15 years of record.

Figure 3-FF-9. Graphical summary of winds at the Hayden weather station.



Records show that lightning is a significant source of ignition for the Deerfoot Resource Area. According to Forest Service and Idaho Department of Lands records (PF Doc. FF-54), there have been 67 ignitions in the area from the east side of Hayden Lake to the top of Deerfoot Ridge (PF Doc FF-45). Forest Service records include the years 1960-2000, while IDL records include the years 1981-2000. Of the 67 total ignitions, 25 of them were caused by lightning, while 42 were man-caused. Most of the man-caused ignitions occurred on the west side of the cumulative effects analysis area, near private land. Most of the fires were kept under one-tenth acre, and the total amount of acreage burned, according to records, is less than 15 acres.

Fire Regime Condition Class

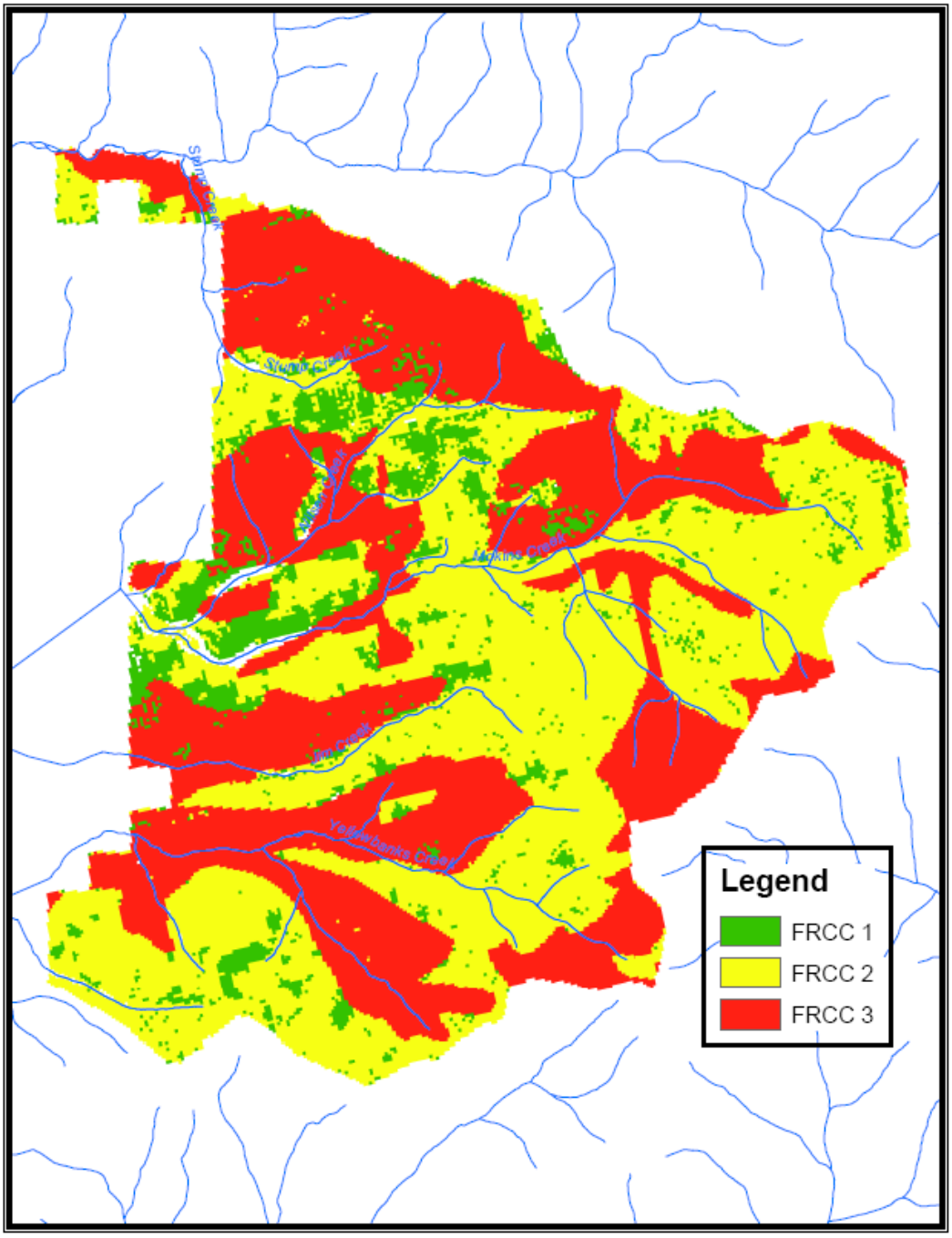
The FRCC analysis is not necessarily an analysis of fire hazard, but a classification of the amount of departure from the natural regime (Hann and Bunnell 2001, PF Doc. FF-53). FRCC includes three condition classes for each fire regime. The classification is based on a relative measure describing the degree of departure from the historical natural fire regime. 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 of the natural range of variability.

Characteristic vegetation and fuel conditions are considered to be those that occurred within the natural (historical) fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural (historical) fire regime, such as invasive species (e.g. weeds, insects, and diseases), "high-graded" forest composition and structure (e.g. large trees removed when they would have lived in a frequent surface fire regime).

FRCC 1	Low Departure
FRCC 2	Moderate Departure
FRCC 3	High Departure

The FRCC analysis was completed according to the procedures in the Interagency Fire Regime Condition Class Guidebook (2005, PF Doc FF-52). A full description of the analysis including the data used, field verification process, and rationale is included in the project file (PF Docs FF-51 and FF-57). FRCC does not directly or specifically measure progress towards meeting the purpose and need, but it is used on a national level to report effects of vegetation management activities. The following graphic shows the results of the Fire Regime Condition Class analysis for the Deerfoot Resource Area.

Figure 3 –FF-10. Current Fire Regime Condition Class of the Deerfoot Resource Area.



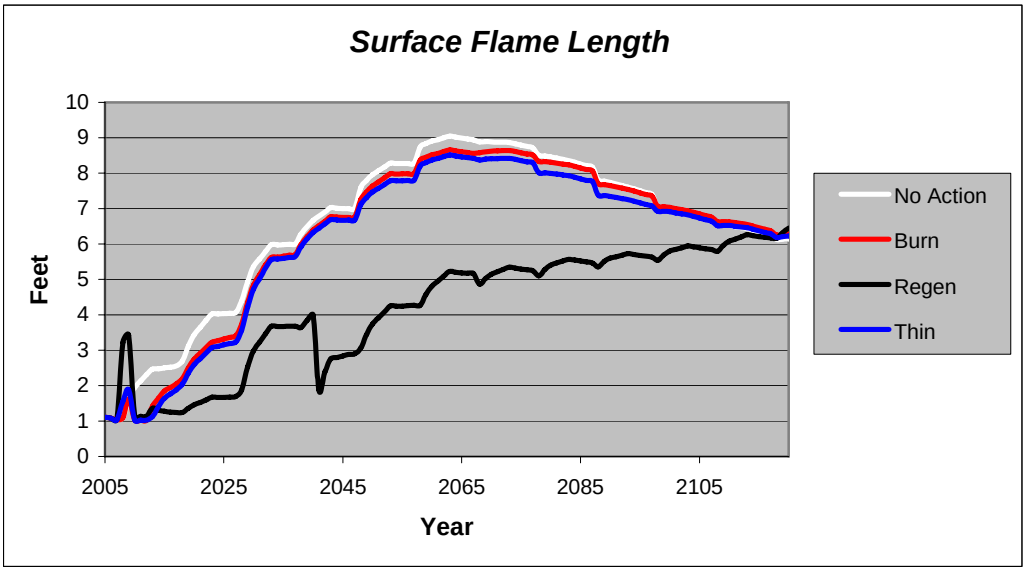
3.3.4. Environmental Consequences to Fire/Fuels

The following graphs briefly compare the No-Action Alternative with the Proposed-Action Alternative in terms of the three fire behavior indicators (flame length, probability of torching, and crowning index). These figures describe one representative stand, and effects vary somewhat between stands depending on site conditions and other factors (refer to PF Doc. FF-44 for all modeling results). A more detailed discussion of the effects of each alternative follows the comparison.

A. Flame Lengths

Only flame lengths of 4 feet or less can be safely attacked directly using hand crews. Once flame lengths surpass this mark, other suppression tactics must be employed. These could include using dozers and air tankers, as well as indirect attack. Indirect attack means that suppression forces would retreat to a safe and defensible place where they believe the fire can be stopped, and attempt to hold the fire at that location. Use of this tactic often results in more acreage burned (NWCG 1993, page B-59; PF Doc. FF-11). In addition, as surface fuels and flame lengths increase across the landscape, the likelihood is greater that the fire will climb into the canopy and become a crown fire. Crown fires have the largest immediate and long-term ecological effects and the greatest potential to threaten human settlements near wildland areas (Graham et al. 2004, page 20; PF Doc. FF-6). The following graph (Figure 3-FF-11) shows the flame lengths over time as modeled by the Fire and Fuels Extension to the Forest Vegetation Simulator (FFE-FVS). The model shows valid trends relative to the effects of activities, and future fuel accumulation, but does not account well for the fuel buildup that has already occurred. For this reason, flame lengths are likely higher in reality under the same weather conditions.

Figure 3-FF-11. Flame length over time. *Under the No-Action Alternative, flame lengths in this stand would surpass the four-foot mark in the near future. With thinning or regeneration treatments, flame lengths would increase as slash is created from harvest operations, then subside after slash is treated. Activities under the Proposed Action would reduce surface fuels and the associated flame lengths. With either of the proposed harvest activities, surface flame lengths are reduced for over 100 years over No Action. Although flame lengths vary widely among the stands in the resource area, without management action, they all exhibit the same trend shown in this graph - increasing flame lengths over time as surface fuels build.*

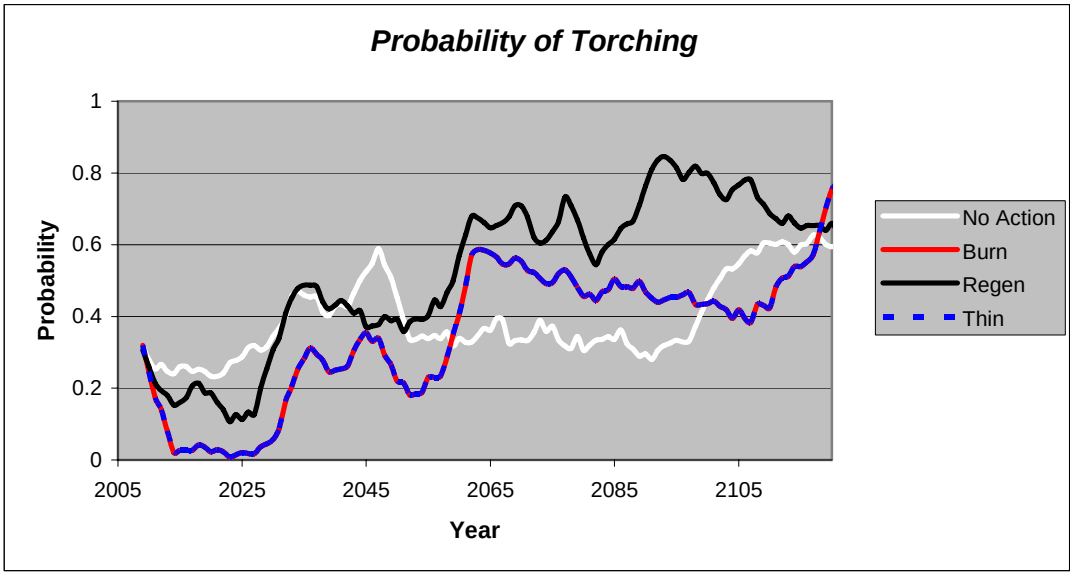


B. Probability of Torching and Crowning Index

Effects of thinning and regeneration treatments on crown fire behavior under specific weather conditions are shown in the following figures. These figures describe one representative stand, and effects vary somewhat between stands depending on site conditions and other factors (refer to PF Doc. FF-44 for all modeling results). The probability of torching is the proportion of small places where trees are present and torching is possible. The higher the probability of torching, the more ladder fuels and the higher the likelihood that the fire will climb into the tree crowns.

Approximately fifty years after treatment, pulses of regeneration cause the probability of torching to rise over No Action. Future prescribed burning or other activities may be necessary to keep ladder fuels low.

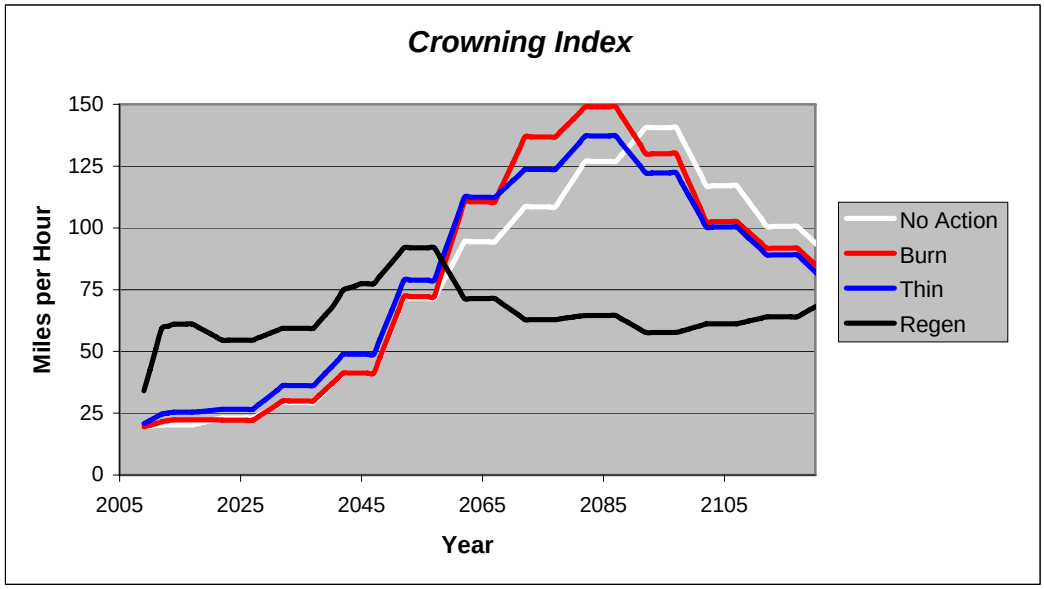
Figure 3-FF-12. Probability of torching. *Prescribed burning, regeneration harvest or thinning harvest all immediately reduce the probability of torching in this stand. The activities reduce the probability of torching because they reduce ladder fuels. All treatments reduce ladder fuels for nearly 30 years over No Action. Over time, regeneration treatments typically increase the probability of torching because of the abundance of small trees with branches close to the ground. This increased torching hazard in a regeneration treatment is offset by the sparse crown fuels and low crown fire hazard after a regeneration harvest. The thinning and burning only treatments result in a nearly identical probability of torching, due to the minimal change in canopy with either treatment. Canopy cover influences regeneration and therefore also influences torching.*



The crowning index reflects the density of the tree canopy, and its ability to sustain an active crown fire. **When the crowning index increases, it means that it takes a stronger wind to keep the fire in the crowns of the trees – a higher crowning index means a lower crown fire hazard.** The effects of thinning, regeneration and burning treatments on the crowning index are shown in the next figure. The burning treatment very slightly increases the crowning index compared to no action, while the thinning treatment increases the crowning index a little more. This means that crown fire hazard has decreased because canopy fuels and the overall density of the canopy have decreased. The regeneration harvest increases the crowning index even more – there is very little crown fire hazard when crown fuels are sparse, such as after a regeneration harvest. Both the thinning treatment and regeneration treatments provide improvements in crown fire hazard over no action for the first 50 years of the simulation. Since the thinning and burning treatments did not change species composition, the Douglas-fir and grand fir canopy is susceptible to insect and disease mortality, resulting in an open canopy and reduced crown fire hazard. The regeneration treatment changed species composition to a greater proportion of ponderosa pine, resulting in a consistent, sustainable canopy; nor is it susceptible to crown fire, since is wouldn't sustain an active

crown fire until winds reach at least 50 miles per hour. The majority of the scientific literature supports the effectiveness of fuel treatments in reducing the probability of crown fire (PF Doc FF-64, Peterson et al. 2005).

Figure 3-FF-13. Crowning Index. *Under the No-Action Alternative, this stand would sustain an active crown fire with less than 25 mph windspeeds. Thinning would slightly reduce crown fuels, increasing the crowning index and reducing the crown fire potential of the stand. Regeneration harvest reduces the crown fire hazard substantially. With no action, the crowning index would remain lower for the first fifty years after treatment, but the continual mortality of the Douglas-fir/grand fir overstory creates an open canopy later in the simulation. The regeneration treatment results in a consistent, sustainable ponderosa pine canopy which would not support crown fire unless winds are greater than 50 mph.*



Crown fires present special problems to managers since they are more difficult to control than surface fires (Scott and Reinhardt 2001, p. 1; PF Doc. FF-10). The rate of spread of crown fires is several times faster than surface fires (Rothermel 1983, p. 108; PF Doc. FF-28). Spotting is frequent and can occur over long distances (Scott and Reinhardt 2001, p. 1; PF Doc. FF-10). Larger flames from crown fires require larger firefighter safety zones (Butler and Cohen 1998, page 14; PF Doc. FF-79). In addition, spotting and increased radiation make structures more difficult to defend from crown fire than surface fire (Cohen and Butler 1998, in Scott and Reinhardt 2001, p. 1; PF Doc. FF-10). Near total tree mortality would be expected from a crown fire, smoke production would be greater, and foliar nutrients may be lost from the site (Scott and Reinhardt 2001, p. 1; PF Doc. FF-10). Crown fires' high spread rates and resistance to control lead to high acreage burned and significant adverse effects (Scott and Reinhardt 2001, p. 34; PF Doc. FF-10).

C. Effects under the No-Action Alternative

<u>Direct and Indirect Effects of the No-Action Alternative</u>

Direct effects (those which are caused by the action and occur at the same time and place) to fire and fuel conditions would be minimal if not absent under the No-Action Alternative, because no activities are proposed under the No-Action Alternative.

The primary effects of the No-Action Alternative would be indirect and cumulative as a result of the ongoing and reasonably foreseeable activities. Although it is possible that wildland fire use will be employed in the future in parts of the Resource Area, it would likely be very limited since the Resource Area is in the wildland-urban interface. Given that there is no current plan to allow wildland fire use in the Resource Area, it is not a reasonably foreseeable activity, and this analysis was completed assuming fire suppression will continue. Surface fuels would continue to accumulate. The successional changes in stand structure that affect fire behavior would also

continue on their current trend. Figure 3-FF-11 displays the effects of the process of surface fuel accumulation over time, if no action is taken. Flame lengths would increase over time as the fuel load builds. Flame lengths would surpass four feet within 20 years under the No-Action Alternative. The probability of torching is variable throughout the stands, but generally increases over time, because the canopy opens over time and allows more and more regeneration and ladder fuels. With no action, shade-tolerant, root disease susceptible species eventually dominate and never form a closed canopy due to continual mortality from insects and disease. This mortality results in very high surface fuels levels, and ladder fuels are always present due to the constant regeneration. Uncontrolled fires would likely be very severe under this scenario, due to the high levels of surface fuels resulting in a large heat flux to the soils, and the lack of fire-resistent species causing a very high level of mortality and loss of forest cover.

Cumulative Effects of the No-Action Alternative

Fuel reduction efforts have been implemented that focus on private lands, primarily around structures within the Resource Area (PF Doc FF-80). These efforts are part of the Kootenai County FireSmart Program, a program designed to help homeowners reduce fuels on their property and increase the chances of their home surviving a wildfire. In the last five years, 99 private structures on the east side of Hayden Lake have been treated by the FireSmart program (PF Doc FF-80). Work includes non-commercial fuel reduction activities such as thinning, pruning, piling and chipping primarily within the home ignition zone (Cohen, PF Doc FF-16). The FireSmart program has also treated lands adjacent to the main access road around Hayden Lake to create safe access and egress in case of a wildfire. The Forest Service completed similar work where the road passes through National Forest System lands. The FireSmart activities have reduced the potential for structure ignition (Cohen 1999, PF Doc. FF-96), even under the No Action Alternative. In addition, roadside fuel reduction completed on both private and National Forest System lands has made access and egress in a wildfire situation safer for both citizens and firefighters.

As discussed earlier, fire suppression is the primary factor in determining the cumulative effects of this project. The No-Action Alternative represents the continuation of current management, which means the effects of over 85 years of fire suppression would continue on their current trend. The No-Action Alternative would allow the continuation of surface fuel accumulation, as well as the changes in fire behavior associated with a change in forest structure and species. When fire is excluded, the fuels that do not burn remain on the landscape and will likely increase through additional vegetation growth stages if other reduction factors (e.g., disease, insects, prescribed fire, mechanical treatments) do not intervene. When fire finally does occur, the potential for the rapid growth of large, difficult-to-control wildfires is increased (Brown et al. 2004, PF Doc FF-90). Successful fire suppression without prescribed fire causes an increase in amount and continuity of the living and the dead material that fuels fires (Saveland 1998, page 4; PF Doc. FF-3). The continued loss of fire-resistant species would continue to lead to forests that are less resilient to fire, meaning that they could experience more pronounced fire effects and an increased amount of mortality associated with a wildfire.

Fire exclusion has many effects that are documented in the publication *Cascading Effects of Fire Exclusion in Rocky Mountain Forests*" (Keane et al. 2002, PF Doc. FF-32). Many of these effects have been directly observed in the Deerfoot Resource Area. Fire exclusion causes forest composition to change from early seral, shade-intolerant tree species to late seral, shade-tolerant species, while stand structure changes from single-layer canopies to multiple-layer canopies. An important stand characteristic that changes with advancing succession in the absence of fire is the increase in the amount of dead and live biomass or fuels. Fuels loadings generally increase in the absence of fire because of a myriad of ecological factors. First, long fire-return intervals mean live fuels have longer times to grow and dead fuels have longer periods to accumulate on the ground. Next, crown fuels increase because late seral, shade-tolerant species tend to have more biomass in the forest canopy due to their high leaf areas, and biomass tends to be well distributed over the height of the trees. Because late seral species are shade tolerant, there are many smaller seedlings and saplings present in the understory to take advantage of any gaps in the canopy. So, the greater crown biomass distributed along greater parts of the stem, coupled with high seedling and sapling densities, can create the ladder fuels that allow flames from surface fires to climb into the forest canopy and result in crown fires.

Surface fuel loadings increase as fire is eliminated because the greater crown biomass ultimately results in increased leaf and woody material accumulating on the forest floor because the recycling process of fire is absent. Duff and litter depths generally increase proportionate to the crown closure and leaf area because of the additional needle fall and reduced decomposition. Soil properties change as fires are reduced and succession advances in an ecosystem. Organic matter generally increases with decreased fire frequency, and this improves pore space, water-holding capacity, and aggregation. However, when soils with thick organic horizons are burned, some of the volatilized organic matter moves downward and condenses to form a water repellent layer that impedes infiltration and can cause massive erosion.

In addition to Keane et al. (2002; PF Doc. FF-32), many other researchers have found that landscapes tend to become more homogeneous as fire is removed because succession eventually advances all stands to similar communities dominated by shade-tolerant species (Schoennagel et al. 2004, PF Doc. FF-60; Hessburg 2005, PF Doc. FF-37). The distribution of structural stages in the Deerfoot Resource Area indicates this has already happened (see Forest Vegetation section). Even though late seral species may differ across a landscape depending on site, the multi-layer structures of these late seral stands are nearly identical across most biophysical settings. Landscape structure (spatial distribution of patches) also changes with fire exclusion as landscapes generally become less fragmented, have lower patch density, and evolve decreased patch diversity, which often results in more contagion, corridors, and large patches. Larger patches and high homogeneity tend to foster more continuous crown and surface fuels, which can then burn in large fires that create still larger patches and so on in this downward “fire-exclusion” spiral (Keane 2002; PF Doc. FF-32).

Fire exclusion combined with a lack of landscape level fuel-reduction activities as in the No Action Alternative would heighten fire hazards to forest homes as people continue to develop and settle lands along the urban-wildland interface. Multi-layered canopies and dense crowns will increase the chance of crown fires that are difficult to control. This could increase the harm to people who own the property and the firefighters who try to protect it (Keane 2002; PF Doc. FF-32, internal citations omitted). Brackebusch (1973, PF Doc FF-8) states that during any period of fire exclusion, the hazard usually continues to build and the probability of a disastrous fire increases correspondingly.

The No Action Alternative would not reduce fuels in the wildland-urban interface of the Deerfoot Resource Area; allowing an increased risk of a more intense, faster spreading fire that could approach nearby developments and threaten lives, homes, infrastructure, and air quality. No-Action allows a greater possibility that severe wildfire would threaten environmental values such as forest cover, wildlife habitat, soil productivity, water quality, and visual quality. The No Action Alternative does not address or respond to the purpose and need to reduce fuels in any way. It allows the existing condition of elevated fuel loadings and increased connectivity of high fuel loadings to persist. No Action will also result in an increased potential for running crown fires and an increased likelihood of severe fire behavior with respect to flame length, rate of spread and fireline intensity. The current landscape homogeneity causes increased contagion or spatial aggregation of vulnerability to severe fire and insect and disease disturbances (Hessburg et al. 2005, PF Doc. FF-37).

The No-Action Alternative does not proactively reduce fuels in the face of fire seasons that have already been proven to be longer, resulting in an increased incidence of large wildfires (Westerling et al. 2006, PF Doc FF-89. Not to mention that virtually all climate-model projections indicate that warmer springs and summers will occur in the west in coming decades (Whitlock et al. 2003, PF Doc FF-88), and that even for a very low-end climatic change scenario, it seems likely that area burned will at least roughly double by the end of this century in most western states (McKenzie et al. 2004, PF Doc FF-86). At high risk in this situation would be isolated stands of older ponderosa pine and Douglas-fir, especially in mesic sites, that have survived past disturbances. The increased fire extent and severity would increase the risk of mortality in these stands (McKenzie et al. 2004, PF Doc. FF-86).

There is a temptation to "let nature take its course" and to allow forests to recover and develop naturally. Yet, such a passive approach to management is not a sustainable forest strategy in ecosystems that have a substantial history of natural disturbance, such as the Deerfoot Resource Area (Agee 2002; PF Doc. FF-91). The hard lesson that we should take away from the last decade of fire management in drier forests, particularly in the North

American west, is that a choice to do nothing is a choice of action, not always one with a desirable outcome (Agee 2002; PF Doc. FF-91).

Although Fire Regime Condition Class is not a direct indicator of progress toward meeting the purpose and need, it is related, and is also required for accomplishment reporting if activities were to take place. Under No Action, FRCC of the entire landscape would likely deteriorate further towards Condition Class 3.

D. Effects under the Proposed-Action Alternative

Direct and Indirect Effects under the Proposed-Action Alternative

Under the Proposed-Action Alternative, all harvest treatments would be followed by prescribed burning to reduce surface fuels. Activities that reduce surface fuels (low vegetation, woody fuel, shrub layer) decrease the chances that a surface fire would be able to ignite ladder fuels and canopy fuels (Graham et al. 2004, page 23; PF Doc. FF-6).

Treatment units range in size, which is an important aspect of landscape and fuel variability. Discontinuities in surface, ladder and crown fuels interrupt fire spread, but relatively small patches may not have a substantial effect on relatively large fires. Treatments of individual stands under a given prescription would probably be irrelevant to fire behavior and effects at the landscape scale, because wildfires are often larger than individual treatment units (Finney and Cohen 2003, page 356; PF Doc. FF-31). Most of the treatments in the Proposed Action span several stands and therefore may be large enough to affect a large fire. Treatments under the Proposed Action would be consistent with and would further the goals of the 10-Year Comprehensive Strategy Implementation Plan (www.fireplan.gov) to reduce hazardous fuels and restore fire-adapted ecosystems.

The Community Protection Zone (CPZ; Nowicki 2002, PF Doc FF-92) was originally defined as an area of reduced fuels immediately adjacent to a community which can provide options for firefighters to control the fire and act as a safety zone for the firefighters. Nowicki (2002) thought that the largest CPZ required under maximal conditions would not exceed 500 meters wide; however, more recent research has considered buffer distances that roughly capture the range of different fire fighting objectives, including structure protection, a safe fire fighting zone based on the maximum sustained flame length of a crown fire, and avoidance of flying embers (Theobald and Romme 2007, PF Doc FF-93). These buffer distances are up to 3200 meters (or about 2 miles), which is generally consistent with the treatments proposed in Proposed-Action Alternative.

Increasing the proportion of fire-resistant tree species such as ponderosa pine and western larch will increase the survivability of trees because they have thicker bark, taller crowns, and a higher canopy base height (Graham et al. 2004, page 36; PF Doc. FF-6). Proposed activities would promote early-seral, fire resistant species such as ponderosa pine, which are more likely to survive even intense fires, reducing future potential fire severities. Even if the ponderosa pine trees were killed in a fire, it is possible that the seeds would survive to regenerate the stand with early-seral species. Without species such as ponderosa pine and western larch on-site, natural regeneration of that species after a wildfire would be much less likely.

Research suggests that fire growth and severity of a large wildfire under extreme weather conditions were mitigated by fuel treatments that included prescribed burning. Longevity of treatment benefits was suggested to improve with unit size. Observations of fire movement near fuel treatments indicate that overall fire growth and large fire sizes can be reduced (Finney 2005, page 1721, PF Doc FF-40). The Proposed-Action Alternative contains several large units designed to take advantage of the improvements in fire behavior associated with increasing unit size.

Effects of Prescribed Burning: Prescribed burning is an important aspect of the Proposed Action, and can have a range of effects depending on the fuel and weather conditions at the time of the fire. Prescribed fire can effectively alter potential fire behavior by influencing multiple fuel bed characteristics (Graham et al. 2004, page 24; PF Doc. FF-6), including:

- *Reducing the loading of fine fuels, duff, large woody fuels, rotten material, shrubs and other live surface fuels, which together with compactness and continuity change the fuel energy stored on the site and potential spread rate and intensity.*
- *Reducing horizontal fuel continuity (shrub, low vegetation, woody fuel strata), which disrupts growth of surface fires, limits buildup of intensity, and reduces spot fire ignition probability.*
- *Increasing compactness of surface fuel components, which retards combustion rates.*

***Figure 3-FF-14**. A recent prescribed burn near the Deerfoot Resource Area.*

Prescribed burning has both stand-level and landscape-level effects, even in extreme burning conditions. At the stand scale, prescribed burning has been shown to reduce subsequent tree mortality, crown scorch, and exposed and blackened soil (Finney 2005, PF Doc FF-40). This reduction in severity was caused by a reduction in fire intensity in the treated area. At the landscape scale, the huge Rodeo-Chediski fire was observed to actually circumvent treated areas, even under extreme burning conditions, leaving unburned inclusions as the fire was actively spreading. Finney's (2005) research suggests that fire growth and severity of a large wildfire under extreme weather conditions were mitigated by fuel treatments that included prescribed burning. Longevity of treatment benefits was suggested to improve with unit size. Observations of fire movement near fuel treatments indicate that overall fire growth and large fire sizes can be reduced (Finney 2005, page 1721, PF Doc FF-40).

Prescribed burning is completed using a prescription and burn plan in order to control and predict the effects of the fire. Common effects of prescribed burning include surface fuel reduction, understory and overstory mortality, duff consumption, soil heating, and mineral soil exposure. Although prescribed burning creates smoke that contains particulate matter, the proposed activities would substantially reduce the PM2.5 (particulate matter less than 2.5 microns in size) emissions of potential wildfires (PF Doc. FF-42).

The degree of each effect of a prescribed fire can be controlled by careful ignition in the appropriate weather conditions. Weather conditions, however, cannot be predicted completely accurately, so there is some risk of escape with every prescribed fire that is ignited. The proximity of the Deerfoot Resource Area to private land and communities increases the values-at-risk, and dictates very careful implementation of any prescribed burning. Prescribed burning has been carried out in the Deerfoot Resource Area and in the Coeur d'Alene River Ranger District in the past (Figure 3-FF-14). Based on that history, it is reasonable to expect that prescribed burning under the Proposed-Action Alternative would be implemented safely and effectively, with little effect to private property. The boundaries of the proposed treatment areas were established with consideration of the prescribed burning to occur after the harvest, and will likely allow efficient ignition and suppression of prescribed fires. Whenever possible, changes in aspect and shaded draws would be used as boundaries; these areas often have higher fuel moistures (especially in the spring), and in many cases burn with very little intensity, if at all. Fireline would be used to contain prescribed burns when necessary (this determination would be based on site-specific

characteristics and weather conditions at the time of the burn). Even with careful forethought and planning, prescribed burning can be uncertain, and small burned areas outside of the designated treatment areas should be expected. These "slop-overs" are commonly relatively small and quickly contained, and cause insignificant effects.

Prescribed burning would result in an improvement in Fire Regime Condition Class, though the improvements are incremental. Burning does not immediately change species composition or structural stage, so it generally does not result in FRCC 1.

Effects of Regeneration Harvests: The Proposed-Action Alternative includes regeneration harvesting. Both thinning and regeneration harvests are followed by underburning, so they both result in a reduction in surface fuels once activities are completed. Another similarity between thinning and regeneration harvests is the reduction in crown fuels. The reduction in the density of crown fuels caused by a regeneration harvest is reflected in Figure 3-FF-13. With the regeneration treatments, the crowning index would increase substantially over what would occur under the No-Action Alternative. According to the model, this effect would last about 50 years. The regeneration treatments establish a more sustainable, consistent overstory, which would not support crown fire until winds are at least 50 miles per hour.

A major direct effect of regeneration harvest is the almost complete reduction in crown fuels in the treated stands. This reduction results in a disruption in the continuity of crown fuels. Because regeneration harvests remove almost all crown fuels, they act as a barrier to crown fire spread. Any crown fire that encounters a regeneration harvest will be forced to the ground because of the lack of crown fuels. This effect is not permanent, however; as the regenerated stand grows, it once again builds crown fuels.

Although regeneration harvests and the accompanying fuel treatments have the similar effects as thinning treatments on surface and crown fuels, their effect on ladder fuels is different. Regeneration harvests remove most of the canopy and initiate the establishment and growth of small trees, which generally have their branches lower to the ground than larger trees. This growth causes an increase in ladder fuels, and thus an increase in the probability of torching. This increase in ladder fuels is not a concern, especially in the short-term, primarily because the canopy has been removed and there is nowhere for the fire to climb. As shown in Figure FF-12, ladder fuels remain relatively low for approximately 50 years post-treatment, and then increase.

Projections of stand growth and associated fire behavior show that the crown fire hazard in regenerated stands will immediately decrease after treatment. Over time, the crown fire hazard in the stand will remain relatively low, needing at least a 50 mph wind to sustain a crown fire. The change in species composition from No Action results in a sustainable, consistent canopy that is crown fire resistant. Still, regeneration harvests may need treatments in 20-30 years, such as pre-commercial thinning and/or underburning to maintain and perpetuate the conditions of reduced fire hazard. Jain et al. (2006, PF Doc FF-62) found that in stands typified by management (e.g. thinned stands, plantations), crown fires would burn around these areas and most often there was evidence that firebrands landed in these stands but the surface fuel conditions prevented sufficient fire from developing that could create a smoldering fire. Personal observations of fire behavior in regeneration harvests on the Coeur d'Alene River Ranger District substantiate Jain's conclusions (Jerome 2007, PF Doc FF-85).

The timber harvesting included under the Proposed-Action Alternative would immediately cause an increase in surface fuel loading, as well as an immediate decrease in ladder and crown fuels (see Figures 3-FF-11 through 3-FF-13). The unmerchantable branches and other fuels that are left after harvest can substantially increase the fuel load, and consequently the potential flame lengths on any given site. This fuel load would then pose a slash fire hazard for a short period of time (one to three years), until the fuel on the site was treated with prescribed burning. Depending on the amount of fuel on the site and the potential effects of a prescribed burn to the remaining overstory, several methods may be used to control the effects of a prescribed burn. Slashing of the understory, protection of leave trees by pulling slash away from their boles, and piling and burning of slash are possible methods that could be used to decrease the slash load on a site and prepare the site for safe and efficient underburning.

Any type of human activity increases the possibility of ignition and wildfire. Common ignition sources include equipment and vehicle operation, smoking, and arson. A timber purchaser would be required to have fire suppression equipment on site and to take necessary fire precautions to prevent a wildfire from occurring. In the event of extreme fire conditions, harvest activities would be regulated or suspended until conditions improved. A timber sale administrator closely monitors the fire prevention requirements of the timber contract throughout the timber harvest operations.

Regeneration harvesting will result in a change from Fire Regime Condition Class 3 to Condition Class 1 because the stands will change from a late-seral to an early-seral structural stage and ponderosa pine and western larch will be re-established.

Surface winds are those beneath the canopy that affect surface fuels.

Effects of Commercial Thinning: The Proposed-Action Alternative would include a relatively small amount of commercial thinning. Thinning and harvesting can reduce vertical and horizontal continuity of the tree canopy and limit initiation and spread of crown fires, especially when done in conjunction with prescribed burning (Finney 2005, page 1720, PF Doc. FF-40). Any removal of canopy would reduce the moderating effect of canopy on wind speed, so surface winds would increase. Scott and Reinhardt (2001, pages 31-32; PF Doc. FF-10) have addressed this subject. They state,

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

The relationship between the forest canopy, surface fuel moisture, soil moisture and fire behavior and effects is complex and has many aspects which must be considered when determining effects. In addition to those site factors that remain constant, current weather, season of the year, presence of drought and the characteristics of the fire in question are all very important but highly variable factors that influence fire behavior and effects.

Under the Proposed-Action Alternative, commercial thinning treatments and associated prescribed burning would result in a reduction of surface fuels (Figure 3-FF-11). Harvest units would result in a short-term increase in surface fuels until the slash is treated. Thinning treatments would tend to decrease the probability of torching, meaning they would reduce ladder fuels. Thinning treatments followed by prescribed burning generally result in stands with the least amount of ladder fuels, as shown in Figure 3-FF-12. The reduction in ladder fuels in the thinning treatments is effective for at least 50 years, in some cases. Crown fuels would be only slightly reduced compared to the No-Action Alternative, but the reduction in surface fuels and ladder fuels associated with the thinning treatment makes crown fire initiation unlikely.

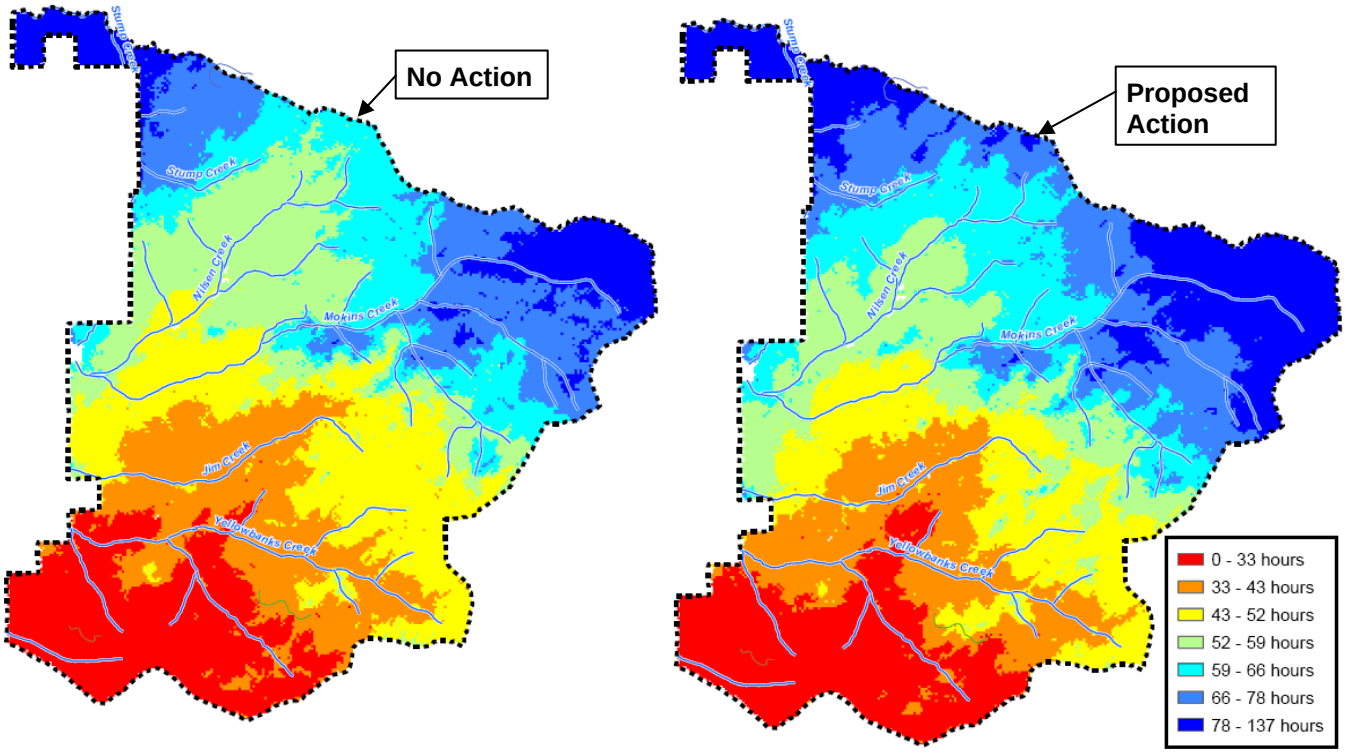
Commercial thinning will result in more open, late-seral conditions in stands where ponderosa pine is already abundant, so these stands would improve in Fire Regime Condition Class, to FRCC 1.

Effects at the Resource Area Scale: Direct and indirect effects of the Proposed-Action Alternative have thus far been discussed at the local, or stand, scale. These treatments would also have impacts at the resource area scale. For instance, a fire progressing across the resource area would be influenced by many of the treatments, resulting in altered spread patterns and a slower spread rate. Maintaining natural openings with prescribed fire and regenerating some stands in the resource area would create a mosaic of vegetation (Brackebusch, PF Doc. FF-8). This mosaic would create fuel interruptions that reduce the potential for conflagrations or serious fast spreading fires. Fuel mosaics can result in delayed fire spread or fire build-up, reducing the risk of escaped fires. The spatial arrangement of vegetation influences the growth of large fires. Patches of vegetation that burn relatively slower or less severely than surrounding patches can reduce fire intensity, severity, or spread rate, or may force the fire to move around them by flanking (at a lower intensity), which locally delays the forward progress of a fire (Graham et al. 2004, page 29; PF Doc. FF-6).

The FlamMap model was used to simulate a fire's spread across the landscape, and to determine the collective effect of all of the treatments. The theoretical fire was started on the southwestern corner of the Resource Area, near Canfield Mountain. A fire originating on Canfield Mountain is a likely scenario, since it has one of the highest ignition densities of the district due to its' heavy recreational use. The fire was modeled with 20 mile per hour southwest winds pushing it across the resource area. FlamMap was used to calculate the **Minimum Travel Time** for the fire to reach each small piece of the landscape, resulting in the graphic in Figure 3-FF-15. As with all models, FlamMap is based on simplifying assumptions and has several limitations (PF Doc FF-34); results should not be interpreted literally, but can be compared on a relative scale. Also, this theoretical fire and weather pattern may never occur; however, the general theme of the modeling results is valid.

The model shows that a fire moving across the resource area would be substantially slowed by implementation of the proposed treatments. The effect of treatments would be most apparent at the northern end of the resource area, after the theoretical fire has encountered most of the proposed treatments. Under the No-Action Alternative, the fire would reach Deerfoot Ridge at the north end of the resource area in 59 hours, while under the Proposed-Action Alternative, the same fire would take nearly 80 hours to reach that point. Recent research has shown that fuel reduction treatments can alter fire behavior and severity both treated areas and for a limited distance downwind of treated areas (Finney et al. 2005; PF Doc FF-40). Fuel reduction treatments have also been shown to be effective at altering fire spread across a landscape, especially when placed in a repeated and overlapping pattern (Finney 2001, PF Doc FF-9). A slower-moving fire would allow more effective fire suppression, resulting in fewer acres burned, reduced threats to human life and property, community infrastructure, air quality, water quality, and forest cover.

Figure 3-FF-15. *Minimum travel time for a fire originating on the southwest corner of the Resource Area, pushed by 20 mph winds. Treatments in the Proposed Action Alternative significantly slow the theoretical fire's progress across the landscape. With No Action, a fire would reach Deerfoot Ridge at the north end of the Resource Area in approximately 59 hours. With the treatments in the Proposed Action Alternative, the fire would move more slowly across the landscape, and would not reach the same point on Deerfoot Ridge until nearly 80 hours into the simulation.*



A Fire Regime Condition Class (FRCC) Analysis was completed for the Proposed-Action Alternative (Figure 3-FF-16). Although FRCC is not a direct measure of progress towards meeting the purpose and need for the project, it does reflect variation from the landscape conditions that existed under the natural (historical) disturbance regime. FRCC shows changes in structural stage and species composition, which are both key components of the purpose and need. Details of the FRCC analysis are in the project file (PF Docs FF-51, FF-57). The FRCC analysis indicates that the Proposed-Action Alternative would improve or maintain the condition class on all treated acres, resulting in 894 more acres in Condition Class 1, 417 more acres in Condition Class 2, and 1,321 *fewer* acres in Condition Class 3 (Figure 3-FF-17).

Figure 3-FF-16. Post-treatment Fire Regime Condition Class. *Fire Regime Condition Class in the Resource Area as a result of the Proposed-Action Alternative. Regeneration and Rehab treatments re-establish ponderosa pine and improve sites to FRCC 1. Thinning results in FRCC 1, but prescribed burning results only in an incremental improvement in Condition Class.*

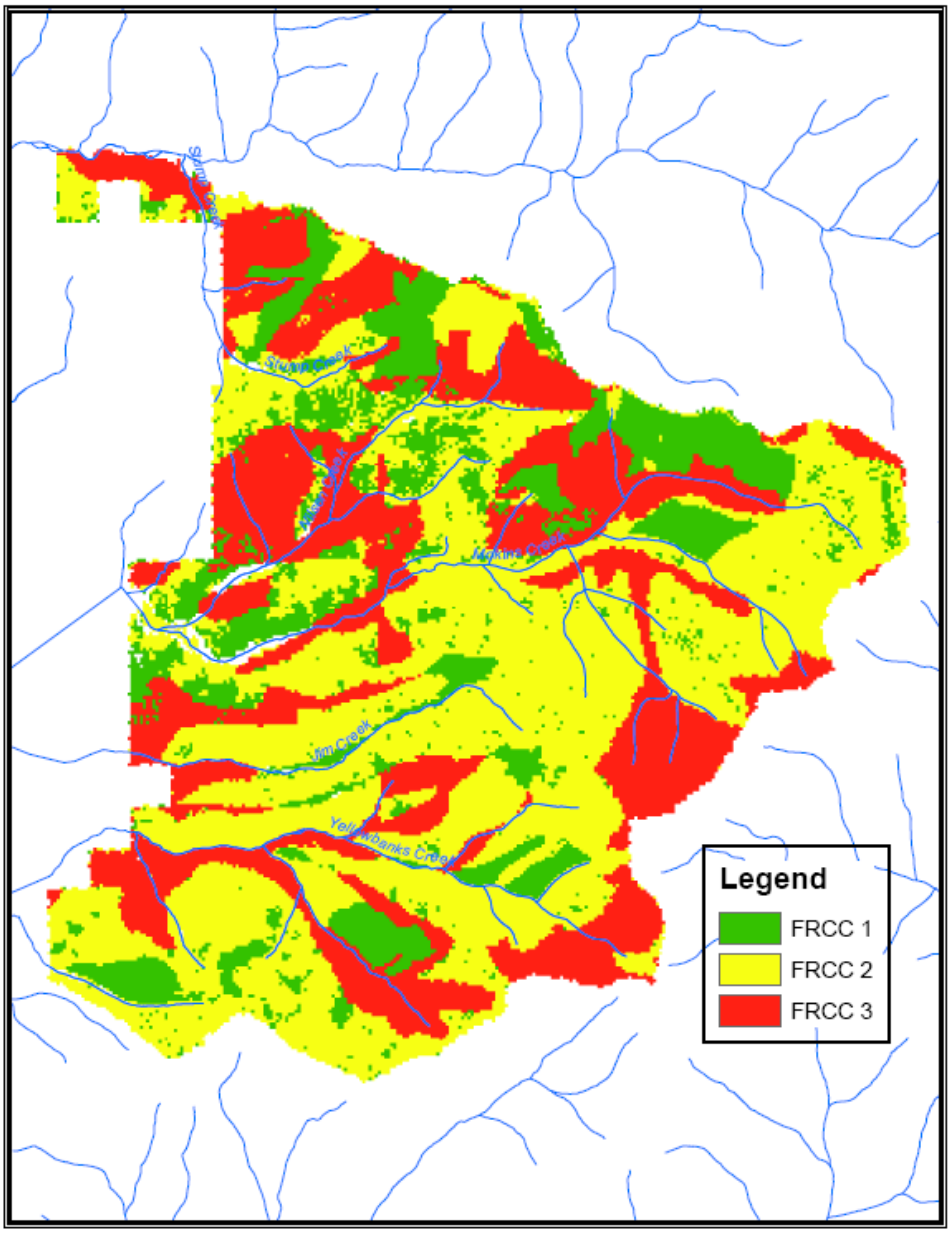
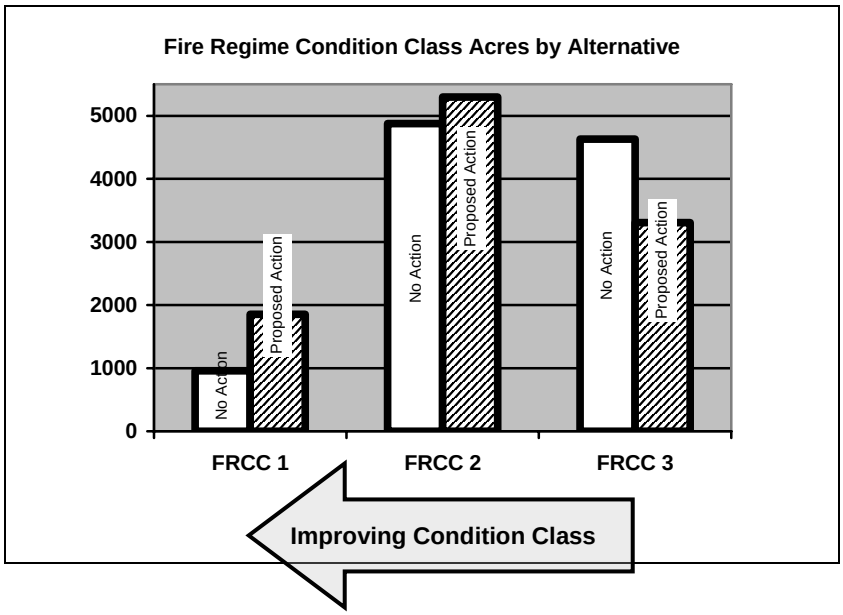


Figure 3-FF-17. Alternative Comparison of FRCC. *Fire Regime Condition Class in the Resource Area for each alternative. The No Action Alternative does not improve or maintain Condition Class. The Proposed Action Alternative improves or maintains Condition Class on all treated acres, resulting in 894 more acres in Condition Class 1, 417 more acres in Condition Class 2, and 1,321 fewer acres in Condition Class 3.*



Cumulative Effects of the Proposed-Action Alternative

Cumulative effects are those that would result from the Proposed-Action Alternative in addition to the incremental impacts of past, ongoing and reasonable foreseeable actions. Fire suppression is the primary action to be considered when evaluating cumulative impacts in the fire/fuels analysis, and the past effects of fire suppression are the same as those described in detail under the Cumulative Effects of the No Action Alternative. Since wildland fire use is not a reasonable foreseeable activity in the Deerfoot Resource Area, only the Proposed Action Alternative disrupts the "fire exclusion spiral" (Keane 2002; PF Doc. FF-32). The Proposed-Action Alternative would take steps to counteract the effects of fire exclusion as summarized previously in this section. The trend of fire behavior away from historical conditions would be interrupted, since early seral, less dense canopies would be promoted. In addition to disrupting the "fire exclusion spiral" by reducing hazardous fuels, improving species composition and improving stand and landscape structure, the Proposed Action Alternative slows fire movement at the landscape scale, reducing the threat of an uncontrolled fire approaching nearby developments.

It is almost impossible to separate indirect effects from cumulative effects when fire suppression is considered. Fire suppression has been effective in the Deerfoot Resource Area for over 85 years, and the incremental effect of suppressing each small fire in the watershed would have over time promoted late seral species rather than early seral species, and changed the structure of those forests, which in turn would change the way they responded to fires (Zack and Morgan 1994, page 32; PF Doc. FF-23).

Records show that 1,100 acres of prescribed burning has occurred on National Forest System lands in the past in the Deerfoot Resource Area (PF Doc. FF-41). This burning includes burning of piles (hand, grapple and dozer), underburning, broadcast, wildlife and ecosystem burning. Most of the past prescribed burning in the Resource Area is associated with timber sale activities. In addition, 170 acres of prescribed burning is planned for the near future in the Resource Area. The historic prescribed burning has reduced activity fuels and helped to maintain more acres of the Resource Area in an early seral stage, providing discontinuity to the fuels.

It is neither possible nor desirable to "fireproof" fire-dependent ecosystems, but active land management can reduce potential effects of severe fire. Federal land management agencies can mimic natural disturbances, but it is essential for managers to consider that current conditions may be considerably different from those conditions that occurred historically. Reintroduction of native processes such as fire without modification of structural patterns, fuel loadings, and spatial distributions can produce unpredictable and undesirable effects (Quigley et al. 1996, pages 165 and 184; PF Doc. FF-21). The overall importance of climate in wildfire activity underscores the urgency of ecological restoration and fuels management to reduce wildfire hazards to human communities and to mitigate ecological impacts of climate change in forests that have undergone substantial alterations due to past land uses (Westerling et al. 2006, PF Doc FF-89).

Activities under the Proposed-Action Alternative would affect the Fire Regime Condition Class by restoring fire effects, vegetation composition/structure, and fuels to more resemble the landscape's natural (historical) range. Treated areas would move toward Condition Class 1, rather than toward Condition Classes 2 or 3.

Most often, timber harvests on **private lands** tend to be partial cuts that remove trees of the highest economic value, generally large fire resistant seral species. Natural regeneration is relied on to fill most created openings. This tends to favor shade tolerant Douglas-fir and grand fir over early seral species such as pine and larch. The historic fire adapted vegetation structure was lost early in the century. Considering past harvest practices on private lands, it is probably safe to say that inherent disturbance regimes and historic vegetation patterns will never be re-established on private lands within the analysis area. Because private lands are likely to convert to more shade tolerant species, the structure of stands on private land will probably not approximate what existed there historically. A review of Notifications of Forest Practice from the Idaho Department of Lands showed that very little harvesting had occurred on private land within the Resource Area within the last 3 years. The records showed that the operations did not cut an amount of timber sufficient to cause a fire hazard (PF Doc FF-17)

FireSmart fuel reduction activities on the east side of Hayden Lake have reduced the potential for structure ignition on 99 private structures in the last five years (PF Doc FF-80). In addition, fuel reduction has been completed in key areas along the main access route on both private and National Forest System lands. These activities have reduced the threat of wildfire to those structures that were treated, and have improved access and egress safety in the event of an uncontrolled wildfire. The activities in the Proposed Action Alternative reduce the rate of fire spread across the Resource Area, possibly allowing a fire to be controlled prior to reaching structures, access routes, and other valuable infrastructure, reducing the risk to these resources even more. When considered together, the FireSmart fuel reduction, access route fuel reduction, and Proposed-Action Alternative are complementary and essential parts of a comprehensive fuel reduction plan for the Deerfoot Resource Area.

E. Conflicting Science

Scoping comments from the Kootenai Environmental Alliance and WildWest Institute question the effectiveness of timber harvesting at reducing fuels and fire hazard. They cite many references to support this contention, such as Countryman (1956, PF Doc FF-65) who observed that opening the forest canopy by removal of trees results in higher temperatures, lower humidity, lower fuel moistures, and increased effective surface wind speeds. Countryman's conclusions are largely accepted (Graham et al. 1999, PF Doc. FF-15; Scott and Reinhardt 2001, PF Doc. FF-10), and are not disputed or contradicted in this assessment. However, since the time of Countryman's study, many advances have been made in research of crown fire initiation and development, a dimension of fire behavior which Countryman does not address; recent research and this analysis include this critical aspect of fire behavior. Many other references were cited to support the contention that timber harvesting has unknown or adverse effects on fuels and fire hazard (Huff et al. 1995, PF Doc FF-81; VanWagtendonk 1996, PF Doc FF-82; Weatherspoon 1996, PF Doc FF-83; Agee 1997, PF Doc FF-68). However, the overwhelming theme of all of these studies is that harvesting and fuel treatment are effective **when surface fuels created by the harvest are treated**, as is proposed in this project. Many of the studies did find increases in fire hazard associated with untreated harvest debris, but these treatments were not designed to reduce fire hazard as the citation implied (DellaSala and Frost 2001, PF Doc FF-67). In fact, Agee (1997, PF Doc FF-68) summarizes Weatherspoon and Skinner (1995) with this quote: "The major implication of this study is less an argument against logging than an argument against the types of logging and fuel treatment that were done in the past."

In their comments on the proposed activities (PF Doc. PI-007), Kootenai Environmental Alliance cites letters from scientists (e.g. Christenson et al. 2002, PF Doc FF-69) questioning the value of thinning to address fire risks and stating that although few studies have shown a systematic reduction in fire intensity subsequent to thinning, others have documented increases in fire intensity and severity. This letter is broad in context, referring to many forest types in the west. It is also not clear what studies found that thinning produced increases in fire intensity and severity -- they may be those that included thinning without subsequent treatment of the residual surface fuels, as discussed above. Without references, it is impossible to address the comments made by the scientists; certainly the letter is not meant to depict specific effects of well-defined treatments in an isolated area, it is an opinion letter with a broad context. Moreover, many research studies have been published on the subject since the letter was written (e.g. Agee and Skinner 2005, PF Doc. FF-70; Stephens and Moghaddas 2005a, PF Doc. FF-71; Perry et al. 2004, PF Doc. FF-73; Stephens and Moghaddas 2005b, PF Doc. FF-72; Cram et al. 2006, PF Doc. FF-74; Raymond and Peterson 2005, PF Doc. FF-75; Omi et al. 2006, PF Doc. FF-76; Strom and Fulé 2007, PF Doc. FF-77; Metlen and Fiedler 2006, PF Doc. FF-78; Ritchie et al. 2007, PF Doc. FF-66, and others).

WildWest Institute cites Rhodes (2007, PF Doc FF-84), who questions the effectiveness of mechanical fuel treatments at reducing fire severity. A primary tenet of Rhodes' argument is that mechanical fuel treatments can only reduce fire severity if fire burns the treated areas during the window where the treatments are still effective, and that chances are fire won't burn the treated areas during that time. A parallel argument is that wearing your seatbelt on a trip to the grocery store is ineffective because you probably won't get in a wreck on the trip. Both are true, but the consequences of the severe fire or the car wreck are such that it is prudent to be prepared in the face of uncertain outcomes. Agee and Skinner (2005, PF Doc FF-70) say that it may be quite difficult to point to a particular stand and define its probability of burning in some given future period, but the probability that substantial areas of dry forest will continue to be burned by severe wildfire is known, and it is high.

Rhodes also estimates that the treatments are effective for only 10-20 years; the regeneration treatments in the Proposed Action have been shown to be effective for very long periods (100 years or more), due to the restoration of insect and disease resilient ponderosa pine. Rhodes also stresses the uncertainties of estimation of the past fire regime, which was addressed in the previous fire history section.

Rhodes (2007, PF Doc FF-84) is overly general and many of the conclusions are not applicable to the Deerfoot Resource Area. An example is the statement that even aged, early seral forests such as plantations burn at high severity, which is true in northern California, but not in forests such as those in the Deerfoot Resource Area (Personal Observations, PF Doc FF-85; Jain et al. 2006, PF Doc FF-62). Rhodes (2007, PF Doc FF-84) assumes that in many cases activity fuels are left untreated after timber harvest, and that the largest trees are harvested, leaving the smaller trees, both of which are not true for this proposal. Rhodes does concede that if fire affects treated areas while fuels are reduced, there is some potential for mechanical fuel treatments to reduce fire severity and restore the natural fire regimes in forests with natural fire regimes of mixed-severity fire or infrequent low-severity fire.

The effects of the vegetation management activities in the proposed action are well-defined with a high degree of certainty, because the effects were determined using site-specific data, supported by observation and research applicable to the forest types in the Deerfoot Resource Area.

3.3.5. Consistency with Policy, Direction and Legal Guidance for Fire/Fuels

The Proposed-Action Alternative is consistent with direction in the Forest Service Manual (FSM 5100, PF Doc FF-29). The Proposed-Action Alternative is designed to help accomplish the goals of the 10-Year Comprehensive Strategy (Strategy) by reducing hazardous fuels and restoring fire-adapted landscapes. One of the guiding principles of the Strategy is to set priorities that emphasize the protection of communities and other high-priority watersheds at risk. The long-term emphasis is to maintain and restore fire prone ecosystems at a landscape scale. The Deerfoot Resource Area is entirely within the wildland-urban interface as defined by the Kootenai County Local Emergency Planning Committee's Wildland Urban Interface Fire Mitigation Task Force (PF Doc. FF-39 and FF-46). The resource area is in close proximity to communities, and within the WUI. These factors make the Deerfoot Resource Area a high priority for hazardous fuel treatment. The No-Action Alternative does not address

the objectives of fire management (FSM 5140, PF Doc. FF-30), the goals of the Strategy, or the goals of the Kootenai County Wildland Urban Interface Fire Mitigation Plan.

The Forest Plan (PF Doc. CR-002, page II-38) identifies two standards regarding fire management.

Forest Plan Fire Management Standard #1

Fire protection and use standards are specified by management area. Cost effective fire protection programs will be developed to implement management direction based on on-site characteristics that effect fire occurrence, fire effects, fire management costs and fire caused changes in values.

Forest Plan Fire Management Standard #2

The Fire Management Action Plan will be guided by the following Forest-wide standards:

a. Management area standards.

b. Human life and property will be protected.

c. Fire will be used to achieve management goals according to direction in management areas. Implementation guides will be prepared for prescribed fire projects and programs identified in Table 10 (Forest Plan Appendix F) using unplanned ignitions.

d. Management area standards will be used in Escaped Fire Situation Analyses as a basis for establishing resource priorities and values.

e. The appropriate suppression response for designated old-growth stands in all management areas except in wilderness will result in preventing the loss of old growth. Fire policy in relation to old growth within wilderness will be provided in specific management direction developed for each wilderness area.

f. Activity fuels will be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.

g. Forest Fuel Management Fund expenditure priorities are:

   (1) Natural fuels that pose a threat to human life and property

   (2) Unfunded activity fuel projects

   (3) Areas where fuels/fire behavior is a threat to management area objectives

Following is a description of how each alternative meets these Forest Plan standards. Forest Plan standards 2d and 2e relate to wildfire suppression policy and requirements that are outside the scope of this project, and therefore compliance with these standards is not described. This project does not determine Forest Fuel Management expenditure priorities, so compliance with standard 2g is not addressed.

No-Action Alternative: The No-Action Alternative would not use prescribed fire to help meet the goals of the management areas within the Resource Area. The alternative would not help develop cost-effective fire programs because it would allow far more intense potential fire behavior to exist in stands that, with treatment, would primarily exhibit low intensity, easily controlled fire behavior. Under the No-Action Alternative, severe fire effects, large wildfire management costs, and fire caused changes in values could reasonably be expected; these results could likely be prevented or lessened with action to treat forest fuels.

The No-Action Alternative would not take any preventative steps to protect human life and property within the Resource Area from an uncontrolled wildfire. The continued succession of fuels and vegetation, mortality from insects and disease, and the exclusion of fire would create areas where the trend in fire behavior characteristics would in time be inconsistent with the goals, objectives and standards established in the Forest Plan. No activity

fuels would be created under the No-Action Alternative, so there is no need to treat activity fuels, which is consistent with the Forest Plan.

Proposed-Action Alternative: The Proposed-Action Alternative would use prescribed fire to help meet the goals of the management areas within the Resource Area, consistent with the Forest Plan. It would help develop cost-effective fire programs by making substantial progress toward reducing potential intensities of wildfire in areas affected by past fire suppression. By inference, the more area treated to restore and maintain stands toward historical species composition, the better the alternative meets the Forest Plan goals. The Proposed-Action Alternative would best meet the goals, objectives and standards of the Forest Plan because it would reduce the severity of fire effects, the costs of potential wildfire, and fire-caused changes in values on the most acres (1,880 acres total). Treatments under the Proposed-Action Alternative would begin to trend stands away from potential fire behavior that could threaten human life and property in and near the resource area. The activity fuels created would be treated in a manner that is consistent with the standards of the Forest Plan.

3.3.6 References Cited in the Fire/Fuels Analysis

Agee, James K. 1994. Fire and weather disturbances in terrestrial ecosystems of the eastern Cascades. Gen. Tech. Rep. PNW-GTR-320. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 52 pp. *PF DOC. FF-2*

Agee, James K. 1997. Severe fire weather – Too hot to handle? Northwest Science. Volume 71, No. 1. *PF DOC. FF-68*

Agee, James K. 2002. The Fallacy of Passive Management Managing for Firesafe Forest Reserves. Conservation in Practice 3 (1), 18–26. *PF DOC. FF-91*

Agee, James K. and Carl N. Skinner. 2005. Basic principles of forest fuel reduction treatments. Forest Ecology and Management 211 (2005) 83–96. *PF DOC. FF-70*

Anderson, Hal E. 1968. Sundance Fire: An analysis of fire phenomena. USDA Forest Service Research Paper INT-56. Intermountain Forest and Range Experiment Station, Ogden, Utah 84401. 38 p. *PF DOC. FF-27*

Arno, Stephen F. and Kathy M. Sneck. 1977. A method for determining fire history in coniferous forests in the Mountain West. USDA Forest Service Gen. Tech. Rep. INT-42. Intermountain Forest and Range Experiment Station, Ogden, Utah 84401. 28 p. *PF DOC. FF-58*

Baker, William L. and Donna Ehle. 2001. Uncertainty in surface-fire history: the case of ponderosa pine forests in the western United States. Can. J. For. Res. 31: 1205–1226. *PF DOC. FF-12*

Baker William L., Thomas T. Veblen and Rosemary L. Sherriff. 2006. Fire, fuels and restoration of ponderosa pine–Douglas fir forests in the Rocky Mountains, USA. Journal of Biogeography, **34**, 251–269. *PF Doc FF-102*

Beukema, Sarah J.; Reinhardt, Elizabeth D.; Kurz, Werner A.; Crookston, Nicholas L. 1999. An overview of the fire and fuels extension to the forest vegetation simulator. In: Proceedings from the Joint Fire Science Conference and Workshop, Grove Hotel, Boise, ID, June 15-17, 1999. Available online at http://www.nifc.gov/joint_fire_sci/conferenceproc/index.htm. *PF DOC. FF-7*

Boas, Franz and James Teit. 1996. Coeur d'Alene, Flathead and Okanogan Indians. Ye Galleon Press, Fairfield, WA. Reprinted from the forty-fifth annual report of the Bureau of American Ethnology, 1927-1928. 381 p. *PF DOC. FF-33*

Boyd, Robert, Editor. 1999. Indians, fire and the land in the Pacific Northwest. Oregon State University Press, Corvallis, OR. *PF DOC. FF-13*

Brackebusch, Arthur P. 1973. Fuel Management – A prerequisite, not an alternative to fire control. Journal of Forestry. 71:637-639. *PF DOC. FF-8*

Brown, J.K.; Arno, S.F.; Barrett S. W. Menakis, J.P. 1994. Comparing the prescribed natural fire program with presettlement fires in the Selway-Bitterroot Wilderness. Int. Jour. Wildland Fire 4 (3):157-168. *PF DOC. FF-20*

Brown, Timothy J., Beth L. Hall and Anthony L. Westerling. 2004. The impact of twenty-first century climate change on wildland fire danger in the western United States: An applications perspective. Climatic Change 62: 365–388. *PF DOC. FF-90*

Butler, B. W.; Cohen, J. D. 1998. Firefighter safety zones: a theoretical model based on radiative heating. International Journal of Wildland Fire. 8(2): 73–77. *PF DOC. FF-79*

Cohen, Jack D. 1999. Reducing the wildland fire threat to homes: where and how much? USDA Forest Service General Technical Report PSW-GTR-173. pp 189-195. *PF Doc FF-96*

Cohen, Jack D. Wildland-Urban Fire – A Different Approach. On the internet at www.firelab.org. Accessed 2006. *PF DOC. FF-16*

Cohen, Jack and Bret Butler. 2005. Wildfire threat analysis in the Boulder River Canyon: Revisited. Fire Sciences Laboratory, USDA Forest Service, Rocky Mountain Research Station. Missoula MT. *PF Doc. FF-97*

Christenson et al. August 2002. Letter to President Bush. *PF DOC. FF-69*

Cram, D.; Baker, T.; Boren, J. 2006. Wildland fire effects in silviculturally treated vs. untreated stands of New Mexico and Arizona. Research Paper RMRS-RP-55. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 28 p. *PF DOC. FF-74*

Crookston, Nicholas L. and Elizabeth Reinhardt. 2004. Fire and Fuels Extension: Addendum, Appendix A: P-Torch. P-Torch: A new torching index. Gen. Tech. Rep. RMRS-GTR-116. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Pp 156-164. *PF DOC. FF-18*

Countryman, C.M. 1956. Old-growth conversion also converts fire climate. Fire Control Notes Vol. 16 No. 4. p. 15-19. *PF DOC. FF-65*

DellaSala, Dominick A and Evan Frost 2001. An ecologically based strategy for fire and fuels management in National Forest roadless areas. Fire Management Today. Vol. 61, No. 2. *PF DOC. FF-67*

Finney, M.A. 2001. Design of regular landscape fuel treatment patterns for modifying fire growth and behavior. Forest Science 47:219-228. *PF DOC. FF-9*

Finney, M.A. and Cohen, J.D. 2003. Expectation and evaluation of fuel management objectives. In P.N. Omi (ed.) Proceedings of Fire, Fuel Treatments, and Ecological Restoration, April 14-17 Fort. Collins CO. USDA Forest Service Proceedings RMRS-P-29, PP 353-366. *PF DOC. FF-31*

Finney, M.A., C.W. McHugh, and I.C. Grenfell. 2005. Stand- and landscape-level effects of prescribed burning on two Arizona wildfires. Canadian Journal of Forest Research. Vol. 35 pp 1714-1722. *PF DOC. FF-40*

Finney, Mark A. 2006. An overview of FlamMap fire modeling capabilities. In: Andrews, Patricia L.; Butler, Bret W., comps. 2006. Fuels Management—How to Measure Success: Conference Proceedings. 28-30 March 2006; Portland, OR. Proceedings RMRS-P-41. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. *PF DOC. FF-34*

Graham, Russell T.; McCaffrey, Sarah; Jain, Theresa B. (tech. eds.) 2004. Science basis for changing forest structure to modify wildfire behavior and severity. Gen. Tech. Rep. RMRS-GTR-120. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 43 p. *PF DOC. FF-6*

Graham, Russell T.; Harvey, Alan E.; Jain, Theresa B.; Tonn, Jonalea R. 1999. The effects of thinning and similar stand treatments on fire behavior in Western Forests. Gen. Tech. Rep. PNW-GTR-463. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 27 p. *PF DOC. FF-15*

Graham, Russell T., Technical Editor. 2003. Hayman Fire Case Study. Gen. Tech. Rep. RMRS-GTR-114. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 396 p. *PF Doc. FF-101*

Hann, Wendell J. and David L. Bunnell, 2001. Fire and land management planning and implementation across multiple scales. International Journal of Wildland Fire, 10; pp. 389-403. *PF DOC. FF-53*

Hessburg, Paul F., James K. Agee, Jerry F. Franklin. 2005. Dry forests and wildland fires of the inland Northwest USA: Contrasting the landscape ecology of the pre-settlement and modern eras. Forest Ecology and Management 211 (2005) 117–139. *PF DOC. FF-37*

Huff, Mark H.; Ottmar, Roger D.; Alvarado, Ernesto; Vihnanek, Robert E.; Lehmkuhl, John F.; Hessburg, Paul F.; Everett, Richard L. 1995. Historical and current forest landscapes in eastern Oregon and Washington. Part II: Linking vegetation characteristics to potential fire behavior and related smoke production. Gen. Tech. Rep. PNW-GTR-355. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 43 p. *PF DOC. FF-81*

Jain, Theresa B., Russell T. Graham, and David S. Pilliod. 2006. The Relation Between Forest Structure and Soil Burn Severity. In: Andrews, Patricia L.; Butler, Bret W., comps. 2006. Fuels Management—How to Measure Success: Conference Proceedings. 28-30 March 2006; Portland, OR. Proceedings RMRS-P-41. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. *PF DOC. FF-62*

Keane, Robert E.; Ryan, Kevin C.; Veblen, Tom T.; Allen, Craig D.; Logan, Jessie; Hawkes, Brad. 2002. Cascading effects of fire exclusion in the Rocky Mountain ecosystems: a literature review. General Technical Report. RMRS-GTR-91. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 24 p. *PF DOC. FF-32*

Keeling, E.G., A. Sala, T.H. DeLuca. 2006. Effects of fire exclusion on forest structure and composition in unlogged ponderosa pine/Douglas-fir forests. Forest Ecology and Management 237 (2006) 418–428. *PF DOC. FF-38*

Leiberg, John B. 1897. General report on a botanical survey of the Coeur d'Alene Mountains in Idaho during the summer of 1895. U.S. Department of Agriculture. Division of Botany. Contributions from the U.S. National Herbarium. Vol. V, No. 1. *PF DOC. FF-59*

MacKenzie, M.D., T.H. DeLuca, A. Sala. 2004. Forest structure and organic horizon analysis along a fire chronosequence in the low elevation forests of western Montana. Forest Ecology and Management 203 (2004) 331–343. *PF DOC. FF-36*

McKenzie, Donald, Ze'ev Gedalof, David L. Peterson, and Philip Mote. 2004. Climatic Change, Wildfire, and Conservation. Conservation Biology. Volume 18, No. 4. *PF DOC. FF-86*

Metlen, Kerry L. and Carl E. Fiedler. 2006. Restoration treatment effects on the understory of ponderosa pine/Douglas-fir forests in western Montana, USA. Forest Ecology and Management 222 (2006) 355–369. *PF DOC. FF-78*

Millar, Constance I., Nathan L. Stephenson, and Scott L. Stephens. 2007. Climate change and forests of the future: Managing in the face of uncertainty. Ecological Applications, 17(8), pp. 2145–2151. *PF Doc FF-98*

Mote, Philip W., Edward A. Parson, Alan F. Hamlet, William S. Keeton, Dennis Letenmaier, Nathan Mantua, Edward L. Miles, David W. Peterson, David L. Peterson, Richard Slaughter and Amy K. Snover. 2003. Preparing for climatic change: The water, salmon, and forests of the Pacific Northwest. Climatic Change 61: 45–88, 2003. *PF DOC. FF-87*

Nowicki, Brian. 2002. The Community Protection Zone: Defending Houses and Communities from the Threat of Forest Fire. Center for Biological Diversity. *PF DOC. FF-92*

NWCG. 1993. Fireline Handbook Appendix B, Fire Behavior. National Wildfire Coordinating Group. NFES 2165. *PF DOC. FF-11*

Odion, Dennis C. and Chad T. Hanson. 2006. Fire Severity in Conifer Forests of the Sierra Nevada, California. Ecosystems. (2006) **9**: 1177–1189. *PF Doc FF-99*

Omi, Philip N., Erik J. Martinson, Geneva W. Chong. 2006. Effectiveness of Pre-Fire Fuel Treatments. Final Report

JFSP Project 03-2-1-07. Submitted to the Joint Fire Science Program Governing Board December 31, 2006. *PF DOC. FF-76*

Peterson, David L.; Johnson, Morris C.; Agee, James K.; Jain, Theresa B.; McKenzie, Donald; Reinhardt, Elizabeth D. 2005. Forest structure and fire hazard in dry forests of the Western United States. Gen. Tech. Rep. PNW-GTR-628. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 30 p. *PF DOC. FF-64*

Quigley, Thomas M.; Haynes, Richard W.; Graham, Russell T., tech. eds. 1996. Integrated scientific assessment for ecosystem management in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-382. Portland, OR; USDA Forest Service, Pacific Northwest Research Station. 303 p. *PF DOC. FF-21*

Raymond, Crystal L and David L. Peterson. 2005. Fuel treatments alter the effects of wildfire in a mixed-evergreen forest, Oregon, USA. Can. J. For. Res. Vol. 35. *PF DOC. FF-75*

Reinhardt, Elizabeth; Crookston, Nicholas L. (tech. eds.). The Fire and Fuels Extension to the Forest Vegetation Simulator. Gen. Tech. Rep. RMRS-GTR-116. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 209 p. *PF DOC. FF-14*

Rhodes, Jonathan J. 2007. Watershed Impacts of Forest Treatments to Reduce Fuels and Modify Fire Behavior. Prepared for Pacific Rivers Council. www.pacrivers.org *PF DOC. FF-84*

Ritchie, Martin W., Carl N. Skinner, Todd A. Hamilton. 2007. Probability of tree survival after wildfire in an interior pine forest of northern California: Effects of thinning and prescribed fire. Forest Ecology and Management 247 (2007) 200–208. *PF DOC. FF-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. 161 p. *PF DOC. FF-28*

Saveland, Jim. 1998. Prescribed fire: the fundamental solution. Pages 12-16 *in*: Teresa L. Pruden and Leonard A. Brennan, (eds.). Fire in ecosystem management: shifting the paradigm from suppression to prescription. Tall Timber Fire Ecology Conference Proceedings, No. 20. Tall Timbers Research Station, Tallahassee, FL. *PF DOC. FF-3*

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. *PF DOC. FF-1*

Schoennagel, Tania, Thomas T. Veblen, William H. Romme. 2004. The Interaction of Fire, Fuels, and Climate across Rocky Mountain Forests. BioScience. July 2004. Vol. 54 No. 7. *PF DOC. FF-60*

Scott, Joe H.; Reinhardt, Elizabeth D. 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. 59 p. *PF DOC. FF-10*

Scott, Joe H.; Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p. *PF DOC. FF-35*

Smith, Jane Kapler. 1994. Presettlement fire regimes in northern Idaho. In: Fire Management under Fire (Adapting to Change) Proceedings of the 1994 Interior West Fire Council Meeting and Program, 1994 November 1-4, Coeur d'Alene, ID. Interior West Fire Council: 83-92. *PF DOC. FF-5*

Smith, Jane Kapler and William C. Fischer. 1997. Fire ecology of the forest habitat types of northern Idaho. Gen. Tech. Rep. INT-GTR-363. Ogden, Utah: US Department of Agriculture, Forest Service Intermountain Research Station. 142 p. *PF DOC. FF-4*

Spurr, S.H. and B.V. Barnes. 1980. Forest Ecology. John Wiley & Sons, New York, Chapter 16, pages 421-428 and 437-439. *PF DOC. FF-19*

Stephens, Scott L. and Jason J. Moghaddas. 2005a. Experimental fuel treatment impacts on forest structure, potential fire behavior, and predicted tree mortality in a California mixed conifer forest. Forest Ecology and Management 215 (2005) 21–36. *PF DOC. FF-71*

Stephens, Scott L. and Jason J. Moghaddas. 2005b. Silvicultural and reserve impacts on potential fire behavior and forest conservation: Twenty-five years of experience from Sierra Nevada mixed conifer forests. Biological Conservation 125 (2005) 369–379. *PF DOC. FF-72*

Strom, Barbara A. and Peter Z. Fulé. 2007. Pre-wildfire fuel treatments affect long-term ponderosa pine forest dynamics. International Journal of Wildland Fire, 16, 128–138. *PF DOC. FF-77*

Theobald, David M. and William H. Romme. 2007. Expansion of the US wildland–urban interface. Landscape and Urban Planning 83 (2007) 340–354. *PF DOC. FF-93*

USDA Forest Service. Forest Service Manual, Title 5100 Fire Management USDA Forest Service. Washington D.C. *PF DOC. FF-29*

USDA Forest Service. Forest Service Manual, Title 5100 Fire Management. Chapter 5140, Fire Use. USDA Forest Service. Washington D.C. *PF DOC. FF-30*

USDA Forest Service. 1998. Toward an ecosystem approach: An assessment of the Coeur d'Alene Basin. Ecosystem Paper #4. Idaho Panhandle National Forests. *PF DOC. CR-025*

USDA Forest Service. 1987. Forest Plan Idaho Panhandle National Forests. *PF DOC. CR-002*

USDI and USDA. 2001a. Review and update of the 1995 Federal Wildland Fire Management Policy. Available online at http://www.nifc.gov/fire_policy/index.htm. *PF DOC. FF-22*

USDI and USDA 2001b. A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy. Available online at www.fireplan.gov. *PF DOC. FF-24*

USDI and USDA 2006. A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan. Available online at www.fireplan.gov. *PF DOC. FF-25*

VanWagtendonk, Jan W. 1996. Use of a Deterministic Fire Growth Model to Test Fuel Treatments. Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options. *PF DOC. FF-82*

Weatherspoon, C. Phillip. 1996. Fire-Silviculture Relationships in Sierra Forests. Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options. *PF DOC. FF-83*

Westerling, A. L., H. G. Hidalgo, D. R. Cayan, T. W. Swetnam. 2006. Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity. Science Vol 313 p, 940-943. *PF DOC. FF-89*

Whitlock, Cathy, Sarah L. Shafer, Jennifer Marlon. 2003 The role of climate and vegetation change in shaping past and future fire regimes in the northwestern US and the implications for ecosystem management. Forest Ecology and Management 178 (2003) 5–21. *PF DOC. FF-88*

Zack, Arthur C. and Penelope Morgan. 1994. Fire history on the Idaho Panhandle National Forest (Review Draft). *PF DOC. FF-23*

3.4 AQUATIC RESOURCES

The following section focuses on the existing condition for water quality and fishery resources in the area and the effects from implementing each of the alternatives. Issues addressed serve as indicators for measuring how the alternatives may impact water quality and fish habitat.

3.4.1. Policy, Direction and Legal Guidance for Aquatic Resources

The regulatory framework governing management of watershed and fisheries for the analysis is based on:

- *National Forest Management Act (NFMA)*
- *Forest Plan – Idaho Panhandle National Forest (IPNF)*
- *Endangered Species Act (ESA)*
- *Clean Water Act (CWA) and amendments.*
- *Idaho Department of Environmental Quality (IDEQ) implementation of the Clean Water Act*
- *Rules Pertaining to the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code, 2000)*
- *Executive Order 12962 (Recreational Fishing)*
- *U.S. Fish and Wildlife Final Rule – Designation of Critical Habitat for the Bull Trout (CFR 50 Part 17)*
- *State of Idaho Governor's Bull Trout Plan*

The National Forest Management Act (NFMA 1976) requires that the Forest Service provide for diversity of plant and animal communities in the Plan area (16 USC §1604 NFMA §6 (g)(2) (B)). Regulations further state that the effects on these species and the reason for their choice as management indicator species (MIS) become documented (Forest Plan, PF Doc. CR-002). The Inland Native Fish Strategy (USDA 1995; PF Doc. CR-003) amended some Forest Plan direction regarding stream and fish habitat protection measures (see Aquatics Section – Consistency with the Forest Plan and Consistency with other laws, regulations, and policy).

Section 7 of the 1973 Endangered Species Act (ESA) includes direction that Federal agencies, in consultation with the U.S. Fish and Wildlife Service, will not authorize, fund, or conduct actions that are likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat. No known tributaries in the Deerfoot Resource Area have ever contained bull trout and it is not listed as critical habitat by the U.S. Fish & Wildlife Service (Federal Register, October 6, 2004, 50 CFR Part 17; http://www.fws.gov ; PF Doc. AQ-R01).

Under authority of the Clean Water Act, the Environmental Protection Agency and the States must develop plans and objectives that will eventually restore identified stream segments of concern. Hayden Lake is currently a listed 303(d) water quality limited segment from the outlet to the inlet of Hayden Creek (IDEQ 2000). The pollutants of concern are phosphorus and sediment. The current status is that there is an approved Total Maximum Daily Load (TMDL), and its implementation plan is pending. Under this status, there should not be a net increase in sediment through management activities to Hayden Lake.

The Forest Service will develop an implementation plan for its portion of the TMDL in Hayden Lake in cooperation with IDEQ and interested local parties. In the interim, any activities we undertake or permit on National Forest System lands will be designed to reduce phosphorus and sediment, where feasible. The timeframe for completion of the implementation plan has not yet been determined.

The Forest Service has agreements with the State to implement Best Management Practices (BMPs; Appendix A) or Soil and Water Conservation Practices for all management activities. Proposed activities will be in compliance with the guidelines in the Soil and Water Conservation Handbook (Forest Service Manual 2509.22), which outlines Best Management Practices that meet the intent of the water quality protection elements of the Idaho Forest Practices Act.

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

The mission of the Governor's Bull Trout Plan is to "…maintain and or restore complex interacting groups of bull trout populations throughout their native range in Idaho" (State of Idaho 1996; PF Doc AQ-R02). The Governor's Bull trout plan does not apply to this project for two main reasons: 1) bull trout likely have never inhabited the Hayden Lake drainage; and 2) in the Plan, Hayden Lake is not listed under the "Panhandle Basin (PF Doc AQ-R02 within Appendix F of Plan)" hence it is not recognized as a key watershed for a bull trout metapopulation.

3.4.2. Affected Environment

A. Methodology Used in the Assessment and Description of the Affected Aquatic Resources Environment

The aquatic resource concerns include: Sediment yield, water yield, and peak flow from the project under the No-Action and Proposed-Action Alternatives in the analysis area watersheds. The variation and quantitative predictions of each are analyzed using WATSED-modeled results. Where the direct, indirect and cumulative effects are disclosed, the effects of the above mentioned parameters on fish habitat and populations are compared between the No-Action and Proposed-Action Alternatives at the watershed scale. The following narratives describe the methodology used, characterization, and existing condition of aquatic resources.

Geographic Scale of the Analyses

Subwatersheds

For this project the analysis area was subdivided into manageable units referred to as subwatersheds. Five of these units are true subwatersheds and one is "face drainage." True subwatersheds are areas of land in which all of the streams are interconnected and drain through a single point and leave the watershed through a distinct outlet or "pore point." For example, the Stump Creek watershed consists of Stump Creek and all its tributaries to the confluence of Hayden Creek. Face drainages consist of smaller independent watersheds grouped together. Streams in face drainages are not as directly interconnected as those in true watersheds. The discussions in this section address the six subwatersheds of the Deerfoot Resource Area in the following order:

- *Stump Creek*
- *Nilsen Creek*
- *Mokins Creek*
- *Jim Creek*
- *Yellowbanks Creek*
- *Hayden Face Tributary (an unnamed stream corridor on USGS and GIS maps; for this project it is be referred to as "Hayden Face Tributary")*

Water quality in Hayden Lake, as well as in the six subwatersheds, is qualitatively addressed in this Environmental Assessment. The Geographic Assessment (page 59; PF Doc. CR-025) recommends one integrated strategy that will help respond to issues and process of the terrestrial, aquatic and recreation components of the ecosystem. This strategy identified different implementation strategies for different areas, so native aquatic resources can be conserved and protected. Within the Deerfoot Resource Area, the implementation strategy is uniform for each subwatershed assessed and they are considered "functioning-at-risk," as is the entire Hayden Lake Basin as defined in the Geographic Assessment (pages 59-61):

- *Properly functioning: Within the scope of this assessment, a properly functioning watershed system is one that is exhibiting dynamic equilibrium characteristics and whose streams are operating and responding appropriately under their current environment. These systems can absorb and respond to disturbances that they have evolved under within their historic range. Typically, parts of these systems, or the system as a whole, can move toward a more stable condition over time following a disturbance (or a series of disturbances) within a certain time period. As a system, these watersheds will not benefit from large-scale watershed restoration actions (although local, site-specific improvements may be productive.)*
- *Functioning at Risk: A watershed system that is functioning-at-risk is one that is essentially still properly functioning. However, it may be exhibiting trends or it may contain known risks that are likely to compromise that status and the ability to fully support beneficial uses in the future. This status may be assigned where the apparent watershed status is uncertain because the complexity of the system and disturbances. These systems are the first priority for large-scale watershed system restoration and improvement programs. Such programs will often produce effective and timely responses in the near future.*
- *Not Properly Functioning: Watershed systems that are not properly functioning often exhibit rapid adverse trends and may not fully support beneficial uses. These systems may appear to be responding to their own last adjustment, rather than toward stabilizing the last disturbance. They are "out-of-balance" with their environment and may not be in dynamic equilibrium, in periods of at least several decades. These systems are in need of large-scale restoration. These watersheds are usually second priority due to limited availability of resources, uncertain technology, and the long time period expected for positive responses.*

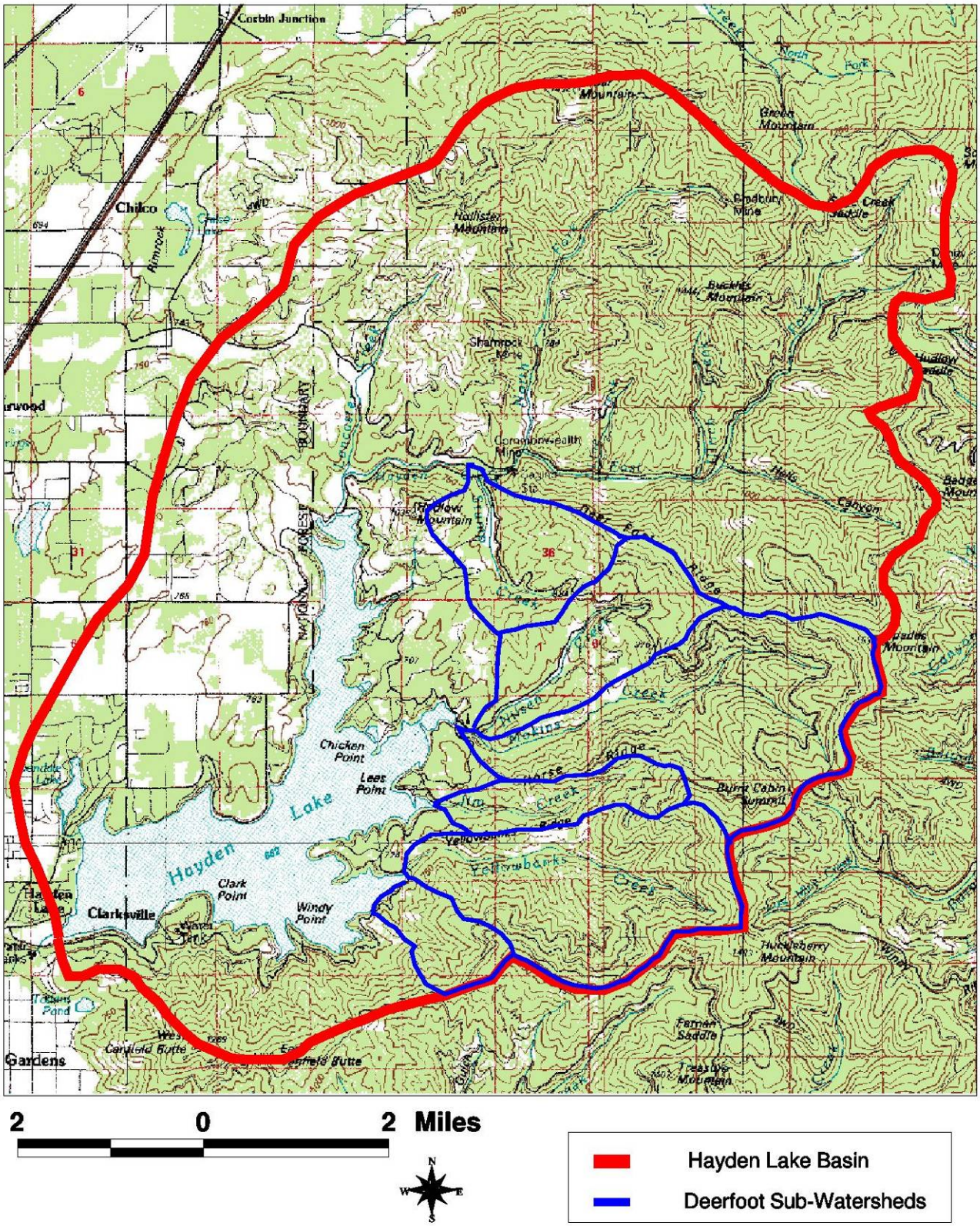
Cumulative Effects Analysis Area

The cumulative effects analysis area includes six subwatersheds that flow into Hayden Lake. The entire Hayden Lake basin was not selected as the cumulative effects area due to the fact that the resource area occupies less than 50 percent of the basin, and approximately 25 percent of the basin is privately owned. Within the subwatersheds used as the cumulative effects area, 73 percent is National Forest System and 27 percent is private.

Literature and Office Review

The assessment of existing condition is critical to an environmental analysis because it both describes the current condition of the resource area and provides a basis for comparing the effects of management alternatives. Information for the watershed and fisheries analysis was compiled using data from the field collections made over several years (e.g. 1997, 2001, and 2005) in watersheds in the resource area. Additional information was gathered from district files, historical records, aerial photographs, and published scientific literature. Also, discussions and annual report data obtained from the Idaho Department of Fish and Game provided electrofishing and stocking data and comprehensive knowledge of the fisheries resources in the Hayden Lake Basin (PF Doc AQ-2). A roads analysis was also completed, which established recommendations for road management objectives within the Deerfoot Resource Area watersheds (PF Doc. TRAN-1).

Figure 3-AQ-1. Watershed Cumulative Effects Area (areas outlined in blue) for the Deerfoot Project in relation to the Hayden Lake Basin (outlined in red).



The WATSED Model

The anticipated sediment and water yield runoff for the Deerfoot Resource Area watersheds (e.g. Stump, Nilsen, Mokins, Jim, and Yellowbanks; Figure 3-AQ-1) were estimated from the methods documented in the R1/R4 Sediment Guides (USDA 1981; PF Doc AQ-R03; PF Doc. AQ-01: WATSED Model Limitations) and the WATBAL Technical User Guide (Patten 1989; PF Doc. AQ-R04); Hayden Face Tributary was not run because the subwatershed is too small to model (PF Doc. AQ-01). The version calibrated for the Idaho Panhandle National Forests, known as WATSED, is an analysis tool that spatially and temporally organizes typical watershed response relationships as a result of forest practices. The estimated responses are combined with other sources of information and analyses to help determine the findings of probable effects.

WATSED estimates a series of anticipated annual values over a period of years. The model predicts an estimate of most likely mean annual sediment loads (reported as tons per square mile per year, or as routed tons per year), and the expected sediment load modifications over time. The estimate of additional loading is expressed as a percent of the "natural" (i.e., historic mean load prior to significant development activities) sediment load, which is based on the history of disturbances and average climate patterns in the watershed. In this analysis, the existing condition represents the year 2007, which is prior to any anticipated disturbances related to the proposed activities.

The estimates of sediment and peak flow reflect how watersheds with similar conditions and landtypes have responded over time to a similar history of disturbance. WATSED is not intended or designed to model event-based processes and functions, or specific in-channel responses. It does, however, incorporate the results of those processes in the calibration of its driving coefficients. WATSED does not evaluate increases in sediment and peak flows specifically resulting from "rain-on-snow" events or other stochastic events, nor does it attempt to estimate in-channel and stream-bank erosion. The Idaho Panhandle National Forests (IPNF) frequently validates the WATSED coefficients and estimates using long-term water quality monitoring networks on the IPNF (USDA 1998b, 1999, and 2000; PF Doc. CR-014 through CR-016).

The forest management activities used to calibrate the model include standard BMPs and Soil and Water Conservation Practices (see Appendix A: BMPs); therefore, standard BMPs and Soil and Water Conservation Practices are necessary requirements for maintaining an effective confidence level in the model's use. Non-standard BMPs, management or natural disturbances not related to forest practices, and site-specific non-standard BMPs must be integrated into the final analysis to fully determine watershed response.

WATSED was designed to address and integrate a vast and complex array of landtypes and disturbances within the context of a watershed and organize the evaluation according to rule sets established by the author and cooperators. In the case of WATSED, the rule sets reflect watershed processes and functions based on research, data, and analyses collected locally and regionally. Forest Plan monitoring reports (USDA 1998b, 1999, and 2000; PF Doc. CR-014 through CR-016) describe how the calibration and validation of WATSED has been an annual process on the forest and where changes have been made. The model, however, also includes simplifying assumptions, and does not include all possible controlling factors. Therefore, the use of models is to provide one set of information to the technical user, who, along with knowledge of the model and its limitations, other models, data, analysis, experience and judgment must integrate all those sources to make the appropriate findings and conclusions.

Field Review

Most roads within the resource area were surveyed during 1997 and 2002, with some repeat collections in 2005. Priority setting for inventories was given to those roads that have stream crossings or are located nearest stream channels so that risk of sediment to aquatic systems could be evaluated. Sites where roads cross drainages were inventoried to assess erosional hazards and risks to aquatic ecosystems, using a protocol developed locally for the Coeur d'Alene River Ranger District. This method gathered information on road-stream crossings that included fill volumes, culvert sizes, erosional features, and other variables, so that

sediment risk from culvert failure could be assessed. From this information culverts and stream crossings could be prioritized for upgrading or removal (Sediment Risk Analysis, PF Doc. AQ-03).

Stream information was collected in the lower reaches of the resource area (Stump, Mokins, and Yellowbanks Creeks) during the 2002 field season. In 2005, stream information was again collected from Mokins and Yellowbanks Creeks, as well as at Jim Creek. Also in 2005, Nilsen Creek was electrofished for presence/absence data (Project Files listed below in Affected Environment). Representative segments within the lower reaches (those that are most sensitive to watershed disturbance) were selected for collecting information to determine stream channel types, cross sectional profiles, longitudinal profiles, woody debris composition, bank erosion, and stream temperature. A modified version of the R1/R4 fish and fish habitat inventory (Overton et al. 1997; PF Doc. AQ-R05) was conducted along these same index reaches in Stump Creek, Nilsen Creek, Mokins Creek, and Yellowbanks Creek. These sites are mapped, documented, and marked on the ground so that repeat measurements can be accomplished to track changes in conditions.

GIS Technology

Geographical Information Systems (GIS) were used to combine existing databases, proposed activities and data taken from aerial photos to create maps and summary tables of existing conditions. Landtype maps and descriptions were input into GIS layers to evaluate the existing condition and for the effects analysis.

Along with field data, ground truthing, and GIS technology; GIS mapping was used to determine buffers (as defined by INFS) within the resource area (PF Doc. AQ-04).

B. How Past Actions Influenced Existing Conditions of the Affected Watersheds

The following is a description of past actions, used to establish the appropriate geographic and time boundaries for the cumulative effects analysis. Activities identified below were ones that are relevant to the watershed and fisheries cumulative effects analysis. Other past activities are not discussed here because there was no soil, watershed, or fisheries disturbance created by these activities. These include tree planting, firewood gathering and recreational activities.

Effects of Wildfire: Historically, the greatest natural agent of disturbance in the Hayden Lake watershed was wildfire. Fire history of the area is explained in detail in Section 3.3 Fire/Fuels. Generally speaking, frequent, low-intensity fires were common on the dry aspects of the watershed, occurring on average once every 20 to 30 years. Throughout the entire area, including moist sites, the historic fire return interval is 54 years for all types of fires (mixed and lethal severity). The very moist riparian stands likely burned less often and less severely, due to their topographic position and fuel moisture conditions during most fire seasons. This has led to the condition where stream bottoms historically would have a good supply of large woody debris and excellent aquatic habitat. Salvage logging, road building, and other human development in the riparian areas have occurred in areas inside and outside the resource area. These activities have altered the historic natural condition. Past fire suppression has occurred in recent years within and near the Deerfoot Resource Area. This has contributed to the continual increase in fuel loading on both dry and moist sites.

Effects of Roads: Road construction within the Deerfoot Resource Area has been extensive. Initial entry into the Deerfoot Resource Area occurred at the turn of the twentieth century. For example, the Ohio Match railroad bed was converted into its present day road condition. In all, there were approximately 115 miles of road; of these, about 49 miles are closed by vegetation (brushed in). Before watershed restoration efforts began in 1993, road densities ranged from 4.63 miles of road per square mile of area (mi/mi²) in Stump Creek to 8.51 mi/mi² in Jim Creek. Since then, approximately 32 miles of road have been decommissioned. Road densities across all the watersheds have decreased through restoration efforts, where currently they range from 2.94 mi/mi² in Jim Creek to 7.43 mi/mi² in Nilsen Creek (Table 3-AQ-1).

Effects of Fish Barriers: Waterfalls, channel flow intermittency, and some debris jams are part of the reference conditions that naturally and continually fragment aquatic habitats for various periods of time. In the resource area, high gradient stream reaches are the predominant form of natural barriers. Under the Douglas-fir Beetle Project (1999), work was implemented to remove known human-caused fish barriers in the Two Forks and Three Forks drainages, specifically on Road 1536.

Effects of Sediment Production and Delivery: Surface erosion and, to a much lesser extent, mass erosion are part of the natural reference conditions for sediment production and delivery of the streams within the resource area. Prior to fire suppression, wildfire frequently altered the structure and composition of forest stands within the area. At times site conditions following fires would coincide with wet climatic conditions in a season, year, or period of years that would trigger landslides or surface erosion. Other than topographic characteristics such as slope shape and drainage networks, there were no features such as roads on the landscape that would increase the potential for slope failures or surface erosion by intercepting, re-routing, and concentrating water. Other than hillslope rejuvenation caused by streams reaching a lower base elevation or channel migration, there was no major mechanism such as roads that could cause slope instabilities by undercutting or overburdening slopes.

Effects of Water Yield Increases: Rain-on-snow events occur throughout much of northern Idaho when strong warm moist weather fronts from the Pacific Coast invade during the winter months. These relatively warm and moisture-laden air masses cause mid-winter snowmelt, thaws and rainfall. Snow packs generally between 3,000 to 4,500 feet in elevation accumulate substantial snow in the winter and are often found to achieve isothermal conditions following prolonged warm, moist storm periods. In the Deerfoot Resource Area, the percentage of the drainages within this elevation range that is most prone to rain-on-snow events ranges from 13 percent (Stump Creek) to 70 percent (Mokins Creek; Table 3-AQ-1). Peak flows and water yield effects from the past timber harvest activities on both public and private managed lands for the watersheds in the Deerfoot Resource are still recovering. Following the ice storm of 1996 and subsequent Douglas-fir beetle outbreak, salvage of dead, down and damage timber occurred on both public and private lands, increasing peak flows and water yields in some of the watersheds. The majority of the timber harvest since 1990 has occurred on private land, with the heaviest timber removal occurring in Nilsen Creek subwatershed.

Effects of Land Development and Timber Management on Private Lands: These types of activities are principally located in the lowermost portions of each watershed analyzed for within this document and will continue to occur with or without the implementation of this project. These lands have experienced urban development due to timber harvest and roading. Effects from these actions (PF Doc. AQ-20) are similar to the effects described above in "water yield increases" and are accounted for in WATSED modeling, and are also described in the cumulative effects section.

On some private lands in the analysis watersheds, forested lands have been converted to agricultural development. These forms of activity include cultivation, home development, and grazing, where lands were developed in or near riparian areas (e.g. Yellowbanks, Mokins and Stump Creek subwatersheds).

C. Characterization of the Affected Environment

Designated Beneficial Uses in the Deerfoot Resource Area

The status of beneficial uses comes from Idaho Department of Health and Welfare, 1992 (PF Doc. AQ-R06). Beneficial uses in streams of the resource area include:

- *salmonid spawning and rearing habitat*
- *cold water biota*
- *primary contact recreation*
- *secondary contact recreation*
- *drinking water(domestic and agriculture)*

Impaired Waters

There are no streams within the cumulative effects analysis area being analyzed here for the Deerfoot Resource Area that are water quality limited or listed for any pollutant. All the streams in the Deerfoot Resource Area, except for Hayden Face Tributary, flow through private land in their lower reaches and then flow into Hayden Lake. Hayden Lake is identified as water quality limited (303d listed) for both nutrients and sediment. Water quality assessments in 1995 and 1996 concluded that human-caused phosphorus and sediment were causing water quality degradation (Hale et al. 1994; PF Doc AQ-R07).

Phosphorus is responsible for causing increased growth of aquatic plants and algae. Its source is from both septic systems and sediment from the lake's tributaries. A study by Skille and Lider (1988; PF Doc. AQ-R08) concluded that 69 percent of the lake's phosphorus is coming from tributaries and 73 percent of the tributaries' phosphorus is coming from Hayden Creek. A recent effort has been made to improve septic systems around the lake so that the primary source of phosphorus is likely to be from sediment. Hayden Lake Watershed Association is currently developing a Hayden Lake Watershed & Lake Management Plan Addendum that identifies likely sources of phosphorous loading into Hayden Lake for the TMDL. The largest contribution of phosphorous loading occurs from the Hayden Creek drainage (33 percent) and residential storm water (32 percent). In this draft plan, areas of reduction efforts have been identified through a collaborative process. The Forest Service, as a collaborator of these efforts, has begun to follow the TMDL-targeted implementation efforts to reduce phosphorous loading (i.e. Stump-Shamrock meadow restoration) and the monitoring plan.

The following outline is used to characterize the current conditions for each watershed in the analysis area:

- *Overview (size, topology, and past activities)*
- *Stream flow regime (peak flows, rain on snow sensitivity, equivalent clearcut area)*
- *Stream channel morphology (based on 2002 stream surveys)*
- *Water quality (number of inventories road channel crossings)*

Table 3-AQ-1. Summary of existing conditions for each watershed in the analysis areas (PF Doc. AQ-05 through AQ-09)

Subwatershed Name	Size (acres)	% NFS lands in subwatershed	Average Precipitation (inches/year)	% Subwatershed in Rain-on-Snow zone Zone	Average Road Density. NFS and Private Lands (miles/square mile)	% Sensitive landtypes in subwatershed	Water body identified as 303d water quality limited	Pollutant that is not meeting Water Quality Standard
Stump Creek	1,262	30	29	13	4.3	18	Hayden Creek	Not listed
Nilsen Creek	1,601	31	27	36	7.4	10	Hayden Lake	nutrients sediment
Mokins Creek	3,682	85	33	70	6.1	5	Hayden Lake	nutrients sediment
Jim Creek	959	80	26	43	2.9	3	Hayden Lake	nutrients sediment
Yellowbanks Creek	3,104	94	29	68	3.2	14	Hayden Lake	nutrients sediment

Conditions in the Stump Creek Subwatershed

Overview: Stump Creek is a 1,262-acre drainage that flows in a northerly direction to lower Hayden Creek just below the confluence of the East and North Forks of Hayden Creek. The lower reaches of Stump Creek flow through low gradient channel types. In this lower reach the floodplain is relatively broad (50 to 100 feet), banks are somewhat downcut and unstable. Some headcutting is occurring within the lower reach indicating the channel is out of equilibrium and is adjusting from past disturbances. The upper reaches are steep and have narrow confined valley bottoms, coarse gravel and cobble substrate and are relatively stable.

Stream Flow Regime: As described in the Geographic Assessment, past management activities have altered the flow regime in Hayden Lake Watershed and its tributaries, which includes Stump Creek. Extensive harvest and road-building have altered the timing, duration and magnitude of flows. Hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-R09; Jones and Grant 1996, PF Doc. AQ-R10; Brooks 1991, PF Doc. AQ-R11; Harr 1986, PF Doc. AQ-R12; Troendle and King 1983, PF Doc. AQ-R13). WATSED model results estimate that average monthly peak flows were about 3 percent above baseline conditions in the early 1980's, and have increased to approximately 9 percent in the year 2000 from recent harvest activity on both public and private lands. Stream flow conditions and hydrologic recovery are still responding to the most recent harvest activities, which occurred following the ice storm in 1996 and subsequent Douglas-fir beetle outbreak. For a more detailed discussion of processes and the interpretation of WATSED (see PF Doc AQ-01) and the Interpretation section of the WATSED project reports (PF Doc. AQ-10: Stump Creek WATSED).

Stream Channel Morphology: There are not many well used system roads within the subwatersheds in the resource area that are built immediately along stream banks or within the floodplain (encroaching roads). The headwaters are the primary areas where roads cross through stream channels; encroaching roads have the greatest influence on channel morphology. These areas have streams that are constricted with decreased ability for the channel to handle the increased streamflow. One area along lower Stump Creek has a short section of a streamside road that influences channel morphology (Roads 3090, 206, and 206-D). Channel pattern changes resulting from streamside roads may result in drastic and long-term changes to the stream flow and sediment routing regime. Additionally, streamside roads are subject to frequent or continual stress of flow against the road fill, particularly during peak discharges. These roads manifest frequent and chronic surface sediment to the stream. Other contributors to altered stream morphology are headwater road failures and downstream bank damage from unauthorized vehicle use; several of these sites were rehabilitated in 2006 (Figure 3-AQ-2). These factors have added sediment to the stream, reduced channel capacity and changed stream equilibrium. Sediment introduction through the years, including the February 1996 flood event have deposited in slower downstream segments, decreased channel capacity, and altered channel morphology from its natural state of equilibrium. Increased bedload supply and bed mobility can result from riparian harvest and may have also resulted in increases in stream bank erosion. Within the Stump Creek drainage the riparian zone has been influenced by past harvest, road construction and illegal motorized activity.

Figure 3-AQ-2. Lower Stump Creek, where user-created fords were rehabilitated in 2006.

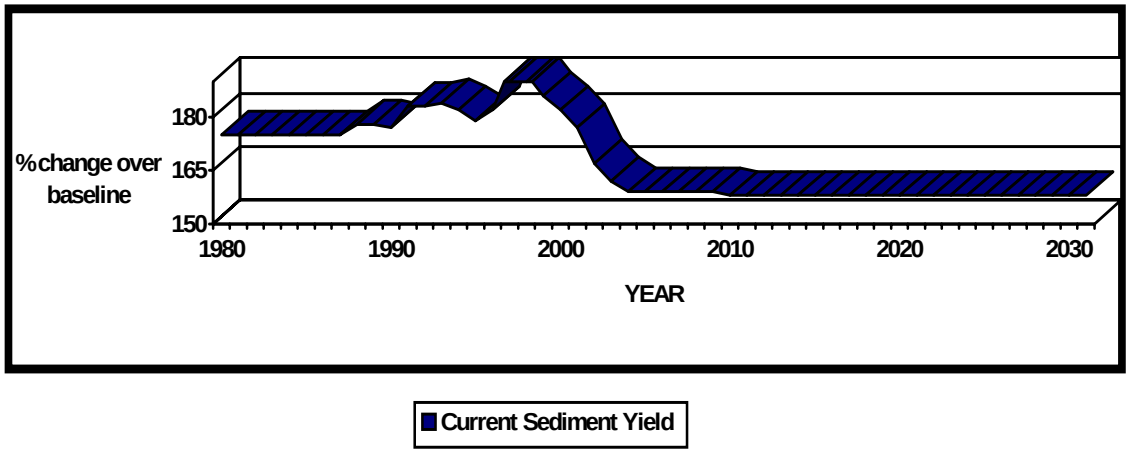
Water Quality: Prior to restoration efforts (see the table below), Stump Creek had a road density of 4.6 mile/mile^2; currently it has a road density of 4.3 mile/mile^2. This equates to a modeled reduction in sediment yield of 17 percent sediment yield (PF Doc. AQ-10: Stump Creek WATSED). Of the seven inventoried road-stream crossings, there is a risk of sediment delivery that could be routed and delivered downstream if these culverts were to plug and subsequently fail, particularly on roads that are no longer maintained. Fills at channel crossings without culverts may also fail because of exceptionally steep slopes and/or unstable soils.

Table 3-AQ-2. Sediment reduction from watershed restoration work in the Stump Creek subwatershed.

Year	Activity	Total percent reduction in sediment yield
1996 and 2006	Road Decommissioning and culvert removals (1996 road restoration efforts; 2006 instream and roads)	17 percent

There are approximately 1.54 miles of road per square mile area that fall on sensitive land types that are prone to high landslide potential, surface erosion, and/or sediment delivery (PF Doc. AQ-05). Bank erosion was evident along the lower Stump Creek channel, particularly in the lower drainage where the channel parallels Roads 206 and 437. The contributing factors discussed above have set the stage for the existing sediment yield values modeled within the Stump Creek subwatershed (Figure 3-AQ-3). However, as evident by the modeled sediment yield, past and recent restoration efforts within the watershed have reduced sediment considerably.

Figure 3-AQ-3. Existing Sediment Yield in the Stump Creek subwatershed. *Sediment modeling has accounted for watershed restoration (road decommissioning).*



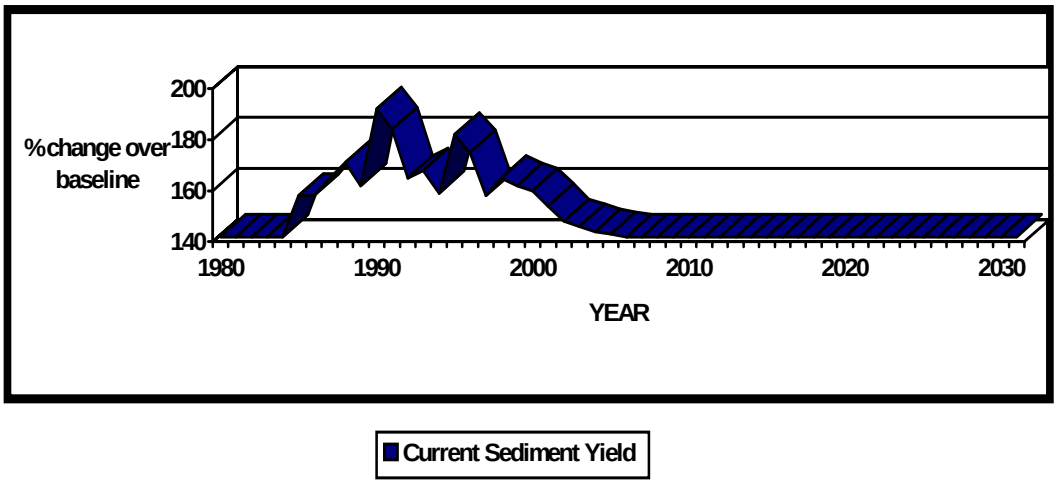
Conditions in the Nilsen Creek Subwatershed

Overview: The Nilsen drainage is 1,601-acre fourth-order stream that flows southwesterly into Hayden Lake. The valley side-slopes are steep (30 to 50 percent) and vegetated predominantly with conifers. The lower 1.5 miles of Nilsen Creek is characterized by a broad floodplain ranging from 100 to 200 feet in width. The upper-most reaches of this drainage is comprised of moderate to high gradient channels with narrow floodplains, 20 to 30 feet in width. Approximately 69 percent of the drainage is in private ownership, located within the lower portion of the drainage. Past harvest activities on National Forest System lands are largely comprised of salvage, with 29 acres of regeneration harvest. From aerial photos it was estimated that harvest activities have occurred on over 600 acres of the private land within this watershed.

Stream Flow Regime: Past management activities have altered the flow regime in Nilsen Creek, as described in the Geographic Assessment regarding the whole Hayden Lake watershed. Extensive private harvest and road-building have altered the timing, duration and magnitude of flows. Hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-R09; Jones and Grant 1996, PF Doc. AQ-R10; Brooks 1991, PF Doc. AQ-R11; Harr 1986, PF Doc. AQ-R12; Troendle and King 1983, PF Doc. AQ-R13). WATSED model results estimate that average monthly peak flows were about 4 percent above baseline conditions in the early 1980's, and have increase to a maximum of 29 percent in the year 1995 from private harvest activity throughout the 1990's. Stream flow conditions and hydrologic recovery are still responding to these recent activities as vegetative recovers. For a more detailed discussion of processes and the interpretation of WATSED (see PF Doc AQ-01) and the Interpretation section of the WATSED project reports (PF Doc. AQ-11: Nilsen Creek WATSED).

Stream Channel Morphology: The channel condition in the lower reaches show deposition of gravel, and cobbles and indications of high sediment movement from a either headwater disturbances or in-stream bank erosion or a combination of both. There is also frequent bank erosion along the lower reaches of Nilsen Creek.

Figure 3-AQ-4. Existing Sediment Yield in the Nilsen Creek subwatershed. *Sediment modeling has accounted for watershed restoration (road decommissioning).*



Water Quality: There are approximately 7.4 miles/mile^2 of road within the Nilsen Creek drainage. Of the nine inventoried road-stream crossings, there is a risk that sediment delivery could be routed and delivered downstream if these culverts were to plug and subsequently fail, particularly on roads that are no longer maintained. Fills at channel crossings without culverts may also fail because of exceptionally steep slopes and/or unstable soils.

There are approximately 1.1 miles/mile^2 of existing roads that fall on sensitive land types. These land types are prone to high landslide potential, surface erosion, and/or sediment delivery. No watershed restoration has occurred within the Nilsen Watershed to date; however there is a modeled reduction of sediment yield over time due to natural processes (Figure 3-AQ-4).

Conditions in the Mokins Creek Subwatershed

Overview: Mokins Creek, including its two main tributaries (Two Forks and Three Forks) is a 3,682-acre watershed. The mainstem of Mokins Creek is approximately 5.5 miles in length before entering Hayden Lake. High road densities exist in the headwaters of this drainage and contribute to accelerated runoff, erosion, and introduction of fine sediment into the lower reaches of the stream. Field reviews in 1995 and again in 2002 indicated that the stream has been impacted by off-road vehicles operating within the riparian zone and by roads and trails in the uplands which can contribute fine sediment to the channel.

Stream Flow Regime: Past management activities have altered the flow regime in Mokins Creek as described in the Geographic Assessment for all of the Hayden Lake Watershed. Extensive harvest and road-building have altered the timing, duration and magnitude of flows. Hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-R09; Jones and Grant 1996, PF Doc. AQ-R10; Brooks 1991, PF Doc. AQ-R11; Harr 1986, PF Doc. AQ-R12; Troendle and King 1983, PF Doc. AQ-R13). WATSED model results estimate that average monthly peak flows were about 7 percent above baseline conditions in the early 1980's, and increased to 10 percent following the Douglas fir beetle outbreak. Stream flow conditions and hydrologic recovery are responding slowly to past activities in the late 1980's as vegetative recovers. For a more detailed discussion of processes and the interpretation of WATSED (see PF Doc AQ-01) and the Interpretation section of the WATSED project reports (PF Doc. AQ-12: Mokins Creek WATSED).

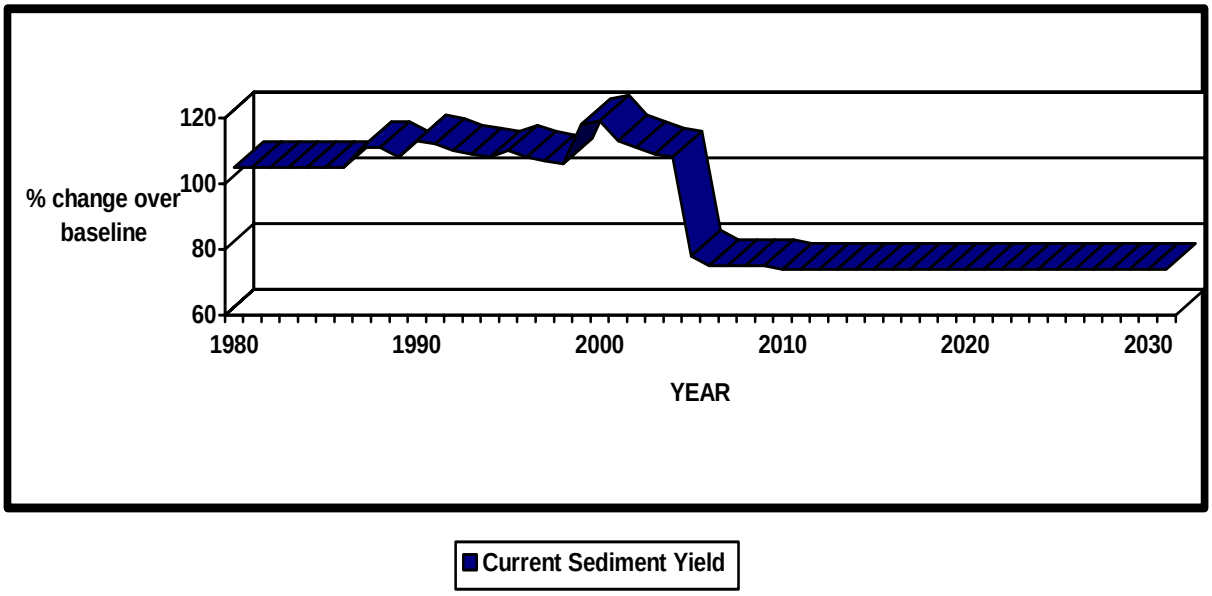
Stream Channel Morphology: Three Forks and Two Forks are narrow steep streams with gradients from 5 to 12 percent. Gravel, cobble substrate is easily transported with high flows and little to no bank erosion is detectable. A high degree of bedload deposition is evident in small backwater areas, behind woody debris, or in short low gradient areas. The downstream portions of Mokins Creek shows bank erosion and channel down cutting.

Table 3-AQ-3. Sediment reduction from watershed restoration work in the Mokins Creek subwatershed.

Year	Activity	Total percent reduction in sediment yield
2005	Road decommissioning	30

Water Quality: Prior to road decommissioning, Mokins Creek had a road density of 7.3 mile/mile^2; currently it has a road density of 6.1 mile/mile^2. This equates to a modeled reduction in sediment yield of 30 percent (Table 3-AQ-3). With 27 inventoried road-stream crossings in Mokins Creek, there is a risk of sediment delivery that could be routed and delivered downstream if these culverts were to plug and subsequently fail, particularly on roads that are no longer maintained. Fills at channel crossings without culverts may also fail because of exceptionally steep slopes and/or unstable soils. There are approximately 0.15 mile/mile^{2}of existing roads that fall on sensitive land types. These land types are prone to high landslide potential, surface erosion, and/or sediment delivery. Some restoration and culvert upgrades occurred in the mid-1990's to the mid 2000's within the watershed, reducing overall sediment yields (Figure 3-AQ-5).

Figure 3-AQ-5. Existing sediment yield in the Mokins Creek subwatershed. *Sediment modeling has accounted for watershed restoration (road decommissioning).*



Conditions in the Jim Creek Subwatershed

Overview: Jim Creek is a small subwatershed (959 acres) that flows into Hayden Lake. The floodplain widths are 10 to 20 feet in the headwaters and 30 to 40 feet in the lower reaches. Only the lower two to three miles are perennial, with an average bankfull channel width of two to three feet.

Stream Flow Regime: Past management activities have altered the flow regime in Jim Creek as described in the Geographic Assessment for all of the Hayden Lake Watershed. Extensive harvest and road-building have altered the timing, duration and magnitude of flows. Hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-R09; Jones and Grant 1996, PF Doc. AQ-R10; Brooks 1991, PF Doc. AQ-R11; Harr 1986, PF Doc. AQ-R12; Troendle and King 1983, PF Doc. AQ-R13). WATSED model results estimate that average monthly peak flows were about nine percent above baseline conditions in the early 1980s, and increased to 15 percent in the mid 1990s. Stream flow conditions and hydrologic recovery are responding slowly to past activities in the late 1970s as vegetation recovers. For a more detailed discussion of processes and the interpretation of WATSED see PF Doc. AQ-01 and the Interpretation section of the WATSED project reports (PF Doc. AQ-13: Jim Creek WATSED).

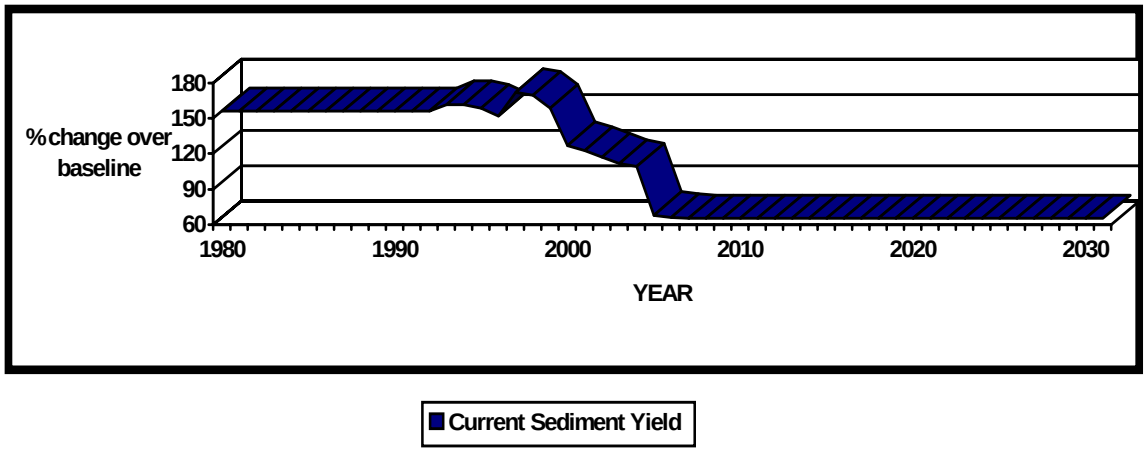
Table 3-AQ-4. Sediment reductions from watershed restoration work in the Jim Creek subwatershed.

Year	Activity	Total percent reduction in sediment yield
1996, 2000 and 2005	Road decommissioning and culvert removals	91

Stream Channel Morphology: Jim Creek has a moderate valley gradient that begins to become a narrow steep drainage with gradients from 7 to 14 percent at mid- and upper-channel elevations. Gravel, cobble substrate is easily transported with high flows and little to no bank erosion is detectable. A high degree of bedload deposition is evident and visible only behind woody debris that spans the channel width. The downstream portions of Jim Creek shows very little bank erosion and channel down cutting.

Water Quality: Prior to restoration efforts (1993-2005; e.g. road decommissioning/culvert removal) Jim Creek had a road density of 9.5 mile/mile^2; currently it has a road density of 2.9 mile/mile^2. This equates to a modeled reduction of 91 percent decrease in sediment yield (Table 3-AQ-4). There are five inventoried road-stream crossings in Jim Creek, with a risk of sediment delivery that could be routed and delivered downstream if these culverts were to plug and subsequently fail, particularly on roads that are no longer maintained. Fills at channel crossings without culverts may also fail because of exceptionally steep slopes and/or unstable soils. There are approximately 0.8 mile/mile^2 of existing roads that fall on sensitive land types. These land types are prone to high landslide potential, surface erosion, and/or sediment delivery. Some restoration and culvert upgrades have occurred in the mid-1980s with past timber activities reducing sediment yield to it modeled existing condition (Figure 3-AQ-6).

Figure 3-AQ-6. Existing sediment yield in the Jim Creek subwatershed. *Sediment modeling has accounted for watershed restoration (road decommissioning).*



Conditions in the Yellowbanks Creek Subwatershed

Overview: Yellowbanks Creek is one of the largest streams within the resource area. The drainage is 3,682 acres with approximately 94 percent of the watershed on National Forest System lands. The valley side-slopes are steep (30 to 50 percent) and vegetated predominantly with conifers. The lower mile of this stream flows through private land with a broad floodplain (100 to 300 feet). The very lower half-mile of Yellowbanks Creek is often dry with only subsurface flow in late summer. The middle reaches of this stream have medium-width floodplains of 50 to 75 feet and vigorous riparian vegetation consisting of wet site conifers of all age classes such as cedar hemlock and grand fir. High road densities exist in the headwaters of this drainage and contribute to accelerated runoff, erosion, and introduction of fine sediment into the lower reaches of the stream.

Stream Flow Regime: Past management activities have altered the flow regime in Yellowbanks Creek as described in the Geographic Assessment for all of the Hayden Lake Watershed. Extensive harvest and road-building have altered the timing, duration and magnitude of flows. Hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-R09; Jones and Grant 1996, PF Doc. AQ-R10; Brooks 1991, PF Doc. AQ-R11; Harr 1986, PF Doc. AQ-R12; Troendle and King 1983, PF Doc. AQ-R13). WATSED model results estimate that average monthly peak flows were about eight percent

above baseline conditions in the early 1980s, and have not yet declined. Stream flow conditions and hydrologic recovery are responding slowly to past activities in the 1970s as vegetation recovers. For a more detailed discussion of processes and the interpretation of WATSED (see PF Doc AQ-01) and the Interpretation section of the WATSED project reports (PF Doc. AQ-14: Yellowbanks Creek WATSED).

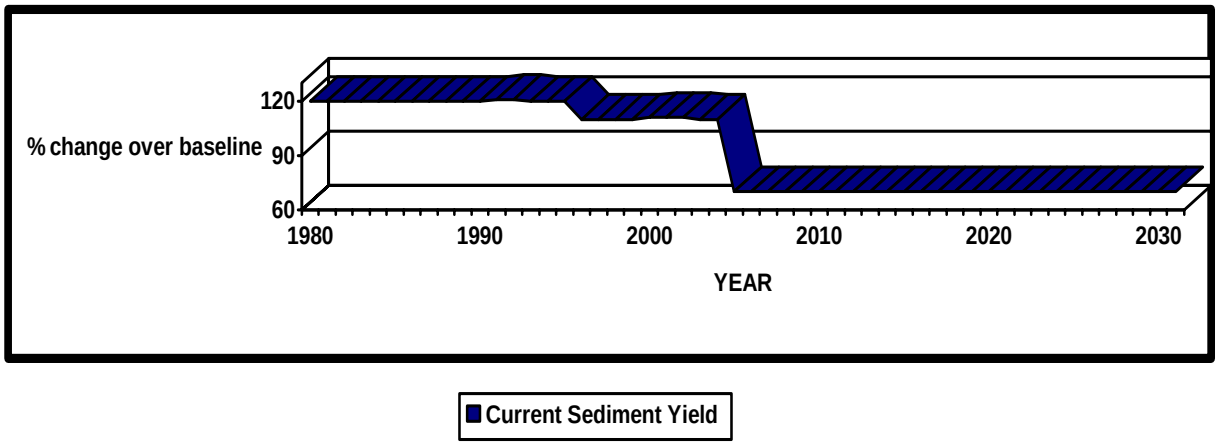
Stream Channel Morphology: Channel aggradation and large amounts of bedload movement is evident from the delta that has formed at the mouth, where the stream joins Hayden Lake. Gravel and cobble substrate is easily transported with high flows and little to no bank erosion is detectable. A high degree of bedload deposition is evident in the middle reaches of this stream within small backwater areas, lateral bars, and especially behind woody debris that spans the channel. The deposition of cobbles and gravels in the middle and lower reaches of Yellowbanks Creek have caused the channel to be relatively wide and shallow in some locations. The upper reaches are relatively steep (5 to 12 percent), have small narrow channels with coarse gravel and cobble substrate, and are relatively stable.

Table 3-AQ-5 Sediment reduction from watershed restoration work in the Yellowbanks Creek subwatershed.

Year	Activity	Total percent reduction in sediment yield
1993-2005	Road Decommissioning	50

Water Quality: Prior to restoration efforts (e.g. road decommissioning/culvert removal) in the mid-1990s to mid-2000s, Yellowbanks Creek subwatershed had a road density of 6.4 mile/mile^2; currently it has a road density of 3.2 mile/mile^2. This equates to a modeled reduction in sediment yield of 50 percent (Table 3-AQ-5). With 11 inventoried road-stream crossings in Yellowbanks Creek, there is a risk of sediment delivery that could be routed and delivered downstream if these culverts were to plug and subsequently fail, particularly on roads that are no longer maintained. Fills at channel crossings without culverts may also fail because of exceptionally steep slopes and/or unstable soils. There are approximately .46 miles of road per square mile of area that fall on sensitive land types. These land types are prone to high landslide potential, surface erosion, and/or sediment delivery.

Figure 3-AQ-7. Existing Sediment Yield in the Yellowbanks Creek subwatershed. *Sediment modeling has accounted for watershed restoration (road decommissioning).*



Conditions in the Hayden Face Subwatershed

Overview: Hayden Face is a small subwatershed (276 acres) with two small intermittent streams that flow into Hayden Lake. The floodplain is 10 to 20 feet wide in the lower reaches and 5 to 10 feet wide in the upper reaches. Past harvest activities in the headwaters of this drainage have contributed to accelerated runoff, erosion, and introduction of fine sediment into the lower reaches of the streams.

Stream Flow Regime: Past management activities have altered the flow regime in Hayden Face subwatershed as it has for all of Hayden Lake Watershed in the Geographic Assessment. Past harvest and road-building have altered the timing, duration and magnitude of flows. Hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-R09; Jones and Grant 1996, PF Doc. AQ-R10; Brooks 1991, PF Doc. AQ-R11; Harr 1986, PF Doc. AQ-R12; Troendle and King 1983, PF Doc. AQ-R13).

Stream Channel Morphology: The stream channel is small and changes are difficult to observe or measure in the small intermittent channels of Hayden Face subwatershed. Some recent deposition and movement of cobble/gravel is evident in the lower reaches of these small stream channels. No bank erosion is visible.

Water Quality: There are approximately 3.19 miles/mile^2 of roads within the Hayden Face drainage. There is no riparian road encroachment within this subwatershed. There is only 0.94 mile of road; due to road location it is unlikely that there are any high risk stream/road crossings. There are no existing roads that fall on sensitive land types. Watershed restoration has occurred in the headwaters, removing 0.4 mile of road.

Rain-on-Snow Events and Watershed Responses

Northern Idaho experiences a strong maritime influence with warm moist weather fronts invading in the winter from the Pacific Coast. These relatively warm and moisture-laden air masses are frequent and have a profound effect on the climate and hydrology of the Coeur d'Alene Mountains. As a result, midwinter snowmelt, thaws, and rainfall are common in the region. In northern Idaho, the snow pack within the 3,000 to 4,500-foot elevation range is most susceptible to rain-on-snow events. The Deerfoot Resource Area has approximately 6,049 acres (56 percent) in this susceptible rain-on-snow zone, that ranges from 13 to 70 percent by watershed analyzed (Table 3-AQ-1; PF Doc. AQ-15 and AQ-16). Below 3,000 feet, the snow pack often may accumulate and abate several times during the season and not be a substantial contributor to overall basin runoff. Many years the snow pack above about 4,500 feet is usually "cold" and less susceptible to rain-on-snow events. Rain-on-snow is a natural process under which the streams of the basin developed. The historic streams of the basin were very stable and resilient because they developed in response to the variability of the climatic processes and the dominant geology of the basin. Rain-on-snow events probably did not cause the loss of mainstream equilibrium historically. Changes in vegetation and subsequent alteration (i.e. roads) of natural hydrological pathways in this zone or natural events can affect the magnitude of rain-on-snow events.

Before human disturbance, rain-on-snow events always occurred but probably did not have the same effect on stream channel equilibrium as they did during the 1950s through the 1980s, when clearcutting and associated road construction were predominant activities. As a matter of process, clearcutting opened up stands, affecting wind and microclimates, which increased the melting effects from rain-on-snow. In association with this vegetative management, road construction occurred which provided a break in hydrological continuity along which this runoff was routed, that results in entrained sediment. Road-stream crossings channel more water into stream networks and introduce more sediment into the streams from road and culvert failures during a rain-on-snow event.

Sensitive Landtypes

Different geological landtypes exist within each of Deerfoot Resource Area watersheds, and each landtype is geologically coded and described by its composition. Some landtypes are more prone, or sensitive, to erosion based on their geological composition. Sensitive landtypes are those identified as having a combination of slope instability (i.e. rated mass failure potential; PF Doc. AQ-17) and sediment delivery capability (i.e. riparian areas; PF Doc. AQ-18) that exhibit high erosion rates under disturbances. With higher delivery efficiencies can deliver the erosion products to the water system within the watershed. The percentage of sensitive landtypes in each watershed is found in Table 3-AQ-1 (PF Doc. AQ-19). The geological parent material in most subwatersheds is influenced by a belt-series geology having low surface erosion potential in the Deerfoot Resource Area.

D. Fisheries

Overview

The cumulative effects areas contain approximately 11.5-miles of a fish-bearing stream, which is contained within the Hayden Lake basin. Fish species that inhabit or potentially inhabit streams in the Hayden Lake Basin include native populations of westslope cutthroat (*Oncorhynchus clarki lewisi*), mountain whitefish (*Prosopium williamsoni*), northern pike minnow (formerly squawfish; *Ptychocheilus oregonensis*), large-scale sucker (*Catostomus macrocheilus*), sculpin (*Cottus spp*.; primarily slimy sculpin, *C. cognatus*, and possibly torrent sculpin, *C. rhotheus*), and longnose dace (*Rhinichthys cataractae*).

Introduced fish species include populations of rainbow trout/Kamloops (*O. mykiss*); eastern brook trout (*S. fontinalis*); brown trout (*Salmo trutta*), kokanee (*O. nerki);* and redside shiner (*Richardsonius balteatus*). Several types of introduced warm water species also inhabit Hayden Lake that include: small (*Micropterus dolomieu)* and largemouth bass (*M. salmoides*), northern pike (*Esox lucius*), sunfish (*Lepomis gibbosus*), perch (*Perca flavescens*), and crappie (*Pomoxis nigromaculatus*). The creation of hybrid fish between native westslope cutthroat trout and exotic rainbow trout may be present (Table 3-AQ-6).

Table 3-AQ-6. Stocking records (Idaho Fish & Game) snorkel and electrofishing records (Idaho Fish & Game and USDA Forest Service) for subwatersheds in the Deerfoot Resource Area analysis. *IDF&G stocking data was gathered using a search engine located on the website: http://www2.state.id.us/fishgame/ (PF Doc. AQ-R14).*

Stream	Species*	Information Source	Date of Sample	Species (Year) Fish Stocked by IDF&G**
Stump	EBT/WCT/RB/ Sculpin/WCTxRB Hybrids	Forest Service	2002	-----
Nilsen	WCT/EBT	Forest Service	2005	-----
Mokins	WCT	Forest Service	2002/2005	CT/RB (1968-73)
Two Forks Three Forks	Unk. Trout Unk. Trout	Forest Service Forest Service	1984; 1998 1984; 1998	-----
Yellowbanks	WCT WCT/RB/RBxWCT WCT	IDF&G Forest Service Forest Service	1980s 2002 2005	CT/Kamloops (1982 & 1984)
Jim	WCT	Forest Service	2005	-----
Hayden Lake				CT/RB/Kamloops/Trout Hybrids/Kokanee/Bass/Other Salmon (1968-2002)

** WCT/CT = westslope cutthroat trout; RB = rainbow trout; EBT = eastern brook trout; Unk. = Unknown.*

***IDF&G stocking data was gathered using a search engine located on the website: http://www2.state.id.us/fishgame/.*

Streams listed in the above table flow into other fish-bearing waterways; specifically, Hayden Creek and Hayden Lake. Given the scope and ensuing analysis of this project, it was determined that cumulative effects would not be detected in Hayden Creek or Hayden Lake. Non-fish-bearing perennial and intermittent streams occur within the resource area, but are not named on Forest Service topographic maps.

The analysis of direct, indirect, and cumulative effects to fish is based on effects to sensitive and management indicator fish species (MIS). Under this concept, larger groups of organisms or communities are believed to be adequately represented by a subset of the group. The Forest Plan identifies westslope cutthroat trout, bull trout, and rainbow trout as potential Management Indicator Species (MIS) for fisheries (Forest Plan Appendix L). Current MIS, westslope cutthroat and rainbow trout are known to utilize streams within the cumulative effects area for spawning, rearing, and over-wintering. They have nearly similar habitat needs. Consequently, westslope cutthroat and rainbow have been selected as appropriate MIS for the fisheries analysis of this project.

A brief description of bull trout will be included below because it is listed as threatened under the Endangered Species Act (1973). However there is no set or sub-set of data that has identified bull trout in the Hayden Lake basin, hence it will be recognized as listed within its larger geographical area for this document. Nor has there been any privately owned stream segment in the subwatersheds designated as critical habitat (Federal Register, October 6, 2004, 50 CFR Part 17; http://www.fws.gov/pacific/bulltrout; PF Doc. AQ-R01).

White sturgeon, burbot, and interior redband are found only to naturalize in the Kootenai River system, possibly large tributaries (e.g., Yaak River for sturgeon and burbot) and smaller tributaries (e.g. interior redband trout). Hence these species of fish will be given no further analysis within the context of this document since they do not naturally inhabit the Hayden Lake Basin or its tributaries.

Threatened and Endangered Species - Bull Trout

Bull trout, listed under the Endangered Species Act as a threatened species, are not known to reside in the Hayden Lake Basin. Streams within the Deerfoot Resource area have been surveyed for fish occupancy; bull trout were not found and have never been documented through these survey efforts. The Governor's Bull Trout Plan (1996; PF Doc. AQ-R02); historical data for the lake basin (IDF&G and USFS); and the recovery plan does not identify the Hayden Lake basin as being occupied by bull trout.

Sensitive Species - Westslope Cutthroat Trout

Westslope cutthroat trout are listed as "sensitive" by Region 1 of the USDA Forest Service and are listed as a "species of special concern" by the State of Idaho. In addition, the U.S. Fish and Wildlife Service (USFWS) list westslope cutthroat trout as a "species of concern" with respect to section 7(c) of the 1973 Endangered Species Act (ESA; USDI 2002; PF Doc. AQ-R15). The USFWS lists westslope cutthroat trout as to occur, potentially occur, and/or its habitat exists within the portion of the Idaho Panhandle National Forests where activities could be implemented in the Deerfoot Resource Area. But first, a brief history is necessary to ascertain the background of status reviews on westslope cutthroat:

> *On two separate occasions (1997 and 1998) petitioners petitioned to list westslope cutthroat trout as threatened. On June 10, 1998, the USFWS published a Federal Register notice announcing a 90-day finding that an amended petition to list the westslope cutthroat trout as threatened under the Endangered Species Act, where substantial information was provided to indicate that such a listing may be warranted. After review, the USFWS concluded in April 2000 that listing westslope cutthroat trout as a threatened or endangered species under the act was not warranted at that time.*
>
> *However, in 2001 the court ordered USFWS to review the status of westslope cutthroat trout based on three key points. In response, on September 3, 2002 in the Federal Register (vol. 67, #170: 50 CFR Part 17), the USFWS set forward a notice of intent to prepare a status review for the westslope cutthroat trout. In summary, the USFWS announced the initiation of a new status review for the westslope cutthroat trout in the U.S. pursuant to a recent court order and the Endangered Species Act of 1973, as amended.*

> *After a thorough review of all the available scientific information (Shepard et al 2003 PF Doc. AQ-R16), the USFWS reaffirmed their previous decision t*hat th*e westslope cutthroat trout did not warrant listing as a threatened species because abundant, stable, and reproducing populations remain well distributed throughout its historic range.*

Westslope cutthroat trout have been identified in nearly all perennial fish-bearing streams in the Deerfoot Resource Area. Unknown variations of cutthroat trout and other salmonids have been previously stocked in Mokins and Yellowbanks Creeks in the 1970s and 1980s (Table 3-AQ-6) by Idaho Department of Fish and Game. However, the populations that resided there prior to the introductions were likely native westslope cutthroat trout.

There are three possible life-history forms that westslope cutthroat trout could exhibit within the Hayden Lake basin. These are adfluvial, fluvial, and resident forms (see Acronyms/Glossary). The two most likely life forms within the Deerfoot Resource Area are resident and adfluvial fish. The resident forms are most likely present in the smaller headwater streams (e.g. Two Forks and Three Forks). Adfluvial fish are likely present within the larger Hayden Lake, using the stream habitat for spawning and rearing. Westslope cutthroat trout are spring spawners (April – June). There is a possibility that they can utilize more habitat than fall spawning salmonids, principally due to higher water conditions creating more habitat and greater access.

The preferred habitat of westslope cutthroat trout is cold, clear streams with rocky, silt-free riffles for spawning and slow, deep pools for feeding, resting, and over-wintering (Reel et al. 1989; PF Doc. AQ-R17). Pools are a particularly important habitat component as cutthroat trout occupy pool habitat more than 70 percent of the time (Mesa 1991; PF Doc. AQ-R18). Other key features of westslope cutthroat habitat are large woody debris (LWD) for persistent cover and habitat diversity as well as small headwater streams for spawning and early rearing.

A population status review of westslope cutthroat trout in Idaho has determined that populations in northern Idaho have declined over their historic distribution with viable populations existing in only 36 percent of the original Idaho range. The primary cause of the decline was found to be habitat degradation (Rieman and Apperson 1989; PF Doc. AQ-R19). The most recent status review in 2002 for westslope cutthroat trout (WCT) in the United States indicated they currently occupy 59 percent of historical habitat (Shepard et al 2003; PF Doc. AQ-R16). They found that within Idaho, WCT currently occupy 95 percent of historical habitat. Of the total miles of occupied habitat, 29 percent support populations that are believed to be at or near the habitat's potential capacity and 28 percent support populations below capacity. Many of these populations have hybridized with rainbow trout. This status review indicated that currently 10 percent of the occupied habitats are not introgressed (Shepard et al 2003; PF Doc. AQ-R16). Currently within the scientific community there are ongoing discussions as to the levels of hybridization and how this relates to the status of westslope cutthroat trout and management of the species and habitats.

Management Indicator Species (MIS) – Rainbow Trout

Rainbow trout are found in 100 percent of the 4th code HUCs and nearly all of 6th code HUCs on the IPNF. Due to its economical value as a priority sportsfish by the IDF&G (though coastal strain is introduced) and recognized as a Management Indicator Species in the IPNFs Forest Plan, the issue of species presence in the Deerfoot Resource Area is addressed.

The effects on rainbow trout will be addressed similar to westslope cutthroat as described in the above section.

Reference Condition for Fisheries

The reference condition for fish habitat is based on reference reaches in Stump, Nilsen, Mokins, Yellowbanks, and Jim Creeks, historic information, knowledge of basic ecological processes, and professional judgment. Physical attributes of fish habitat are mainly defined by stream channel condition.

Salmonids generally require cool, clear water, clean gravel substrates; well-vegetated banks for shading and bank stability; abundant instream cover such as boulders, logs, and undercut banks; and unobstructed migratory corridors (Bjornn and Rieser 1991; PF Doc. AQ-R20).

The historic distribution of westslope cutthroat in the tributaries within the Deerfoot Resource Area is speculated, but no known natural mainstem barriers would have limited access (except headwater stream gradient). If adfluvial or stocks of westslope cutthroat trout were present they would utilize main channel and headwater habitat with resident forms. Several data sources have identified westslope cutthroat within the Hayden Lake basin. These include USFS and IDF&G records that indicate that westslope cutthroat trout have been identified within the system and that other species of salmonids have been historically stocked in the Hayden Lake basin (Table 3-AQ-6). Historical plantings of eastern brook trout are not known (pre-1960) in the Hayden Lake basin, but may have been likely the result of legal and/or illegal stocking. Historical planting of several species has occurred within the basin by IDF&G (Table 3-AQ-6), and these fish utilize several tributaries in the resource area.

Existing Condition for Fisheries

Stream Channel Characteristics: Stream habitats are influenced by woody debris constrictions and local confinement, which typically produce scour pools and riffles. Streambank erosion rates are normally low as are channel aggradation and degradation process rates. For a complete review of each watersheds condition see "Conditions of each respective Subwatershed in Watershed Section."

Stream temperature data from 2001 and 2002 show that temperature requirements for cold-water biota (i.e. salmonids) are being met. Cold-water aquatic life (i.e. salmonids) is being met in all tributaries.

Fish Populations: Populations of rainbow, westslope cutthroat, and rainbow-cutthroat trout hybrids inhabit Stump, Nilsen, Mokins, Yellowbanks, and Jim Creeks and their respective tributaries (Table 3-AQ-6). Westslope cutthroat, eastern brook, rainbow, westslope cutthroat rainbow hybrids, and sculpin *spp*. densities were calculated from electrofishing samples in 2002 and for select repeat sites in 2005. For example densities for westslope cutthroat ranged from 14 cutthroat trout/100m^2 in Jim Creek to 32 cutthroat trout/100m^2 in Mokins Creek.

Habitat: Fisheries habitat data was collected in Stump, Nilsen, Mokins, Yellowbanks and Jim Creeks in 2002 and 2005. All hardcopy field data is located within the project file for this project as the information was disseminated within the write-ups below for each watershed analyzed. This data is summarized below for each of the subwatersheds for this project to describe the existing conditions.

Fish habitat in Stump Creek: Stump Creek is approximately 2.5 miles in length before entering Hayden Creek. The Stump Creek drainage has experienced past levels of harvest activity, including harvest in or near the riparian area. Several small intermittent and perennial non-fish bearing tributaries feed Stump Creek for its entire length (see resource area map). Stream channel habitat and morphology were evaluated by establishing a reference reach that can be repeatable using modified R1/R4 (Overton et al. 1997; PF Doc. AQ-R05) stream survey methodologies; Stream Channel Reference Sites (Harrelson et al. 1994; PF Doc. AQ-R21) guide and large woody debris (LWD) collections. A modified R1/R4 stream survey (Overton et al. 1997; PF Doc. AQ-R05), protocol was used to sub-sample an identified monitoring reach and collect important variables (e.g. LWD information; pool, riffle, and run habitat information; pool volume, etc.).

Forest Service stream survey crews conducted electrofishing in Stump Creek in 2002 to determine fish density and presence/absence data. Due to the difficulty of accurate field separation, westslope cutthroat and rainbow trout are demonstrated as hybrids for overall density (PF Doc AQ-21). These surveys showed that, rainbow/westslope cutthroat trout hybrids dominated all other salmonid species collected (32 fish/100m^2), followed by eastern brook trout. It is unknown if eastern brook trout were stocked in Stump Creek (or Hayden Lake pre-1967 – IDF&G data), but rainbow were planted in the basin (Table 3-AQ-6; Fish Stocking

Database (http://www2.state.id.us/fishgame). Other non-salmonid species have been identified within Stump Creek, these include sculpin spp.

Adfluvial and/or resident forms of westslope cutthroat are likely in Stump Creek watershed. Historical introductions or stocking of rainbow trout, invasion of habitat by eastern brook trout along with the compounding effects of past natural (i.e. fire) and human management activities in the Hayden Lake basin have combined to likely develop the fish and fish habitat in the watersheds.

Over one-third (34 percent) of Stump Creek lies within private landownership that has been intensively managed and developed (i.e. agricultural development; see Aquatics Ongoing and Reasonably Foreseeable Activities Section). Stream temperatures were documented by USFS (2002; PF Doc. AQ-22) in the lowermost section of Stump Creek, near its confluence with Hayden Creek.

Stump Creek was surveyed in the lowermost portion of the drainage to establish a long term monitoring site (PF Doc. AQ-23). The Stump Creek monitoring site survey identified two different types of Rosgen (1996; PF Doc. AQ-R22) stream channel types. Overall, Stump Creek had a high pool to riffle ratio (approximately 1:1; PF Doc. AQ-24) in this monitoring reach, 20 percent of pools sampled were formed by large woody debris (LWD). Single LWD pieces within the monitoring site exceeded 35-pieces/100 meters. Most single LWD pieces surveyed were either very small in length and diameter (83.3 percent; Class I) or associated with pieces that bridged the channel (16.7 percent; Class VII; PF Doc. AQ-24).

The Stump Creek monitoring site survey data indicated the following: 1) fish density was relatively high; 2) channel stability at cross-sections was in fair condition; 3) pool-to-riffle ratio was high; and 4) LWD class was small in length and diameter and few aggregates exist.

Fish habitat in Nilsen Creek: Nilsen Creek is approximately three miles in length before entering Mokins Bay (Hayden Lake). The Nilsen Creek drainage has experienced past levels of harvest activity, including harvest near and in riparian areas. Several small intermittent and perennial non-fish bearing tributaries feed Nilsen Creek for its entire length (see Figure 3-AQ-1). In 2005, electrofishing surveys were conducted in Nilsen Creek where westslope cutthroat and eastern brook trout were found at densities of 21 fish/100 square meters ($m^{2)}$ and 2 fish/100m^2, respectively (Table 3-AQ-6; PF Doc. AQ-25).

Nilsen Creek has no known natural barriers that would impede adfluvial and/or resident forms of westslope cutthroat from utilizing habitat in the drainage. However, there is likely a man-caused barrier on private land due to a culvert crossing. Historical introductions or stocking of rainbow trout in Hayden Lake, invasion of habitat by eastern brook trout; along with the compounding effects of natural and human management activities in the Hayden Lake basin have likely combined to affect fish populations and/or spawning and rearing habitat. Of all watersheds analyzed in the Deerfoot Resource Area area, Nilsen Creek contains the largest portion of private land ownership (68.6 percent), to which most has been intensively managed and developed (see Section 3.4.3, Part A discussions of the effects of past activities on aquatic resources).

Fish habitat in Mokins Creek: The mainstem of Mokins Creek is approximately 5.5 miles in length before entering Mokins Bay (Hayden Lake). This does not include its headwaters tributaries (Two Forks and Three Forks Creeks) which are treated separately below. Mokins Creek encompasses an area of 5.75 square miles, and has experienced past levels of harvest activity, including harvest near and in riparian areas. Several small intermittent and perennial non-fish bearing tributaries feed Mokins Creek for its entire length. Stream channel habitat and morphology were evaluated by establishing a reference reach that is repeatable using modified R1/R4 (Overton et al. 1997; PF Doc. AQ-R05) stream survey methodologies, Stream Channel Reference Sites (Harrelson et al. 1994; PF Doc. AQ-R21) guide and large woody debris (LWD) collections. A modified R1/R4 stream survey (Overton et al. 1997; PF Doc. AQ-R05), protocol was used to sub-sample an identified monitoring reach and collect important variables (e.g. LWD information; pool, riffle, and run habitat information; pool volume, etc.).

Forest Service stream survey crews conducted electrofishing in Mokins Creek in 2002 and 2005 to determine fish density and presence and absence data. Additional electrofishing surveys in Mokins Creek were

conducted by the Idaho Department of Fish of Game in 1984. In both the 2002 and 2005 electrofishing surveys (PF Doc AQ-26 and AQ-27), westslope cutthroat trout were the only salmonid species collected (16 and 33 fish/100m^2 respectively), followed by sculpin species. Adfluvial and/or resident forms of westslope cutthroat are likely in Mokins Creek watershed.

A portion (14.8 percent) of Mokins Creek lies within private landownership that has been intensively managed and developed (see Section 3.4.3, Part A discussions of the effects of past activities on aquatic resources). In 2002, stream temperatures were documented by the Forest Service in the lowermost section of Mokins Creek, upstream of its confluence with Hayden Lake (PF Doc. AQ-28).

Mokins Creek was surveyed in the lowermost portion of the drainage to establish a long-term monitoring site, where one Rosgen (1996; PF Doc. AQ-R22) stream channel type was identified. Overall, Mokins Creek had a high pool to riffle ratio (approximately 1:1) in this monitoring reach and 80 percent of the pools surveyed were created by large woody debris (LWD). Single LWD pieces within the monitoring site equaled 44 pieces/100m. Most single LWD pieces surveyed were either very small in length and diameter (75 percent; Class I; PF Doc. AQ-30) or associated within the channel as aggregates.

The Mokins Creek monitoring site survey data indicated the following: 1) fish density was relatively high; 2) channel stability was relatively good; 3) pool-to-riffle ratio was high; and 4) LWD class was small in length and diameter and few aggregates exist.

Two and Three Forks Creeks *are two headwater drainages that create Mokins Creek; they are moderate to higher gradient streams with step pool and high gradient riffle. Forest Service survey crews surveyed the streams. Both drainages are approximately 1.75 miles in length before entering Mokins Creek, each encompassing an area of approximately 1.3 mi^2. The Two Forks drainage has experienced past levels of harvest activity, this includes near and in riparian harvests and road building. During the implementation of the Douglas-fir Beetle Project (1999), the main culvert crossings on Road 1536 were upgraded to allow fish passage. Headwater reaches are mainly groundwater fed, having many small springs with relatively shallow depths and a lack of supporting fish habitat. Mid- and low elevation reach characteristics are composed of debris jams, step pools, and riffle habitat types that support fish.*

Stream surveys identified fish within the system, but were categorized as unknown salmonids (Table 3-AQ-6). Two and Three Forks has no known or suspected man-caused fish barriers that would impede adfluvial and/or resident forms of westslope cutthroat to utilize habitat in the watershed. Historical non-native fish introductions and past natural and human management activities in the Two and Three Forks watershed has combined to likely develop the fish and fish habitat in the watersheds.

Fish habitat in Yellowbanks Creek: Yellowbanks Creek is approximately 4.4 miles in length before entering O'Rourke Bay (Hayden Lake). The Yellowbanks Creek drainage has experienced past levels of harvest activity, including road construction and timber harvest near and in riparian areas. Several small intermittent and perennial non-fish bearing tributaries feed Yellowbanks Creek for its entire length. Stream channel habitat and morphology were evaluated by establishing a reference reach that is repeatable using modified R1/R4 (Overton et al. 1997; PF Doc. AQ-R05) stream survey methodologies; Stream Channel Reference Sites (Harrelson et al. 1994; PF Doc. AQ-R21) guide and large woody debris (LWD) collections. A modified R1/R4 stream survey (Overton et al. 1997; PF Doc. AQ-R05), protocol was used to sub-sample an identified monitoring reach and collect important variables (e.g. LWD information; pool, riffle, and run habitat information; pool volume, etc.).

Forest Service survey crews conducted electrofishing surveys in Yellowbanks Creek in 2002 and 2005 (PF Doc. AQ-31 and AQ-32; respectively) in order to determine fish density and presence and absence data. Additional electrofishing surveys in Yellowbanks Creek were conducted by the Idaho Department of Fish and Game in 1984. Due to the difficulty of accurate field separation, westslope cutthroat and rainbow trout are demonstrated as hybrids for overall density estimates. In the 2002 and 2005 electrofishing surveys collectively, rainbow/westslope cutthroat trout hybrids dominated all other salmonid species collected (80 and

17 fish/100m^2, respectively). Cutthroat trout and Kamloops have been planted in the basin (Table 3-AQ-6; Fish Stocking Database (http://www2.state.id.us/fishgame). No other salmonid or non-salmonid species were identified within Yellowbanks Creek.

Adfluvial and/or resident forms of westslope cutthroat are likely in Yellowbanks Creek watershed. Historical introductions or stocking of Kamloops along with the compounding effects of past natural and human management activities in the Hayden Lake basin have combined to likely develop the fish and fish habitat in the watershed.

A relatively small portion of Yellowbanks Creek lies within private land ownership (5.6 percent), but this has been intensively managed and developed (see Section 3.4.3, Part A discussions of the effects of past activities on aquatic resources). Stream temperatures were documented by USFS (2002; PF Doc AQ-33) in the lowermost section of Yellowbanks Creek, upstream of its confluence with Hayden Lake. Temperature data collected indicate that criteria for cold-water aquatic life are being met, while salmonid spawning and incubation periods are exceeded during some times of the year (IDAPA 250.02.f).

Yellowbanks Creek was surveyed in the lowermost portion of the drainage to establish a long term monitoring site. The established monitoring site in Yellowbanks Creek identified one Rosgen (1996; PF Doc. AQ-R22) channel type and collected three cross-sectional profiles (PF Doc. AQ-34). Overall, Yellowbanks Creek had a high pool to riffle ratio (approximately 1:1) in this monitoring reach and 100 percent of the pool sampled were created by large woody debris (LWD; PF Doc. AQ-35). Single LWD pieces sampled were approximately 80-pieces/100 m with several aggregates identified. Most single LWD pieces surveyed were very small in length and diameter (91.0 percent; Class I - PF Doc. AQ-35).

The Yellowbanks Creek monitoring site survey data indicated the following: 1) fish density was relatively high; 2) channel stability was relatively good; 3) pool-to-riffle ratio was high; and 4) LWD class was small in length and diameter.

Fish habitat in Jim Creek: Jim Creek is approximately 3.0 miles in length before entering Hayden Lake at Preston Beach. The Jim Creek drainage has experienced past levels of harvest activity, including road construction and timber harvest near and in riparian areas. Several small intermittent and perennial non-fish bearing tributaries feed Jim Creek for its entire length. Stream channel habitat and morphology were evaluated by establishing a reference reach that is repeatable using modified R1/R4 (Overton et al. 1997; PF Doc. AQ-R05) stream survey methodologies; Stream Channel Reference Sites (Harrelson et al. 1994; PF Doc. AQ-R21) guide and large woody debris (LWD) collections. A modified R1/R4 stream survey (Overton et al. 1997; PF Doc. AQ-R05), protocol was used to sub-sample an identified monitoring reach and collect important variables (e.g. LWD information; pool, riffle, and run habitat information; pool volume, etc.).

Forest Service survey crews conducted electrofishing surveys in Jim Creek in 2005 (PF Doc. AQ-36) in order to determine fish density and presence and absence data. In the 2005 electrofishing surveys, westslope cutthroat trout were the only salmonid species collected (14 fish/100m^2; Table 3-AQ-6). No other salmonid or non-salmonid species were identified within Jim Creek during these collection efforts.

Adfluvial and/or resident forms of westslope cutthroat are likely in Jim Creek watershed. Historical introductions or stocking of Kamloops along with the compounding effects of past natural and human management activities in the Hayden Lake basin have combined to likely develop the fish and fish habitat in the watershed.

A relatively small portion (17.2 percent) of Jim Creek lies within private land ownership, but this has been intensively managed and developed (see Section 3.4.3, Part A discussions of the effects of past activities on aquatic resources). Jim Creek was surveyed in the lowermost portion of the drainage to establish a long term monitoring site. The established monitoring site in Jim Creek identified one Rosgen (1996; PF Doc. AQ-R22) channel type and collected three cross-sectional profiles (PF Doc. AQ-37). Overall, Jim Creek had a high pool to riffle ratio (approximately 1:1) in this monitoring reach and 90 percent of the pools sampled were created by large woody debris (LWD). Single LWD pieces sampled equaled approximately 20-pieces/100 m

with several aggregates identified. Most single LWD pieces surveyed were very small in length, but large in diameter (Class II and IV; PF Doc. AQ-38).

The Jim Creek monitoring site survey data indicated the following: 1) fish density was relatively high; 2) channel stability was relatively good; 3) pool-to-riffle ratio was high; and 4) LWD class was small in length, but larger in diameter class compared to other drainages in the resource area.

Hayden Face Tributary

The Hayden Face Tributary is an intermittent stream approximately one mile in length before entering O'Rourke Bay (Hayden Lake). Adfluvial and/or resident forms of westslope cutthroat and other salmonid species do not inhabit the channel in the resource area. The entire drainage is within National Forest System lands, and is considered a perennial and intermittent non-fish bearing stream.

3.4.3. Environmental Consequences to Aquatic Resources

The following discussion discloses the direct, indirect, and cumulative effects of the proposed and reasonably foreseeable activities on the aquatic resources. The discussion of effects is based on the aquatic concerns identified in Methodology for Aquatics. The ongoing and reasonably foreseeable activities are listed here as those relevant to the aquatics cumulative effects discussion.

Direct effects: *those immediately detected in time or space as a result of activities. Example: an immediate delivery of sediment to a stream.*

Indirect effects: *those that are detected at a later time or place and occurring separate from actual activities. Example: an increase in water yield as a result of removing canopy.*

Disclosure of the direct and indirect effects analyses are combined in this report.

Cumulative effects: *based on the existing condition, the direct and indirect effects of proposed activities and any ongoing or reasonably foreseeable actions. The reference condition of the cumulative effects analysis is presented in the Existing Condition section of this report. The Ongoing and Reasonably foreseeable activities are identified in this Chapter and in Chapter 2, Table 2-1.*

A. Methodology Used in the Analysis of Environmental Consequences to Aquatic Resources

The proposed activities and their potential effects to water quality or changes to stream channels, and fish habitat are the main concerns related to watershed and fisheries resources. Hillslope conditions are reflected in stream channels, which in turn are the formative features of aquatic habitat. The analysis of direct and indirect effects is based on how the various components of the project (*e.g.,* location, size of cutting units, methods of logging systems, road construction, culvert upgrades, and reasonably foreseeable actions) are expected to affect each subwatershed within the Deerfoot Resource Area. For this environmental analysis, the WATSED model was used to compare the cumulative effects of the No-Action Alternative to effects of the Proposed-Action Alternative.

Estimating Effects to Water Yield and Peak Flow (Flow Regime): Peak flows represent the change in runoff and are expressed as the percent change from the estimated "natural" peak month discharge. The WATSED model was used for this analysis to estimate the effects of the proposed timber harvest, construction, reconstruction and decommissioning of temporary roads, and site preparation treatments. Reasonably foreseeable actions are included in this analysis. Changes in peak flows are compared to the existing peak flows discussed in the affected environment section. The timeframes for the estimated direct and indirect effects, for the Proposed Action is 2008 (estimated start of activity) through 2031.

Guidelines for Changes to Water Yield and Peak Flow	
Zero	If the increase over the existing level is zero, there is no potential for an increase in water yield and peak flow or delay of watershed recovery.
0 to 5 percent	No potential exists for measurable increases in water yield and peak flow or delay of watershed recovery. For example, if you dumped a cup of water into a stream, you know the flow has increased; yet it would not be measurable with modern flow gauging equipment.
5 to 10 percent	There would be a slight potential of a measurable increase in water yield and peak flow or delay of watershed recovery.
10 percent or more	A potential exists for measurable increases and recovery delay.

Estimating Effects to Channel Morphology: Morphology is the shape of the stream channel – such as bank height, bank slope, channel width, and pool size. The stability of a stream channel and morphology is dependent on variations of the stream channel type. Stream channels that are primarily alluvial systems (sediment deposited and formed) are the most susceptible to stream bank erosion, changes in sediment supplies, and large woody debris removal (Chamberlin et al. 1991, PF Doc. AQ-R23; Rosgen 1996, PF Doc. AQ-R22). Stream channels are more stable with respect to fluctuations in flow and sediment yields when the substrate is composed of bedrock and boulders that have a good portion of large woody debris jams and are more confined within the valley bottom (Chamberlin et al 1991, PF Doc. AQ-R23; Rosgen 1996, PF Doc. AQ-R22). This analysis compares effects of proposed activities under the Proposed Action in regard to changes in channel morphology (such as bank erosion, downcutting, and deposition of bedload sediment). The analysis stems from interpretation of WATSED's sediment and water flow changes and where (or if) any changes may be occurring in the more sensitive reaches of the streams.

***Estimating Effects to Water Quality*:** Water quality is analyzed from two different aspects: 1) changes in sediment yield from proposed vegetation activities, burning, road construction, and culvert upgrades; and 2) in respect to aquatic restoration activities such as road decommissioning and treatment of road crossings.

Estimating Effects to Sediment Yield: percent increase in sediment yield is estimated as the annual sediment above existing levels loading into each of the subwatersheds. This percent is compared to the current sediment load discussed in the existing conditions section. Sediment yield percent is calculated for each alternative using the WATSED model. The proposed timber harvest units, construction, reconstruction, and decommissioning of temporary roads and site preparation treatments are included in the analysis. Some of the reasonably foreseeable actions discussed below are also calculated in the analysis. The estimated short-term or direct and indirect effects analysis timeframe for sediment yield for the Proposed Action is 2008 (estimated start of activity) through 2031.

Guidelines for changes to Sediment Yield	
Zero	If the increase over the existing level is zero, there is no potential for an increase in sediment or delay of watershed recovery.
0 to 10 percent	No potential exists for measurable increases in sediment or delay of watershed recovery. For example, if you dumped a cup of dirt into a stream, you know the sediment has increased; yet it would not be measurable at a gauging station or with modern sediment sampling equipment.
10 to 20 percent	There would be a slight potential of a measurable increase in sediment or delay of watershed recovery.
20 percent or more	A potential exists for measurable increases and recovery delay.

Estimating Effects on Rain-on-Snow: There is a potential for localized effects of rain-on-snow at the subwatershed scale. It is difficult to predict large-scale, catastrophic effects at the larger watershed scale and the effects to the Hayden Lake basin downstream of Deerfoot Resource Area. The analysis is based on change of canopy openings, the size of those openings, and conclusions drawn from studies specific to the Pacific and Inland Northwest including Rothacher (1973; PF Doc. AQ-R24), Harr and McCorison (1979; PF Doc. AQ-R25), Harr (1981; PF Doc. AQ-R26), Christner and Harr (1982; PF Doc. AQ-R27), Berris and Harr (1987; PF Doc. AQ-R28), King (1993; PF Doc. AQ-R29), and Coffin and Harr (1991; PF Doc. AQ-R30).

The concern is whether the management activities proposed with this project will affect the hydrologic response to rain-on-snow events at a scale beyond that disclosed in this analysis. The rationale used for this analysis was based on these two questions:

1) *Is the* **scale** *of the management activities with this project sufficient to affect the hydrologic response of large watersheds to rain-on-snow events (i.e. will openings created from the proposed vegetation treatments effect flows into Hayden Lake?*
2) *Is the* **magnitude** *of the management activities proposed with this project sufficient to affect the hydrologic response of large watersheds to rain-on-snow events?*

B. Direct and Indirect Effects to Aquatic Resources under the No-Action Alternative

Since no management activities would be implemented with this alternative, there would be no direct or indirect effects associated with this project. Sediment yield values and trends as discussed in the affected environment would not change from existing conditions and predicted trends. Water yield values would continue to decrease very slowly by an average of 1 percent every 5 to 10 years as vegetation recovers from past harvest (Table 3-AQ-7). Sediment yield values would stay the same percent above natural as infrastructure (i.e. roads) on the landscape would be retained (Table 3-AQ-8).

Under the No-Action Alternative, the identified culvert upgrade and the relief culvert installation to improve road-stream crossing potential risk would not be implemented, leaving the associated risk of sediment delivery. The failure of the road-stream crossings may occur under several environmental conditions (e.g. natural cyclic flood, lack of maintenance, or stand replacing fire). If a pipe becomes plugged than a flash flood and/or debris flow is triggered, culvert failures occur when debris plugs the culverts or when the capacity of the culvert is exceeded. Water then is either concentrated over the top of road fills or is diverted down the road or ditch and onto hillslopes unaccustomed to concentrated overland flow.

With either of these scenarios, the additional sediment pulse could result in adverse effects to fish populations and/or fish habitat. If either of these events were to occur while salmonid eggs or alevins were still in the gravels, they could potentially be entombed by the additional sediment and suffocate.

C. Direct and Indirect Effects to Aquatic Resources under the Proposed-Action Alternative

Descriptions of direct and indirect effects are documented together because at the subwatershed scale variable differences in WATSED outputs and interpretation of effects are described below.

Direct and Indirect Effects to Water Yield and Peak Flow: Nearly all watersheds have modeled increases that range up to three percent for water yield and peak flow change under the Proposed-Action Alternative. Where no potential exists for measurable increases in water yield or peak flow or delay of watershed recovery. Stump Creek has modeled peak flows and water yield increases at five percent and eight percent over existing conditions, respectively. The modeled water yield percentage may constitute a slight potential that there would be a measurable increase or delay of watershed recovery (Table 3-AQ-7). The units in which the only prescription is to reduce fuels by burning are not expected to scorch soils or remove canopy enough to cause any change in water yield or peak flow.

Table 3-AQ-7. Comparison of Changes to Peak Flow and Water Yield in the subwatersheds in the Deerfoot Resource Area (including activities on private lands), by alternative.

Indicator	No-Action Alternative (baseline)	Proposed-Action Alternative (change from baseline)
WATER YIELD Effects of commercial harvest and resulting canopy openings on percent increase in water yield. **(percent increase over existing)**	Stump Creek **0%** Nilsen Creek **0%** Mokins Creek **0%** Jim Creek **0%** Yellowbanks Cr **0%**	Stump Creek **5**% Nilsen Creek **1**% Mokins Creek **2**% Jim Creek **0**% Yellowbanks Cr **1**%
PEAK FLOW Effects of commercial harvest and resulting canopy openings on percent increases in peak flows. **(percent increase over existing**)	Stump Creek **0%** Nilsen Creek **0%** Mokins Creek **0%** Jim Creek **0%** Yellowbanks Cr **0%**	Stump Creek **8**% Nilsen Creek **1**% Mokins Creek **3**% Jim Creek **0**% Yellowbanks Cr **2**%

Direct and Indirect Effects of Water Yield and Peak Flow on Fisheries: For Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Face Creeks the increases in water yield would be small with the proposed vegetation treatments and road prescriptions (Table 3-AQ-7). Within the drainages in the resource area, proposed activities would increase water yield peaks by an estimated 0 percent (Jim Creek) to a maximum of 5 percent (Stump Creek). The Proposed Action alternative would initiate a small increase in flows within the first order, headwater drainages, but any effects are expected to be localized. Consequently there would be no direct or indirect effects to fish habitat or populations based on water yield interpretation, because as previously stated it would not be measurable with current flow instrumentation at a ≤5 percent increase within the subwatersheds. Since any change in water yield associated with this project probably could not be differentiated from normal climatic fluctuations in the Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Face Creek drainages, any additional bedload scour during high flows would not be expected. Fish and fish habitat in the subwatersheds in the cumulative effects area would not be directly or indirectly affected by the expected increase in water yield.

Based on the guidelines provided in the earlier methodology discussions, increases in peak flow under the Proposed-Action Alternative would not be measurable in the Deerfoot Resource Area subwatersheds (Table 3-AQ-7) and would not change existing fisheries habitat conditions in any of the fish-bearing stream segments.

Since any change in water yield associated with this project probably would not be differentiated from normal climatic fluctuations in the Deerfoot Resource area subwatersheds any additional bedload scour during high flows would not be expected. The only watershed where modeling predicted a five percent or greater increase in peak flow was Stump Creek; with an eight percent increase, there would be a slight potential of a measurable increase in peak flow or delay of watershed recovery. Salmonid redds, aquatic life, and their associated habitat existing in the cumulative effects area would not be directly or indirectly affected by the zero percent (Jim Creek) to three percent (Mokins Creek) modeled increases in peak flow.

***Direct and Indirect Effects to Water Quality (Sediment Yield)*:** Sediment yield is variable by subwatershed as modeled with WATSED. Table 3-AQ-8 display the differences in sediment yield increases by analysis area watershed, resulting only from vegetative treatments, fire/fuel reduction measures, and associated road construction. All results assume that treatments would be implemented in 2008.

Table 3-AQ-8. Comparison of sediment yield changes in the Deerfoot Resource Area subwatersheds (including activities on private lands), by alternative.

Indicator	No-Action Alternative (baseline)	Proposed-Action Alternative (change from baseline)
SEDIMENT YIELD Effects of commercial harvest and resulting canopy openings on percent increase in sediment yield. **(percent increase over existing)**	Stump Creek **0%** Nilsen Creek **0%** Mokins Creek **0%** Jim Creek **0%** Yellowbanks Cr **0%**	Stump Creek **3%** Nilsen Creek **1%** Mokins Creek **1%** Jim Creek **0%** Yellowbanks Cr **1%**

The Proposed-Action Alternative shows a maximum predicted sediment yield increase of three percent above existing in Stump Creek watershed; all the remaining watersheds have modeled increases from 0 percent to 1 percent. The increase in sediment as modeled would not show any measurable effects of sediment in these subwatersheds. There is 0.6 mile of system road construction, 0.6 mile of temporary road construction, and 0.4 mile of temporary skid road construction associated with the proposed action. This road construction could potentially have a greater influence on the results of predicted sediment increases from WATSED compared to the harvest or burning of the units. The new system and temporary road construction would be located far from any stream channel and even though sediment could be eroded and transported down-slope it would be filtered and deposited on the forest floor before reaching the nearest stream channel. Rolling dips would be constructed as prevention of rutting and a maintenance–free method of providing adequate drainage. The model predicts surface erosion from both roads and harvest activities but the road construction is near a ridge top far from any stream course and would have no new stream crossings. Application of BMPs (Appendix A) and no harvest, or new road building activities within INFS (1995) buffers are expected to prevent sediment levels from increasing. There would be road work along Road 206, consisting of blading, water-barring, and culvert replacement. Short-term sediment delivery would likely occur at the two crossings during replacement. If a large precipitation event were to occur during or shortly after the road work is completed, additional sediment could be routed and delivered to the stream system. Over the long term, improved drainage features along the road surface would slightly reduce sediment and reduce chronic background sediment at the local subwatershed scale. The benefits would be less likely realized or measured from these improvements at the larger watershed scale in Hayden Lake. No long-term impacts to beneficial uses would occur because sediment yield increases would be too small to measure.

A one to three percent increase in sediment yield would have a slight potential for increased sediment yield but it would not be measurable and there would be no direct effect to any of the subwatersheds. The indirect effect of delaying recovery is observed from WATSED model outputs (Figure 3-AQ-8-12), but would not be detectable in the subwatersheds because the location of tractor units are greater than 300 feet from riparian areas and occur over a small area compared the subwatershed scale. There would be no detectable increases in sediment with the Proposed Action in any of the subwatersheds.

In summary, there would be only a slight difference in sediment yield increases between the no action and the proposed action. The risk of measurable sediment under the Proposed Action would be very low for both the larger watershed scale and the smaller subwatershed scale. If sediment increases were to occur, it would be localized only near treatment units and landings locations on or near Road 206. This relatively low level of treatment at the subwatershed scale, application of BMP's, and location of treatments far away from streams as buffered (INFS 1995) would prevent sediment from being routed down slope to stream channels or into the Hayden Creek or Hayden Lake. Sediment yield increases under the proposed action would not be great enough to cause measurable effects to water quality or impair beneficial uses. In the short term, reconstruction may generate some measurable sediment dependent of flow levels and high precipitation

during the activity. In the long term the proposed activities would have no measurable effects to water yield, sediment yield, and overall aquatic health.

The Proposed-Action Alternative would result in a slight increase in sediment yield compared to the existing condition as model output showed from WATSED. The difference is relatively small when modeled and compared between the current (i.e. existing) sediment yield and the sediment yield derived under the implementation of the Proposed Action and projected by WATSED (Figures AQ 3-AQ-8:12). Consequently, these increases would not be detectable if attempts were made to measure sediment change.

Figure 3-AQ-8. Comparison of WATSED modeled sediment yield (change in baseline) in Stump Creek under the Proposed-Action Alternative.

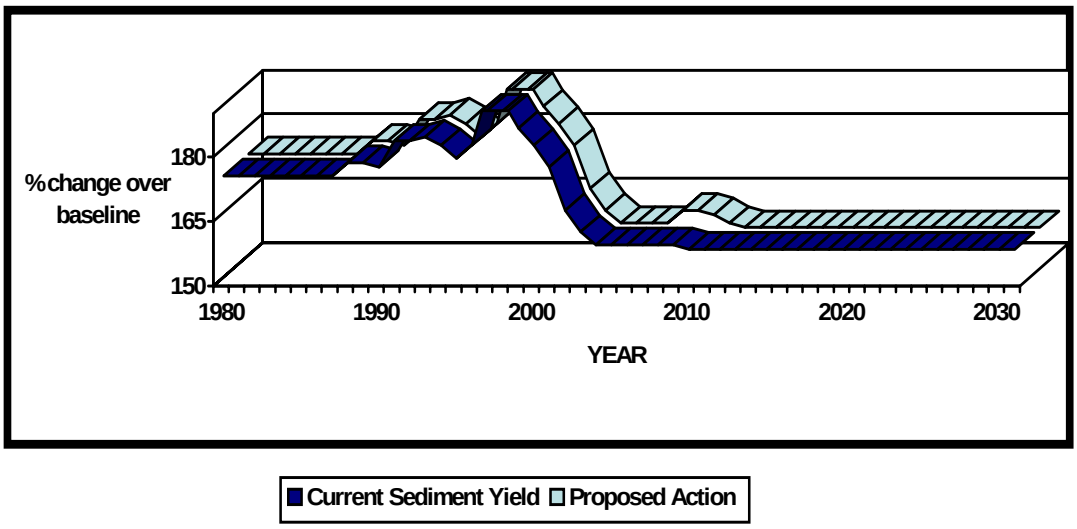


Figure 3-AQ-9. Comparison of WATSED modeled sediment yield (change in baseline) in Nilsen Creek under the Proposed-Action Alternative.

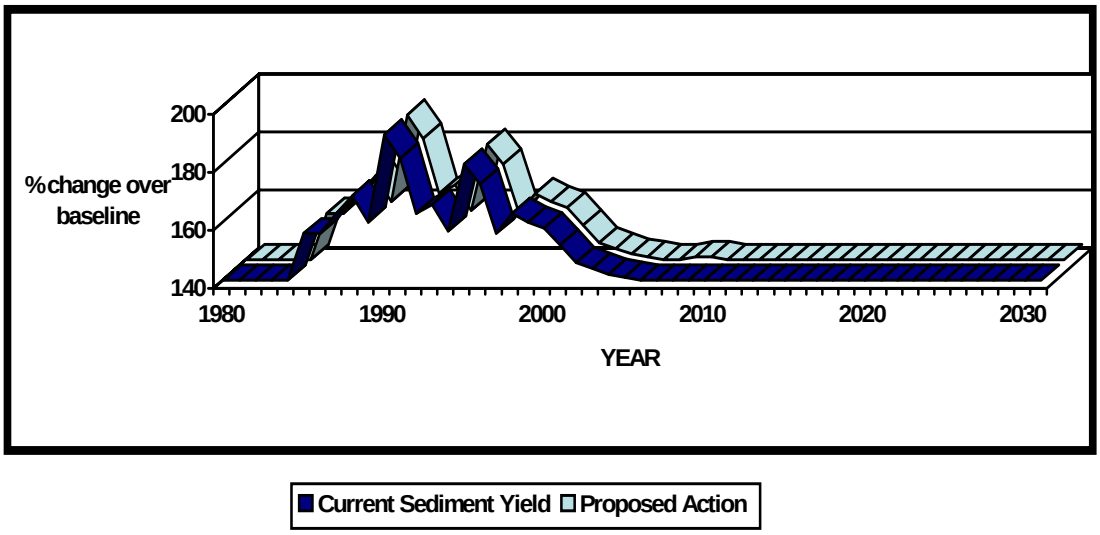


Figure 3-AQ-10. Comparison of WATSED modeled sediment yield (change in baseline) in Mokins Creek under the Proposed-Action Alternative.

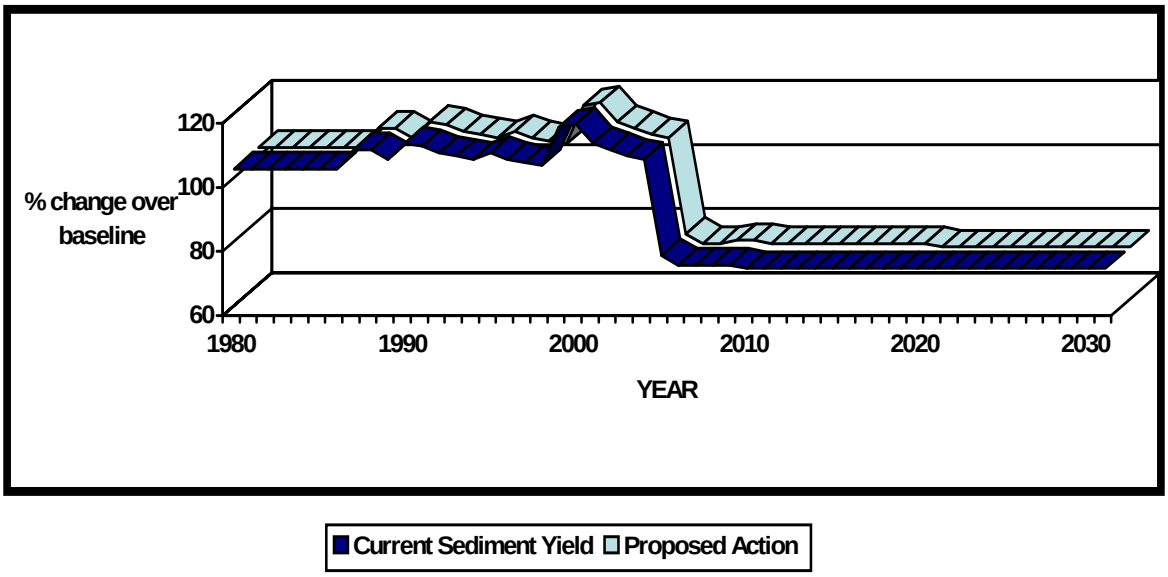


Figure 3-AQ-11. Comparison of WATSED modeled sediment yield (change in baseline) in Jim Creek under the Proposed-Action Alternative.

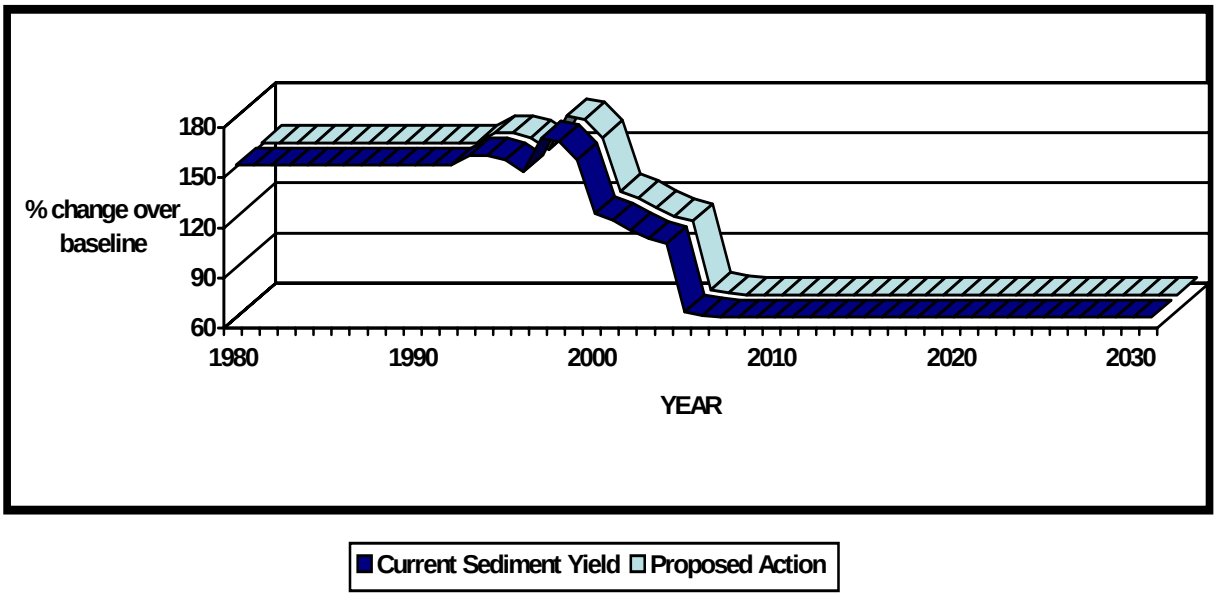
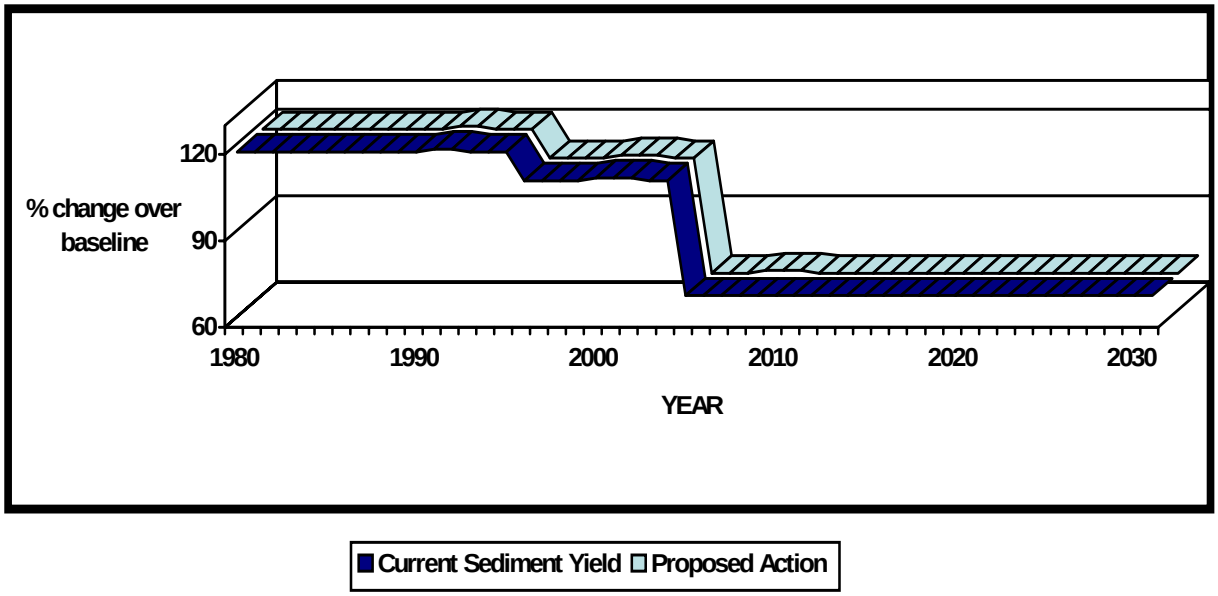


Figure 3-AQ-12. Comparison of WATSED modeled sediment yield (change in baseline) in Yellowbanks Creek under the Proposed-Action Alternative.



Direct and Indirect Effects of Sediment Yield on Fisheries: Increases in sediment delivery can affect fish habitat by filling in the small open spaces in spawning gravels. This results in decreased water flow through the gravels that is imperative for oxygen delivery and waste removal for incubating eggs. Filling of these open spaces can also displace macroinvertebrates, thereby reducing an important food source for fishes. High amounts of sediment can fill in pools and reduce rearing habitat for juvenile fishes.

Since all ground-disturbing activities (i.e. tractor logging) would occur outside of RHCAs, the risk of any sediment generated by logging activities actually reaching a live channel is very low (Belt et al. 1992; PF Doc AQ-R31). By using timing restrictions, onsite direction, and BMPs, sediment delivery to occupied fish habitat associated with culvert removals and upgrades would be minimized, thereby reducing risk of failure.

The identified culvert upgrade is located in across an intermittent channel within the Stump Creek drainage (i.e. not within fish-bearing waterways) and the front-end decommissioning of illegally pioneered trails occurs primarily along road #206. During culvert upgrade, relief pipe installment, and front-end decommissioning of illegally pioneered trails, BMPs (Appendix A) will be utilized as part of the Design Features for Aquatics (Chapter 2) for the Proposed Action. The likelihood that any entrained sediment during these proposed activities would be very low and no potential exists for a measurable increase within the analysis watersheds (see Direct and Indirect Sediment Yield –Watershed). The higher-gradient channel types present in the headwaters of these drainages would likely carry any sediment to the nearest low gradient stream reaches where it would settle out. Given the considerable amount of large woody debris component found in the project watersheds (USFS-Stream Surveys PF Doc. AQ-24, 30, 35, 38), the predicted increase in sediment delivery would likely be transported or stored within the system. During high flows, silts would likely stay suspended, be carried through the system and be deposited in large woody debris sites or off-channel microsites (i.e. depositional zones) influenced by high flows. Similarly, sands and gravels would be deposited on gravel bars or other energy reducing features. Risk of sediment delivery would be immediately reduced when culvert upgrade, relief pipe installation, and front-end decommissioning of illegally pioneered trails were implemented; hence, the sediment levels would trend back toward baseline in the long term if the Proposed Action alternative was implemented.

Direct and Indirect Effects of Stream Channel Morphology: Changes in the magnitude, intensity or duration of peak flows and sediment yields have the potential to change stream channel characteristics. Stream channels that are primarily alluvial systems (sediment deposited and formed) are the most susceptible to stream bank erosion, changes in sediment supplies, and large woody debris removal (Chamberlin et al. 1991; PF Doc. AQ-R23; Rosgen 1996; PF Doc. AQ-R22). Stream channels where the substrate is composed of bedrock and boulders that have a good portion of large woody debris jams and are more confined within the valley bottom are more stable with respect to fluctuations in flow and sediment yields (Chamberlin et al. 1991; PF Doc. AQ-R23; Rosgen 1996; PF Doc. AQ-R22).

Based on the stream channel types and landtype characteristics of Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Face Creeks, the estimated changes in peak flows, sediment yields and the potential increases in flows from a rain-on-snow event, the Proposed-Action Alternative would not cause a measurable affect to stream channel morphology and therefore would not change fish habitat. Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Face Creeks are mostly alluvial channels and are only boulder and bedrock controlled in a few isolated segments. The dominant stream bank material is primarily composed of cobbles in the upper reaches and gravel in the lower reaches, which are easily erodible. Most of these channels do show bedload aggradation and some downcutting. The recovery of these channels from past activities is slow and will remain slow with the implementation of the Proposed-Action Alternative.

Stream survey data from 1998, 2002, and 2005 (PF Doc. AQ-24, 30, 35, 38) indicates that woody debris recruitment levels are high, primarily due to an ice storm in 1996, where considerable woody debris exists in the form of single pieces that were classified as relatively small in length and diameter. These pool formative features can dissipate stream energy. A maximum increase in water yield of eight percent in Stump Creek over the existing condition would likely result in some elevated flows in the headwaters, but would be undetectable in Hayden Creek. In conclusion, the riparian management objectives as established by INFS (1995) should show no change or be reduced to levels below those prescribed for streams in the Deerfoot Resource Area.

D. Cumulative Effects to Aquatic Resources

Ongoing and Reasonably Foreseeable Actions Affecting Aquatic Resources

The following is a description of past, ongoing and reasonably foreseeable actions, to establish the appropriate geographic and time boundaries for the cumulative effects analysis. Activities identified below were ones that are relevant to the watershed and fisheries cumulative effects analysis. Other activities listed in Chapter 1 are not discussed here because there is no soil or watershed disturbance created by these activities. These include tree planting and recreational activities.

Fire suppression activities over the last century within the Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Face drainages have allowed stands to progress towards climax vegetative condition. The current trend is toward more shade tolerant species that are not as long-lived and are more susceptible to insects and disease (refer to Chapter 3.2 - Forest Vegetation). As this occurs, water yield values will not be affected or deter any entrainment and sorting of sediments or delivery and transport of large woody debris from natural events. The streams in the resource area will continue storing sediment in the channel in areas of deposition until an episodic event increases peak flows high enough to flush and entrain sediments.

Restricted or Unauthorized Motor Vehicle Use - The Douglas-fir Beetle Project (USDA 1999) identified this general area as one that would likely see an increase in recreational vehicle use. Since motorized use is not as restricted as other areas on the district, the increasing popularity from the Coeur d'Alene area, motorcycles, ATVs and snowmobile use is increasing. This has forced additional needs in road and trail maintenance. The lack of road and trail maintenance causes increases in erosion and sediment delivery. Currently, road and trail maintenance has been reasonable in the Stump, Nilsen, Mokins, Yellowbanks, and Jim Creek drainages and have addressed the immediate concerns with erosion and sediment delivery.

Road maintenance activities - occur annually to some degree within the watershed. These activities include, but are not limited to, blading, brushing, and culvert cleaning. Maintenance activities typically improve drainage and decrease erosion from water channeling down the road surface. Culvert cleaning and associated maintenance lowers the associated risk of failure. Recent road maintenance in Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Lake Face drainages have occurred through past timber sales within the resource area and are based on a random rotational maintenance design. This should improve road surface runoff and reduce sediment delivery along sections of road since it would observe a rotational frequency in road maintenance.

Activities on Private Lands within the Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Lake Face Watersheds - Private land consists of 22.2 percent (PF Doc. AQ-39) in the watershed cumulative effects analysis area, with the majority of the land within the lake shore areas of Hayden Lake (especially Nilsen Creek, which is 68.6 percent private). The private lands around Hayden Lake and the tributaries to the lake analyzed in the project primarily consist of summer homes and developed acreage. Some of the private roads accessing these homes have delivered sediment to these streams from road fill failures, road surface runoff, and immediate riparian activities. Sediment delivery levels from these private roads are based on the level of road maintenance activities. It is reasonable to suspect that private land development will continue to occur, specifically timber harvest activities to clear more acreage for land use change (i.e. home development).

Noxious Weeds Monitoring and Treatment - This activity would follow guidelines established in the Coeur d'Alene Noxious Weeds FEIS (USDA 2000). Effects to aquatic resources were analyzed in that document and its adaptive strategy. No additional effects to watershed or fisheries are expected to occur.

Timber Stand Improvement - This activity would occur outside riparian habitat conservation areas except potentially where it would improve riparian habitat. No ground disturbance would occur and timing restrictions would be enacted. No detrimental direct or indirect effects to watershed and fisheries are expected to occur.

Cumulative Effects to Sediment Yield

Under the Proposed-Action Alternative, the direct and indirect effects of increased sediment yield combined with the effects from past, present and reasonably foreseeable activities would not result in any cumulative effects to Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Lake Face Creeks. Modeled sediment yield increases are within the historic range of variability for magnitude, intensity and duration when compared with estimates for past natural events. The effects of the Proposed Action would be consistent with what likely occurred within the natural variability of such events, where no potential exists for measurable increases in sediment yield or delay of watershed recovery.

Phosphorus is the nutrient of concern in Hayden Lake and it is delivered with sediment from the lake's tributaries. Stump Creek is a tributary to Hayden Creek and the previous restoration activities reduced sediment by 5 tons per year. Within the Deerfoot Resource Area, the ongoing activities and reasonably foreseeable projects will reduce some of the sediment that is being contributed to Hayden Creek and Hayden Lake. The implementation of the Proposed Action Alternative would not impair beneficial uses within Hayden Lake Basin and would meet the intent of the Hayden Lake TMDL. The Proposed Action Alternative would have an immeasurable amount of sediment yield by definition (Figure 3-AQ-8:12) in the short and long-term sediment yields, since few temporary roads are constructed and vegetative treatments are mixed in amount and form across cumulative effects boundary.

Cumulative Effects to Water Yield: Increases in Peak Flows

Under the Proposed-Action Alternative, the direct and indirect effects of increased peak flows combined with the effects from past, present and reasonably foreseeable activities would not result in any cumulative effects to Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Lake Face Creeks. Modeled water yield increases are within the historic range of variability for magnitude, intensity and duration when compared with estimates for past natural events. The effects of the Proposed Action would be consistent with what likely occurred within the natural variability of such events, where water yield increases are most likely immeasurable.

The proposed activities in Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Lake Face Creeks would not increase peak flows in these streams or affect the lake levels in Hayden Lake. Historically, the greatest natural agent of disturbance in the Hayden Lake basin was wildfire. Fire history of the area is explained in detail in Chapter 3.3 - Fire/Fuels. Generally speaking, frequent, low intensity fires were common on the dry aspects of the watershed, occurring on average once every 20 to 30 years. Throughout the entire area, including the moist sites Zack and Morgan, (1994; PF Doc. FF-23), established a historic fire return interval of 54 years for all types of fires (mixed lethal severity). The very moist riparian stands likely burned less often and less severely, due to their topographic position and fuel moisture conditions during most fire seasons. Since the Proposed Action would not create large canopy openings or replicate large-scale, high-intensity fire, the reasonably foreseeable activities would not significantly increase peak flows, the increases in flows from Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Lake Face Creeks would be within the historic range of variability for the Hayden Lake basin.

In the event of a **rain-on-snow** event, peak flow increases would not cause any cumulative effects to Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Lake Face Creeks. These events are natural processes that occur episodically in time and space. Vegetation prescriptions would trend vegetation towards conditions and patterns, which would be similar to those formed by past disturbance events. As discussed in the Affected Environment section, the greatest impacts observed from rain-on-snow events occur when culverts become plugged from resulting floods and debris flows. The past activities of large vegetative treatments and road construction are considered recovering through time with the aid of past road and stream restoration efforts minimizing the routing agent of water during rain-on-snow events. All ongoing and reasonably foreseeable activities are pre-commercial thinning related, with no canopy opening of any size is expected to affect rain-on-snow events. .Activities under the Proposed-Action Alternative are not expected to open the canopy enough to have any effect on runoff and flooding from rain-on-snow events.

Cumulative Effects to Stream Channel Morphology

Under the Proposed-Action Alternative, the direct and indirect effects of increased sediment yield, peak flows, and water yield combined with the effects from past, present and reasonably foreseeable activities would not result in any cumulative effects to channel morphology in Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Lake Face Creeks. The modeled increases of these are within the historic range of variability for magnitude, intensity and duration when compared with estimates for past natural events. The effects of the Proposed Action would be consistent with what likely occurred within the natural variability of such events, where sediment yield, peak flow, and water yield increases are likely immeasurable.

Cumulative Effects to Fisheries

Under the Proposed-Action Alternative, the direct and indirect effects of increased sediment yield, peak flows, and water yield combined with the effects from past, present and reasonably foreseeable activities would not result in cumulative effects that would change the existing condition for fish and fish habitat in Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Lake Face Creeks. The modeled increases of these are within the historic range of variability for magnitude, intensity and duration when compared with estimates for past natural events. The effects of the Proposed Action would be consistent with what likely

occurred within the natural variability of such events, where sediment yield, peak flow, and water yield increases are likely immeasurable.

In general, there would be long-term benefits to fisheries with the implementation of the pipe upgrade, relief pipe installation, and the front-end decommissioning of the illegal pioneered trails. Based on the direct and indirect effects discussed, the risk of any sediment delivery actually reaching a live channel is relatively low, however is existent. Consequently, the potential short-term increase in sediment, peak flow, and water yield **may affect individual westslope cutthroat trout, but would not lead toward a trend in federal listing** if the Proposed Action Alternative is selected. Any increases in water yield or peak flow changes would be localized and would not be measurable in fish-bearing channels. The No Action has a maintained affect on fish and fish habitat.

3.4.4. Consistency with Policy, Direction and Legal Guidance for Aquatic Resources

The Proposed-Action Alternative would meet the requirements of the Forest Plan for water resources and fisheries. Specific requirements and how this project meets them are listed in Appendix A – BMPs (watershed) and Appendix B - INFS (1995). The No-Action alternative would not change riparian habitat conditions, except for a steady increase in the risk of a stand-replacement fire over time and the potential for road failures. The following are the water and fish standards to the Forest Plan and responses on each (USDA 1987, pp II 29-31).

A. Forest Plan Water Standards

Water Standard 1: Management activities on Forest Lands will not significantly impair the long-term productivity of the water resource and ensure that state water quality standards will be met or exceeded.

Idaho State BMPs (BMPs) are designed to protect the long-term productivity of the water resource and ensure state water quality standards will be met. Activities in the Deerfoot Resource Area will meet standard BMPs; where site-specific BMPs apply they were included with this project.

Water Standard 2: Maintain concentrations of total sediment or chemical constituents within state standards.

The net increase and delivery of sediment would be a maximum of 3 percent above existing conditions in the Stump Creek watershed to as low as 0 percent in Jim Creek subwatershed as modeled by WATSED, (PF Doc. AQ-10:14). This increase in sediment will not further degrade water quality in Hayden Lake or Hayden Creek. The proposed activities in conjunction with past and foreseeable actions would not impair beneficial uses. The proposed action alternative would meet State standards for chemical constituents given that there is minimal proposed road construction that would elevate chemical constituents above current input levels from the motorized road and trail infrastructure.

Water Standard 3: Implement project level standards and guidelines for water quality contained in the BMPs (IPNF Forest Plan - Appendix S), including those defined by State regulation and agreement between the State and Forest Service such as: Idaho Forest Practices Rules, Rules and Regulations and Minimum Standards for Stream Channel Alterations, and BMPs for Road Activities.

Specific road and trail maintenance measures are addressed in the Idaho Panhandle National Forests, "Programmatic Roads and Trails BA/BE" which incorporate and are consistent with Idaho Forest Practices Rules for the No Action alternative. The proposed action alternative is consistent with this criterion. In addition to standard State BMPs, other soil and water conservation practices that are approved BMPs are built into Appendix A that lists what is considered road and trail maintenance actions. Overall, the specified

maintenance measures surpass those required by the State Forest Practices Act with the use of INFS (1995) standards and guidelines and are consistent with Forest Service standards.

Water Standard 4: Cooperate with the states to determine necessary instream flows for various uses. Instream flows should be maintained by acquiring water rights or reservations.

Instream flows are not an issue with any portion of the proposed project. Therefore, this standard is not applicable.

Water Standard 5: Manage public water system plans for multiple uses by balancing present and future resources with public water supply needs. Project plans for activities in public water systems will be reviewed by the water users and the State.

Streams not defined as public water systems, but used by individuals for such purposes, will be managed to standards established by the state's forest practices rules and/or the National Forests' BMPs or to the INFS (1995) standards and guidelines whichever is applicable. Streams within the Deerfoot Resource Area are not defined as a "Municipal Watershed" but Hayden Lake serves as the primary water source that feeds the aquifer in the Rathdrum prairie as well domestic water use from the lake and its tributaries. The implementation of the Proposed Action would not impact this supply and maintain that water quality by not altering its beneficial development.

Water Standard 6: Activities within non-fishery drainages, including first and second order streams, will be planned and executed to maintain existing biota. Maintenance of existing biota will be defined as maintaining the physical integrity of these streams. BMPs (Forest Plan Appendix S), Appendix 0, and riparian guidelines will be used to accomplish this objective.

The existing biota will be maintained in first and second order streams through standard and site specific BMPs and the application of INFS (1995; Appendix B) standards and guidelines. Site Specific BMPs and applicable INFS (1995; Appendix B) standards and guidelines are listed and described in the BMP appendix for this project (Appendix A).

Water Standard 7: It is the intent of this plan that models be used as a tool to approximate the effects of National Forest activities on water quality values. The models will be used in conjunction with field data, monitoring results, continuing research and professional judgment, to further refine estimated effects and to make recommendations.

Both alternatives would meet this standard. The WATSED model was used to predict water and sediment yield changes. A Risk Analysis model for culvert failure was used to determine the risk of crossings for all known locations on roads in the Deerfoot Resource Area.

B. Forest Plan Fish Standards

Fish Standard 1: Activities on National Forest lands will be planned and executed to maintain existing water uses. Maintain is defined as "limiting effects from National Forest activities to maintain at least 80 percent of fry emergence success in identified fishery streams." The percent is measured from pristine conditions. Current methodology will not detect an impact of less than 20 percent. During the life of the plan, new technologies may permit more precise assessments; however, the goal of this standard will remain as to maintain 80 percent of fry emergence success.

Fish Standard 2: Streams providing spawning and rearing habitat, which are considered critical to the maintenance of river and resident populations of special concern *["high value streams"],* will be managed at a standard higher than the 80 percent standard. Monitoring will be needed to detect this higher standard.

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 (USDA Forest Service 2005; PF Doc. AQ-R32). 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 INFS (1995) 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.

Fish Standard 3: The stream and river segments (if listed) will be managed as low access fishing opportunities to maintain a diversity of fishing experiences for the public and to protect sensitive fish populations. Special road management provisions will be used to accomplish this objective.

Forest Plan standard 3 is not applicable to this analysis because no streams in the Deerfoot Resource Area are listed as "low access fishing streams." Recently the IDF&G has changed the fishing regulations within the Hayden Lake basin from "closed streams" to "open fishable streams" with imposed limits as well as a year long catch and keep fisheries in Hayden Lake (See 2008- IDF&G Fishing Regulations at http://fishandgame.idaho.gov/). Also, streams within the Resource Area are recognized as providing beneficial uses.

Fish Standard 4: Provide fish passage to suitable habitat areas, by designing road crossings of streams to allow fish passage or removing in-stream migration barriers.

Within the resource area, fish barriers were identified through past project activity implementation and corrected in the Two Forks and Three Forks drainages. Within the Deerfoot Resource Area there are partial and full fish barriers identified through surveys conducted using standard fish barrier data collection protocol (Clarkin et al. 2003; PF Doc. AQ-R33). However, under this Deerfoot EA these culverts/bridges are known to be barriers, but will be managed under separate NEPA analysis for their future removal/replacement/or no action decisions. No new stream migration barriers will be created with this project.

Fish Standard 5: Utilize data from stream, river, and lake inventories to prepare fishery prescriptions that coordinate fishery resource needs with other resource activities. Pursue fish habitat improvement projects to improve habitat carrying capacities on selected streams.

As stated in the aquatics specialist report, information was utilized from stream inventories, field reviews, historical records, aerial photographs, analysis of watershed conditions, published scientific literature, discussions with other Fisheries Biologists and electrofishing/stocking data from the Idaho Department of Fish and Game, and the U.S. Fish and Wildlife Service.

Fish Standard 6: Coordinate management activities with water resource concerns as described in MA 16, Appendix I, and Appendix O.

Water resource concerns are protected in Management Area 16 through INFS standards and guidelines (See Appendix B – INFS Standards and Guidelines).

C. National Forests Management Act – Species Diversity

Fish species that may be affected by the project (westslope cutthroat trout and rainbow trout) are also distributed across the Forest. For example, westslope cutthroat and rainbow trout are found in 13 of 13 (100 percent) of 4th code HUC watersheds (i.e., large watersheds, such as Coeur d'Alene River) on the IPNF. There is possible connectivity between the Coeur d'Alene River basin and one of the twelve other 4th code HUC watersheds on the Forest (i.e. St. Joe River).

- *Further westslope cutthroat are well distributed and found in 100 percent of the 6th code HUCs in the Coeur d'Alene River basin. Though introduced, rainbow are not as well distributed;*
- *At the smaller watershed scale, westslope cutthroat and rainbow are known to inhabit tributary streams in the analysis area (≤7th Code HUC watershed). Based on the distribution of species across the Forest, the lack of connectivity between large watersheds, and the limited cumulative effects area the Deerfoot Resource Area will not affect viability of any threatened, endangered, sensitive, or MIS fish species on the IPNF;*
- *Therefore, the project will not affect species diversity, not only because of species distribution, but also because the project is not predicted as modeled to lead to an adverse impact on fish or fish habitat conditions.*

D. Endangered Species Act - 1973

Section 7 of the 1973 Endangered Species Act (ESA) includes direction that Federal agencies, in consultation with the U.S. Fish and Wildlife Service, will not authorize, fund, or conduct actions that are likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat. The Endangered Species Act does not apply to the any of the Deerfoot Resource Area cumulative effects analysis area subwatersheds since bull trout do not occupy any part of the Hayden Lake basin. Critical habitat has been established for bull trout, but does not include Hayden Lake.

E. Clean Water Act (including State of Idaho Implementation)

All alternatives would be consistent with the requirements of the Clean Water Act, 33 U.S.C. §1251. Sediment and nutrients, the pollutants of concern, would not increase in the water quality limited lake segment in the Hayden Lake basin. Risks to beneficial uses in Stump, Nilsen, Mokins, Yellowbanks, Jim, and Hayden Face Creeks would not be changed by this project. In compliance with the current TMDL status, there would be no net increase in sediment through management activities into Hayden Lake.

F. Idaho Forest Practices Act

The Forest Practices Act was passed by the 1974 Idaho Legislature to assure the continuous growing and harvesting of forest trees and to maintain forest soil, air, water, vegetation, wildlife, and aquatic habitat. The Act requires that federal land practices must meet or exceed the requirements of the state rules. BMPs (Appendix A) or Soil and Water Conservation Practices (PF Doc. AQ-R34) would be applied under all alternatives, and all activities are in compliance with the guidelines in the Soil and Water Conservation Handbook.

G. Presidential Executive Order 12962 – Recreational Fishing

Presidential Executive Order 12962, signed June 7, 1995, furthered the purpose of the Fish and Wildlife Act of 1956, the National Environmental Policy Act of 1969 and the Fish and Wildlife Coordination Act, seeking to conserve, restore, and enhance aquatic systems to provide for increased recreational fishing opportunities nationwide. This order directs federal agencies to: "improve the quantity, function, sustainable productivity, and distribution of aquatic resources for increased recreational fishing opportunity by evaluating the effects of federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order." The proposed action would produce an immeasurable,

potential short-term increase in sediment yield, water yield, and peak flow changes, which may affect individual westslope cutthroat trout, but would **not** lead toward a trend in federal listing.

H. State of Idaho – Governor's Bull Trout Plan

The mission of the Governors Bull Trout Plan (1996; PF Doc. AQ-11) is to "…maintain and or restore complex interacting groups of bull trout populations throughout their native range in Idaho." A bull trout population in the Hayden Lake system is not known to currently persist based on all the information available at the time of this developed document. Bull trout in the Hayden Lake drainage ***do not persist*** based on all the information available at the time of this developed document. In the Plan, the Panhandle Basin (PF Doc AQ-11 within Appendix F of Plan) does not identify the Hayden Lake drainage area as a key watershed for a bull trout metapopulation.

3.4.5. References Cited in the Aquatics Analysis

Belt, G.H., J. O'Laughlin, and T. Merrill. 1992. Design of forest riparian buffer strips for the protection of water quality: analysis of scientific literature. Idaho Forest, Wildlife and Range Policy Analysis Group. Report No. 8. (PF Doc. AQ-R31)

Berris, S. N., and R. D. Harr. 1987. Comparative snow accumulation and melt during rainfall in forested and clear-cut plots in the western Cascades of Oregon. In: Water Resources Research 23(1): 135-142. (PF Doc. AQ-R28)

Bjornn, T. C. and D. W. Reiser. 1991. Habitat requirements of salmonids in streams. In: W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19. Bethesda, Maryland. pp 83-138. (PF Doc. AQ-R20)

Brooks. K. N., P.F.Ffolliott, H.M.Gregersen, J.L.Thames. 1991. Hydrology and the management of watersheds. Iowa State University Press, Ames Iowa, USA. Pp.104-125. (PF Doc. AQ-R11)

Christner,J. and R.D.Harr.1982.Peak streamflows from the transient snowzone, Western Cascades, Oregon. Presented at the Western Snow Conference, April 20, 1982, Reno, Nevada. (PF Doc. AQ-R27).

Chamberlin, T.W., R.D. Harr, and F.H. Everest. 1991. Timber harvesting, silviculture, and watershed processes. In: William R. Meehan, ed. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19:181-205. Bethesda, Maryland. (PF Doc. AQ-R23)

Clarkin, K., A. Conner, M. Furniss, B. Gubernick, M. Love, K. Moynan, and S.W. Musser. 2003. National Inventory and Assessment Procedure: For Identifying Barriers to Aquatic Organism Passage at Road-Stream Crossings. USFS San Dimas Technology and Development Center (PF Doc. AQ-R33).

Coffin, B.A. and R.D. Harr. 1991. Effects of forest cover on rate of water delivery to soil during rain-on-snow Final Report. Project SH-1 (Rain on Snow Field Study) submitted to Sediment, Hydrology, and Mass Wasting Steering Committee. (PF Doc. AQ-R30)

Hale, S. and Hayden Lake Watershed Planning Committee. 1994. Hayden Lake Watershed Management Plan. 86 pp. and Appendcies. (PF Doc AQ-R07)

Harr, R.D. 1981. Some characteristics and consequences of snowmelt during rainfall in western Oregon. Journal of Hydrology. 53. (PF Doc. AQ-R26)

Harr, R.D. and F.M. McCorison. 1979. Initial effects of clearcut harvest logging on size and timing of peak flows in a small watershed in western Oregon. Water Resources Research 15(1), 90-94. (PF Doc. AQ-R25)

Harr, R.D. 1986. Effects of clearcutting on rain-on-snow runoff in western Oregon: A new look at old studies. Water Resource Research, Vol. 22, No 7. pg 1095-1100. (PF Doc. AQ-R12)

Harrelson, C.C., Rawlins, C.L., and J.P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Rocky Mountain Research Station. GTR-RM-245 (PF Doc. AQ-R21).

Idaho Department of Fish and Game. 2006. Fish stocking data. http://www2.state.id.us (PF Doc. AQ-R14)

Idaho Department of Lands. Idaho Forest Practices Act. (PF Doc. AQ-R34)

Idaho Department of Health and Welfare. 1992. Designation of Beneficial Uses. (PF Doc. AQ-R06)

Jones, J.A., and G.E. Grant. 1996. Peak Flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research. Vol. 32 pp 959-974. (PF Doc. AQ-R10)

King, J.G. 1993. Streamflow and sediment yield responses to forest practices in north Idaho. Interior cedar-hemlock-white pine forests: ecology and management: symposium proceedings, March 2-4, 1003, Spokane, Washington, USA. Pullman, Wash.: Washington State University, 1994 p 213-220. (PF Doc AQ-R29)

Mesa, M.G. 1991. Variation in feeding, aggression, and position choice between hatchery and wild cutthroat trout in an artificial stream. Transactions of the American Fisheries Society. 120:723-727. (PF Doc. AQ-R18)

Overton, C.K., S.P. Wollrab, B.C. Roberts, and M.A. Radko. 1997. R1/R4 Fish and Fish Habitat Standard Inventory Procedures Handbook. General Technical Report INT-GTR-346. USDA Forest Service Intermountain Research Station. Ogden, UT. (PF Doc. AQ-R05)

Patten, R. 1989. Watershed Response Model for Forest Management, WATBAL. Technical Users Guide, rev. November 15, 1999. (PF Doc. AQ-R04)

Reel, S., L. Schassberger and W. Ruediger. 1989. Caring for our natural community. USDA Forest Service. Northern Region Wildlife and Fisheries publication. (PF Doc. AQ-R17)

Rieman, B. and K. Apperson. 1989. Status and analysis of salmonid fisheries: westslope cutthroat trout synopsis and analysis of fishery information. Job performance representative. Idaho Department of Fish and Game. Project F-73-R-11, Subproject No. 11 Job No. 1. Boise, Idaho. 113 pp. (PF Doc. AQ-R19)

Rosgen, D.L. 1996. Applied River Morphology. Wildland Hydrology, Printed Media Companies, Minneapolis, Minnesota. 353 pp (PF Doc. AQ-R22)

Rothacher, J. 1973. Does harvest in west slope Douglas-fir increase peak flow in small forest streams? U.S. Department of Agriculture, Forest Service Research Paper PNW-163. Washington D.C. 13 pp. (PF Doc. AQ-R24)

Shepard, B.B., B.E. May, W. Urie, C. Corsi, K. McDonald, R. Snyder, T. Unterwegner, J. Uehara and K. Walker. 2003. Status of Westslope Cutthroat trout (*Oncorhynchus clarkii lewisi*) in the United States: 2002, 94 pgs. (PF Doc. AQ-R16).

Skille, J. and E. Lider. 1988. Nutrient and Sediment Transport in the Hayden Creek Watershed. USDA-Forest Service: Progress Report. 16-pages. (PF Doc. AQ-R08)

State of Idaho. 1996. Governor Philip E. Batt's State of Idaho bull trout conservation plan. Boise, Idaho. July 1, 1996. (PF Doc. AQ-R02).

Thomas, R. and W. Megahan. 1998. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon: a second opinion. Water Resources Research 34:12. Pp. 3393-3403. (PF Doc. AQ-R09)

Troendle, C.A. and R.M. King. 1983. The effect of timber harvest on the Fool Creek watershed, 30 years later. Water Resources Research 21(12). (PF Doc. AQ-R13)

USDA Forest Service. 1981. Guide for Predicting Sediment Yields from Forested Watershsheds. Northern Region and Intermountain Region; Soil and Water Management. (PF Doc. AQ-R03)

USDA Forest Service. 2005. Fry Emergence Amendment Decision Notice and Finding of No Significant Impact. Idaho Panhandle National Forest. Coeur d'Alene, ID. 70 pages. (PF Doc. AQ-R32).

USDI Fish and Wildlife Service. 2007. Update of Forest- and District-wide species list, Endangered, Threatened, Candidate and Species of Concern within the Idaho Panhandle National Forests. SP# 1-9-07-SP-054. August 9, 2007. Spokane, Washington. (PF Doc. AQ-R15).

USDI Fish and Wildlife Service. 2005. Designation of Critical Habitat for the Bull Trout. Federal Register 50 CFR Part 17; Volume 70, Number 185. Final Rule – 101 pages. (PF Doc. AQ-R01).

3.5. SOIL PRODUCTIVITY

Soil is the unconsolidated mineral or organic material on the immediate surface of the earth that serves as the natural medium for the growth of land plants. A productive soil can sustain biological productivity, maintain environmental quality, and promote plant and animal health. The purpose of this report is to investigate and disclose the potential of effects of the proposed action on the soil resource.

3.5.1 Policy, Direction and Legal Guidance for Soil Productivity

The regulatory framework providing direction for protecting a site's inherent capacity to grow vegetation comes from the following principle sources:

- *The Multiple Use-Sustained Yield Act of 1960*
- *The National Forest Management Act of 1976 (NFMA)*
- *The Forest Plan and Regional Soil Quality standards (2554.03-R1 Suppl. 2500-99-1)*

The Multiple Use-Sustained Yield Act of 1960 directs the Forest Service to achieve and maintain outputs of various renewable resources in perpetuity without permanent impairment of the land's productivity. Section 6 of the NFMA charges the Secretary of Agriculture with ensuring research and continuous monitoring of each management system to safeguard the land's productivity. To comply with requirements, the Chief of the Forest Service charged each Forest Service Region to develop soil quality standards for detecting soil disturbances indicating a loss in long-term productive potential. In an effort to imply the most stringent standard, both Forest Plan and Regional Standards were incorporated into the analysis of the project. Management direction in the Forest Plan (p. II-17, PF Doc. Soil CR-02) is to manage the soil resource to maintain long-term productivity.

Forest Plan objectives and standards (Forest Plan, pp. II-32 and II-33, PF Doc. Soil CR-002) 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 (R-1 Supplement 2500-99-1; PF Doc. SOIL-R-58) were revised in November 1999. Manual direction recommends maintaining 85% of an activity area's soil at an acceptable productivity potential with respect to detrimental impacts, including the effects of 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 decline in productivity would have to be at least 15% to be detectable (Powers, 1990; PF Doc. SOIL-R-48). In activity areas where more than 15 percent detrimental soil conditions exists from prior activities, the cumulative detrimental effects from project implementation and restoration should not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality. These standards do not apply to intensively developed sites such as permanent roads/landings, mines, developed recreation and administrative sites.

3.5.2 Methodology Used in the Soil Productivity Analysis

Soil resource existing conditions were determined using TSMRS records, aerial photography, GIS data and field validation. Landtype descriptions and hazard ratings were gathered from the Idaho Panhandle National Forests Land Systems Inventory (USDA 1999, PF Doc. CR-019 and SOIL-2). The Proposed-Action Alternative was analyzed to allow for various harvest unit proposals and to identify those units that would require design modifications to achieve Regional and Forest Plan standards. Discrepancies of acres are possible due to rounding. Detailed field reports are included in the project file (PF Doc. SOIL-1).

Each proposed harvest unit was field reviewed in 2005/2006 by the District's Soil Specialist to verify existing soil conditions by conducting the "Onsite Assessment Method" outlined in Niehoff (2002; PF Doc. SOIL-R44; see also the soil assessment sheets/data in PF Doc. SOIL-1). Within the resource area, most of the previous harvests (PF Doc. SOIL-16) are identified in the TSMRS record, though a few past harvests in the earlier part of the 20th century have no historical records.

The disturbance spreadsheet (DS) evaluates the impacts of proposed activities on harvest units for each harvest method based on empirically derived coefficients that were obtained and averaged from numerous monitored sites throughout the Forest (IPNF Monitoring and Evaluation Reports 1988, 1991, 1993 and 1997, PF Doc. Soil CR-04, CR-07, CR-09, CR-13)(Niehoff 2002, PF Doc. SOIL-R-44). The DS is limited to the harvest and slash disposal methods for which coefficients have been determined, and its coefficients assume that the appropriate best management practices (BMPs) will be implemented. The DS does not account for changes in soil type, the recovery of soils over time, or existing conditions. The protocol for applying the DS is included in the "Soil NEPA Analysis Process and Source of Soil Disturbance Model Coefficients" (Niehoff 2002, PF Doc. SOIL-R-44).

3.5.3 Affected Environment for Soil Productivity

A. Geology and Soils

The resource area encompasses numerous face tributaries that flow either into Hayden Creek or directly into Hayden Lake. This setting is situated within the Hayden Lake Watershed, a series of subsidiary ridges descending from an accordant main ridge with well-incised dry to wet drainages.

Drainages are moderate to steeply sided. Valley fill is Quaternary age alluvial deposits with older gravel remnants indicating an abandoned river channel of Tertiary age. The bedrock is comprised of Precambrian Belt Supergroup metasedimentary geology that was uplifted as part of an early delta depositional feature. This mature landscape had major periods of aggradations, which have left the steep V-shaped valleys and eroded the pre-existing weathered soils, thus new parent material became partially weathered to non-weathered and evolved into the present day geomorphology.

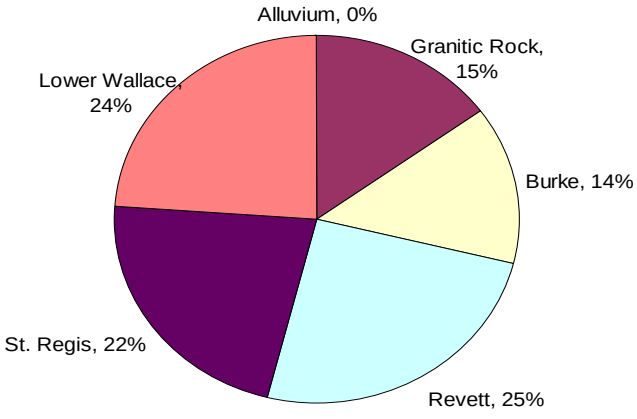


Figure 3-Soil-1. Geologic composition of the Deerfoot Resource Area.

Ridge tops in the resource area are generally broad with shallow soils that can be skeletal (rocky) in nature and exhibit a volcanic ash surface layer (6 to 12 inches deep). The deepest soils are located on the side slopes, in the draws and basin depression area where the ash-capped soils can attain a depth of 40+ inches. The ash-cap's soil texture is a silt loam with rock fragments found throughout the profile, averaging 3 to 35 percent. Subsoil's and substratums are developing in fractured parent rock (Belt metasediments) and have sandy to gravelly loam textures. Rock fragments increase with depth and can average 40 to 60 percent. As the parent rock fractures the soil has migrated down through the parent rock's interstices, which facilitates water percolation.

Outcrops of parent rock are usually situated as isolated features along the mid- to upper-slopes in conjunction with subsidiary benches having southerly aspects.

Throughout the resource area, the soil has developed in a mosaic pattern as dictated by topographic relief, vegetation, and aspect. An elevation difference of over 2,800 feet is attained between the Hadyen Lake valley bottom and Spades Mountain and consists of a mostly steep-sided and weak to moderately incised topography with tributary stream courses.

Figure 3-Soil-2 Satellite photo of Mt. Mazama, now known as Crater Lake.

Under the predominant timber stands a silt loam textured, ash capped soil has developed. The volcanic material accumulated from several of the Cascade volcanic eruptions with most of the ash originating from Mt. Mazama (Crater Lake) in Oregon about 7,600 years ago.

The uppermost part of the ash is usually enriched with organic matter that is incorporated into this part of the soil and has a high water- and nutrient-holding capacity, both of which are important for soil productivity, while the subsoils are not as fertile.

On some of the open slopes with scattered trees and light ground cover, the soil is ash influenced, but not capped. In these locations, the soil texture is more of a sandy loam and skeletal because of higher rock fragment content due to the close proximity of bedrock.

Along the broader valley bottoms, the upper riverine terraces exhibit moderately deep ash capped silt loam soils. On the lower alluvial flats that are influenced by fluvial events, the soil can be shallow and not well developed. These areas are not ash capped but have silt to coarse sandy loam textures. On some lower benches, an aggraded river cobble cap can be encountered that represent abandoned stream and river courses. Here the soil can be moderately thick with a loam or clay loam texture and is ash influenced.

Soils in the resource area are generally weakly weathered and have moderately to moderately high timber production potential. The ash cap soils are of a silt loam texture and are light reddish brown in color with a rock fragment content of 5 to 30 percent and depths of 6 to 10 inches. On the poorly vegetated slopes, usually on south aspects and steep ridge crests, soils are shallow (3 to 6 inches deep) and skeletal because of the high rock fragment content (40 to 50 percent) and are ash influenced with a brown to light brown color and silt loam to sandy loam texture. On the lower gradient drainages where the ash capped soils have pooled, their depths are moderately deep (12 to 18 inches).

The subsoil is more influenced by the underlying bedrock with a light brown color and sandy loam texture. Rock fragments in the subsoil can range between 20 to 65 percent. On a few subsidiary benches where subsoil is exposed in a road cut, its depth can be greater then 2 feet. Bedrock outcroppings are found close to some steep ridge crests, along steeply incised drainages. These are usually indicative of drier habitats, especially on the more southerly aspects.

B. Soils and Productivity

The most productive part of the soil occurs near the surface at the contact between the forest litter and the mineral soil. Here, the litter has been highly decomposed into dark colored amorphous material, which is the richest part of the soil. This layer is frequently only a few inches thick, but its presence is much more important than its thickness would indicate. This organic-matter-rich layer contains most of the soil nitrogen, potassium, additional nutrients, and mycorrhizae that must be present for a site to be productive.

Below the volcanic ash, the subsoils and substratum tend to be medium to coarse textured sandy to silt loam with angular rock fragments. These formations are very weakly weathered and generally have a high component of rock fragments, although this can be quite variable, particularly in the alluvial bottoms.

Retaining coarse woody debris (CWD) and organic matter is important in maintaining the soil's most productive layer. CWD is defined as woody material derived from tree limbs, boles, and roots greater than three inches in diameter and in various stages of decay. It performs many physical, chemical, and biological functions in forested ecosystems and is also a key habitat component for many wildlife species and for stream ecology (Graham et al. 1994, PF Doc. Soil R-21). Coarse woody debris in natural systems fluctuates with forest growth, mortality, fire, and decay.

Because CWD is such a valuable part of a functioning ecosystem, a portion of the material must be maintained to ensure that organic matter is recycled for long-term productivity. Harvest and slash burning should include precautions to maintain large wood to insure that soil function is maintained since both standing boles and down wood may be reduced.

The deep volcanic ash surface layer is very productive, but highly susceptible to compaction, displacement, and surface erosion, especially under wet conditions. Long-term damage to productivity from burning may occur if soil moisture is not sufficient to protect soil organisms (Borchers and Perry 1990; PF Doc. Soils-R-63) (Hungerford et al. 1991, PF Doc Soils-R-26), (Niehoff 1985, PF Doc. Soils-R-45).

Bare or disturbed soils may increase the presence of noxious weeds that can alter vegetative cover and soil stability and effectively reduce native plant species without providing comparable effective soil cover. This can lead to an increase in potential soil erosion, decrease in organic matter input into to the soil, and reduction in potential soil productivity.

Loss of Nutrients

Harvesting results in the removal of nutrients that accumulate in the wood and foliage over time. Of concern is the possible loss of potassium in the soil and its effect on forest health, especially the increased susceptibility to insects and disease (Garrison-Johnston et al. 2003 PF Doc. Soils-R-18,) and a possible link between potassium deficiency and the lack of tree resistance to root disease (Garrison-Johnston 2003 PF Doc. Soils-R-18). Research (Garrison-Johnston 2003; Garrison-Johnston et al. 2003; PF Doc. Soils-R-18) (Moore et. al 2004b; PF Doc. Soils-R-41), (Shen et al. 2001 PF Doc. Soils-R-53), suggests a complex balance between underlying geology and the natural deficiency of potassium in northern Idaho (Garrison-Johnston et al. 2007 PF Doc Soils-R-69). In comparison, soil nitrogen can be replenished more rapidly through nitrogen fixation or atmospheric deposition than can potassium, which is derived primarily from underlying geologic formation and is a product of slow weathering processes.

Natural deficiencies of potassium may occur within Belt series metasedimentary rock formations. The Belt Series supergroup is the main bedrock component throughout the Coeur d'Alene River Ranger District which includes the Deerfoot Resource Area. Areas of lower tree productivity appear to be related to the bedrocks weathering characteristics with some of the calcite and carbonate bearing rock of the Lower and Middle Wallace Formation now being possibly the more productive sites on Belt series rock (Garrison-Johnston et al., 2004; PF Doc. SOIL-63). Whole-tree yarding and removal of treetops can lead to the direct loss of potassium (Morris and Miller 1994, PF Doc. Soils-R-42). On some sites, 45 percent of the available potassium is retained in trees, with the remainder being held in subordinate vegetation, forest floor, and soil pools. Within the trees, about 85 percent of the potassium is held in the branches, twigs, and foliage (Garrison and Moore 1998, PF Doc. Soils-R-17). It is therefore vital to recycle as many nutrients as possible before removal, which can be done by overwintering small-scale debris to leach out potassium (Baker et al. 1989; PF

Doc. SOIL-R2; Barber and Van Lear 1984, PF Doc. SOIL-R3; Edmonds 1987; PF Doc. Soils-R-14) (Garrison and Moore, 1998; PF Doc. Soils-R-17) (Laskowski et al. 1995, PF Doc. Soils-R-32) and (Palviainen et al. 2003, PF Doc. Soils-R-46).

Most of the Deerfoot Resource Area's underlying bedrock formations are the Precambrian metasedimentary Belt series group which includes: 25 percent Revett, 24 percent Lower Wallace, 22 percent St Regis, 14 percent Burke, 15 percent Granitics and less than 1 percent alluvial deposits (Figure SOIL-1; Resource Area Geology Map, PF Doc. SOIL-15).

The Intermountain Forest Tree Nutrition Cooperative (IFTNC) continues to research potassium contents within tree species and different rock types in order to establish specific minimum thresholds for retention and effects of potassium on tree growth and resistance to root diseases (Mika 2005; Shaw 2005). Until these minimum thresholds are developed through research, the Idaho Panhandle National Forests are using management recommendations from the IFTNC as guidelines for maintaining sufficient potassium on a site. These measures have been incorporated into the design features for soils (see Chapter 2).

C. Existing Soil Conditions

Four criteria were used to assess existing conditions for soil resources:

- IPNFs Landtypes and hazard ratings
- Soils and productivity
- Wildfire and severely burned soils
- Conditions based on past activities in the proposed units

Land Types and Hazard Ratings

Thirty-one landtypes have been identified and mapped in the resource area, out of which 22 are in harvest units under the Proposed-Action Alternative. Descriptions of each landtype, detailed acreages and maps displaying landtypes and hazards are contained in the project file (PF Doc. SOIL-2, SOIL-3, SOIL-11, SOIL-12, SOIL-13, and SOIL-14). Hazard ratings have also been compiled and are listed in subcategories for mass failure, surface erosion, sediment delivery potential, and soil productivity. In the following tables, these are rated as low, moderate, or high for each landtype.

Mass Failure Potential is the relative probability of downslope movement of masses of soil material. Besides natural failure, landslides or slumping can be triggered by a number of mechanisms, including harvest activities, severe burning, and related road building.

Surface Erosion Potential is a rating of the relative susceptability of exposed soils to sheet and rill erosion.

Sediment Delivery Potential is a rating of the probability of eroded soil reaching a stream channel. By using slope gradient, slope shape, and distance to channel, a rating of low, moderate, or high potential is determined.

Soil Productivity is a rating of the relative capacity or ability of a soil to produce and sustain biomass.

Table 3-SOIL-1. Percent sensitive landtypes associated with harvest activities in the Deerfoot Resource Area and their potential for hazards, Proposed-Action Alternative.

Mass Failure Potential			Surface Erosion Potential			Sediment Delivery Potential			Soil Productivity		
L	M	H	L	M	H	L	M	H	L	M	MH
85%	13%	2%	100%	0%	0%	49%	48%	3%	28%	62%	10%

L – Low; M – Moderate; H – High; MH – Moderately High

Table 3-SOIL-2. Percent sensitive landtypes associated with prescribed burning activities in the Deerfoot Resource Area and their potential for hazards, Proposed-Action Alternative.

Mass Failure Potential			Surface Erosion Potential			Sediment Delivery Potential			Soil Productivity		
L	M	H	L	M	H	L	M	H	L	M	MH
72%	28%	0%	100%	0%	0%	37%	58%	5%	46%	48%	6%

L – Low; M – Moderate; H – High; MH – Moderately High

For the Proposed-Action Alternative, the 624 acres (any acre differences due to rounding) of harvest activity and associated underburns contain 86 percent (535 acres) of soils that have a low mass failure potential, 12 percent (78 acres) that have a moderate potential, and 2 percent (11 acres) that have a high potential (Table-3-SOIL-1, PF Doc. SOIL-3).

Within the 1,257 acres (acre differences due to rounding) of prescribed burning activity areas under the Proposed-Action Alternative, 72 percent (906 acres) of soils have a low, 28 percent (349 acres) have a moderate, and 0 percent have a high mass failure potential (Table-3-SOIL-2, PF DOC. SOIL-3).

Landtypes that exhibit moderate to high mass failure potential are located primarily on dissected stream breaklands, alluvial fans, moderate side slopes, incised drainages, their toe slopes, and stream headlands.

Removal of forest canopy and cover from either clearcutting or wildland fire increases landslide occurrence (Gray and Megahan 1981, PF Doc. SOIL-R-22; Megahan et al. 1978, PF Doc. SOIL-R-38). This is primarily due to root decay, soil disturbance, increased snow accumulation and altered melting rates, and soil water increases from reduced interception and transpiration.

Little research has been conducted to determine if partial cutting affects landslide rates. Megahan et al. (1978, PF Doc. SOIL-R-38) found that landslide occurrence increased only slightly when overstory canopy was reduced from 100 percent to 11 percent, but increased dramatically when canopy closure went below 11 percent. They also found that crown cover from shrubs affected landslide occurrence after 80 percent crown removal and indicated that landslide occurrence is more sensitive to shrub than tree crown removal.

All soil landtypes associated with proposed Alternative 2 harvest (624 acres) and prescribed burning activities (1257 acres) are rated low for surface erosion (Table-3-Soils 1 and 2; PF Doc. SOIL-3). The potential for soil erosion concerns on the Coeur d'Alene River Ranger District is not so much associated with harvest treatments as with existing roads (Cacek 1998, PF Doc. SOIL-R-7). The dominant processes in roaded portions are surface erosion from bare soil areas of roads, including the cutslope, fillslope, and travelway.

Revegetation of cut slopes and fill slopes are often difficult because of lack of soil moisture, organic material, low productivity potential, and desiccation of seeds and seedlings, especially on south-facing slopes. On moist slopes, revegetation efforts are more successful since erosion of road cut slopes and fill slopes is generally lower.

Road erosion and sediment yield usually decline after construction (Jones 2000, PF Doc. SOIL-R-30; Switalski et al. 2004, PF Doc. SOIL-R-56) but can provide a chronic, long-term source of sediment to streams within the resource area. Periodic large pulses of erosion may occur during intense water yield and overland flow events in interaction with road drainage systems. Roads and their associated impacts are analyzed in detail in the Specialist's Report on Aquatics.

Within the 624 acres of proposed Alternative 2 harvest activity areas, 49 percent (308 acres) of soils have a low, 48 percent (299 acres) have a moderate, and 3 percent (17 acres) have a high sediment delivery potential (Table-3-SOIL 1; PF SOIL-3).

Within the 1,257 acres of prescribed burning activity areas under the Proposed-Action Alternative, 37 percent (467 acres) of soils have a low, 58 percent (727 acres) have a moderate, and 5 percent (64 acres) have a high sediment delivery potential (Table-3-SOIL-2, PF Doc. SOIL-3).

The landtypes that exhibit moderate to high sediment potential are situated at low- to mid elevation on mid- to lower side slopes and adjacent to incised drainages. Because drainage courses and riparian zones are buffered and will not be entered or logged, the potential for increased sediment delivery from the moderately rated landtype units is minimal.

The landtypes in the resource area that rated as having a high sediment delivery potential to stream channels vary in their topographic setting from wide, low elevation stream bottoms to mid-elevation lower slopes/breaklands on deeply incised drainages and stream headlands. The majority (95%) of the activity units are located on Belt geology, with the remaining (5%) on residual granitics. As part of project planning, all stream bottoms have an INFS designated buffer zone that will not be entered by any proposed harvest activities. With established buffer zones, the potential sediment increases from fuel or timber management work is minimal.

Within the 624 acres of proposed Alternative 2 harvest activity areas, 28 percent (177 acres) of soils have a low, 62 percent (387 acres) have a moderate, and 10 percent (65 acres) have a moderately high productivity potential (Table-3-SOIL-1, PF Doc. SOIL-3).

Within the 1257 acres of proposed Alternative 2 prescribed burning activity areas, 46 percent (580 acres) of soils have a low, 48 percent (599 acres) have a moderate, and 6 percent (78 acres) have a moderately high productivity potential (Table-3-SOIL-2; PF Doc. SOIL-3).

Soils which are susceptible to reduced productivity potential are generally those located on shallow, rocky steep slopes on southerly aspects. Past of canopy removal within the Deerfoot Resource Area has affected soil moisture content in several ways. Precipitation may enter previously intercepted areas and provide existing or establishing vegetation with additional needed moisture and increase decomposition rates. Conversely, rain events may increase erosion on the newly-exposed soil, especially if the erosion potential is high, and reduce the availability of a growing medium. Furthermore, increased sunlight may also support plant growth or heat up soils to the extent that vegetation is inhibited.

When soils have adequate moisture conditions to retain their biological, chemical, and physical integrity, effects from the loss of forest floor can be minimized (Barnett 1989, PF Doc. SOIL-R-4; Frandsen and Ryan 1985, PF Doc. SOIL-R-15; Hungerford et al. 1991, PF Doc. SOIL-R-26; McNabb and Cromack 1990, PF Doc. SOIL-R-36). Prescribed underburning and pile burning could potentially remove woody debris that would otherwise provide nutrients to the soil as the decay process occurs (Page-Dumroese et al. 2006, PF Doc. SOIL-R-29). To help maintain coarse woodey debris requirements, prescribed burning, underburning, and pile burning should take place only when the upper surface inch of mineral soil has a soil moisture content of 25 percent by weight, or when duff moisture exceeds 100 percent, or when other monitoring indicates that soil productivity will be protected.

However, on an unpredictable site-specific basis, some drier sites may burn at a severity level that removes all of the protecting duff and litter layers, even under managed fire conditions. The duff and litter layer is important in protecting the soil horizons, both as reducing erosion potential and in maintaining soil moisture. Litter prevents the breakdown of soil aggregates and reduces the velocity of any overland flow, thereby reducing the erosion potential (Beschta 2004, PF Doc. SOIL-R-5).

Soils and Productivity

The soils found in the Deerfoot Resource Area owe their productivity to excellent nutrient-holding capacities and other favorable characteristics provided by an ash layer that can extend to over two feet deep in certain locations. However, these generally young and poorly developed soils can experience long-term deficiencies when biologically essential elements, like organic matter and coarse woody debris, are not sufficiently available.

Organic matter content varies throughout the resource area (PF Doc. SOIL-1 and SOIL-6) and appears to be optimum or low on the south-facing and higher on the north-facing slopes. Its variability and depth is natural and usually correlates to habitat type and aspect with excessive needle cast often decreasing the establishment of a more herbaceous cover. Exclusion of fire has also contributed to increased duff accumulations.

Coarse woody debris was found to be variable as well (PF Doc. SOIL-1 and SOIL-6). Some stands contain higher amounts of downed wood, generally on sites that that have never been harvested and have been excluded from wildfire for a long period of time, but were affected by the 1996 ice storm and subsequent Douglas-fir beetle outbreak. Drier south-facing slopes naturally have lower levels of CWD than the moist northerly facing slopes. Other dry south-facing slopes have lower CWD levels that reflect past management activities including salvage and fuel treatments that have reduced fuel loads. It is important on these drier south facing aspects where soils are shallower to retain some CWD for the long-term productivity of the site. Removal of the CWD component and their nutrient-holding capacities can not only reduce the productivity of the site, but can also cause stress leading to increased mortality from insect and disease.

Whole-tree yarding and removal of treetops can also reduce nutrients, woody material, and lead to the direct loss of potassium (Morris and Miller 1994, PF Doc. SOIL-R-42). However, none of the proposed activity areas will be whole-tree logged.

Wildfire and Severely-burned Soils

The last fire large enough to be mapped occurred in 1930 (73 acres) close to the time that effective fire suppression was initiated in the Deerfoot Resource Area (PF Doc.FF-55). Considering both wildfires and prescribed burning, records show that about 1115 acres has burned since 1931 (PF Doc FF-54, FF-41). Based on the average fire return interval from Zack and Morgan, during that same period approximately 19,000 acres would have burned in the resource area; some areas being visited more than once by fire. A deficiency of that magnitude has likely had considerable effects on the vegetation in the resource area (lSee fire fuels section pg. 3-43).

Natural disturbance events commonly reset watersheds and influence water quality and stream habitat. Wildfire is a natural component in forest watersheds, and has influenced forest soils and watershed processes for thousands of years. However, as a result of fire suppression during the last century, natural fire regimes do not exist anywhere in north Idaho today (Smith and Fisher 1997, PF Doc. SOIL-R-54).

Depending on the intensity of the fire and the severity of its effects, wildfire can alter watershed soils by consuming the erosion-limiting litter layer at the top of soils and the binding organics within the soil (Ice 2003, PF Doc. SOIL-R-27). Condensation of volatized organics on soil surfaces often result in water-repellant (hydrophobic) soil conditions (DeBano 1981, PF Doc. SOIL-R-10; Doerr et al. 2000, PF Doc. SOIL-R-11; Dyrness 1976, PF Doc. SOIL-R-13) that can contribute to overland flow and increased in-channel failures (Ice 2003; PF Doc. SOIL-R-27).

D. Site Conditions from Past Harvest Activities

Within the proposed activity areas, field verification located evidence of past harvesting activities (Table 3-SOIL-3; PF Doc. SOIL-1). Also noted are the existing road networks associated with private land access and past timber harvests. Other areas of activity are past helicopter yarding units and some skid trails on gentler ground.

Commercial thinning and salvage operations were the first recorded entries into the area started in the early to middle 1960's and continued into the early 1970's. These early entries targeted mature, single tree extractions and overstocked areas. The majority of the activity occurred in the headwater areas of Mokins, Jim and Yellowbank Creeks after extensive road building. The main system for extraction of logs was by short cable-jammer work from those newly constructed roads. Except for the scattered stumps, no evidence of soil disturbance associated with those activities was evident. A few areas were also mechanically skidded in this time frame as evidenced from visible trails. When sampled, the trails still show varying severity of soil compaction levels.

In the 1990's the Deersham Timber Sale entered areas accessed off Road 206 in upper Stump, Nilsen and Mokins Creek drainages. Additional roads were constructed and yarding methods consisted of both tractor or cable methods. Little evidence of soil disturbance or compaction was evident in the areas that had been cable yarded. In areas of tractor yarding, the trails were still visible and highly compacted to a depth of greater than 6 inches (Disturbance Class 3) , however spaced throughout the activity area. This spacing of the trails

reduced the number of acres of both soil displacement and compaction, however some of the trails are still highly compacted.

Scattered salvage operations occurred after the ice storm of 1996 and subsequent Douglas-fir beetle outbreak. The majority of the salvaged timber was removed using helicopter yarding, though some small areas of cable and tractor yarding were used. In areas of cable yarding, no evidence of soil displacement or compaction were visible and, with the exception of some stumps, it was difficult to see where any harvest activities had occurred. The tractor yarding areas still showed visible signs of trails, some displacement and highly compacted treads. Very little evidence of off trail skidding was found leaving more of the area in an undisturbed state.

The major disturbance factor associated with the the previous activities are the 40 to 50 year old cable-jammer and tractor units and the remaining road transportation routes. These roads were calculated as part of the past disturbance level as an irretrievable effect when not considered as part of the District's Forest Development Road system.

Table 3-SOIL-3. Existing conditions for harvest treatment units following guidelines in Niehoff (2002, PF Doc. SOIL-R-44). See project file for proposed prescribed burning units, (PF Doc. SOIL-17).

Unit #	% Disturbance			% Organic Matter			Coarse Woody Debris (tons per acre)
	Class 1	Class 2	Class 3	< ¾inch (low)	¾- 1¾ inch (optimal)	> 1¾ inch (too much)	
1	90	10	0	16	70	14	5.5
2	86	8	6	26	73	1	4.8
3	100	0	0	13	67	20	23
4	100	0	0	29	47	24	8.1
5	99	1	0	11	84	5	4.3
6	97	2	1	20	76	4	6.3
9	100	0	0	10	81	9	6.9
10	100	0	0	22	70	8	4.6
11	83	13	4	17	77	6	8.2
12	97	3	0	23	72	5	6.3
13	78	22	0	24	69	7	6.3
14	100	0	0	13	67	20	1.0
15	94	5	1	31	63	6	3.7
16	98	2	0	26	66	8	4.4
17	100	0	0	60	40	0	1.0
20	99	1	0	20	76	4	5.3
23	100	0	0	13	70	17	9.1
24	91	8	1	11	79	10	5.1
25	97	3	0	9	82	9	4.3
28	86	11	3	12	66	22	5.1
29	86	11	3	12	66	22	5.1
30	90	6	4	22	68	10	11.6
31	98	2	0	22	74	4	9.2

Class 1*: Natural Condition – Soil is undisturbed and therefore, represents the condition against which other categories are compared.*

Class 2*: Slight Soil Disturbance – Evidence of disturbance from logging or burning but observable soil characteristics do not meet detrimental soil damage criteria defined in Regional Soil Quality Standards.*

Class 3*: Detrimental Soil Disturbance – Evidence of detrimental disturbance based on observable soil characteristics indicating that the site meets detrimental soil damage criteria defined in the Regional Soil Quality Standards. Detrimental soil disturbance cannot exceed 15% of an activity area.*

3.E. Existing Roads and Transportation

The present road system designated as "classified" (Forest Development Roads) on the National Forest transportation system are considered dedicated lands and total approximately 67 miles within the Resource Area (PF Doc. SOIL-4). There are approximately 31 miles of unclassified roads that are not considered Forest Development Roads (PF Doc. SOIL-4), the majority of which were created in the late 1960's to early 1970's. There is also approximately 23 miles of road on private land throughout the resource area. Roads are categorized as "classified" (dedicated under the area transportation plan) or "unclassified" (non-dedicated roads, which are not considered necessary for long-term forest management objectives). In both cases, the loss of soil productivity on either category of road is often considered irretrievable.

3.5.4. Environmental Consequences to Soils

A. Methodology Used to Analyze Environmental Consequences to Soils

This analysis includes potential effects from proposed logging systems, unclassified and temporary roads, landings, and prescribed burning treatment on soils. To determine whether proposed activities would detrimentally impact or have cumulative effects on soils, the IPNF Soil NEPA Analysis Process (Niehoff 2002, PF Doc. SOIL-R-44) was used. For each alternative, the detrimentally disturbed acres were calculated using coefficients based on past IPNF soil monitoring data. The coefficients were developed as an average soil disturbance level and equated to harvest equipment; time of year (summer vs. winter logging), fuel treatment methods, and the time of year fuel treatment took place. Since the coefficients are based on an average, the areas that have had prior harvest activities could have soil disturbance levels lower or greater than the coefficient's average. This monitoring information is contained in Forest Plan Monitoring and Evaluation Reports and is summarized in the IPNF Soil NEPA Analysis Process (Niehoff 2002, PF Doc. SOIL-R-44). Calculations incorporated the acres and types of proposed logging, burning, and roads/landings constructed for direct and indirect effects.

Based on past monitoring efforts (Niehoff 2002, PF Doc. SOIL-R-44), tractor logging prior to 1990 has had the most detrimental soil impact and ranged between 24 and 42 percent. Since 1990, tractor logging methods and recommended protection measures have decreased most detrimental impacts to an average of 13 percent (Niehoff 2002, PF Doc. SOIL-R-44), which is two percent less than the maximum allowable criteria established by the Regional guidelines. Helicopter and skyline/cable logging systems tend to have between 0 and 2 percent detrimental effects (Niehoff 2002, Doc. SOIL-R-44) and (McIver and Starr 2000, pp. 11-16, PF Doc. SOIL-R-35). These logging systems have less impact than tractor systems because the equipment stays on the road and the logs are partially suspended, restricting impacts to times when logs are being dragged over the ground (Krag 1991, PF Doc. SOIL-R-31; Seyedbagheri 1996, pages. 7-9; PF Doc. SOIL-R-51). Helicopter logging has minimal impacts as the logs are lifted into the air and transported to a landing site (Poff 1996, PF Doc. SOIL-R-47; McIver and Starr 2000, pages 11-16; PF Doc. SOIL-R-35). The landing site is usually one-half to one acre in size and receives the most impact from ground-based equipment that processes and transports the logs. These landings are considered dedicated lands just like the system roads.

Direct effects on soils from proposed activities were measured by analyzing the effects of compaction, erosion, severe burning, rutting, and displacement on the soil surface that is the most productive layer and the easiest to disturb through activities. Potential impacts would result from the type of logging system and fuel treatments used and area disturbed due to construction of roads and landings.

Compaction, displacement, rutting, and severe burning can affect the soils physical, chemical, and biological properties, which indirectly can affect the growth and health of trees and other plants. Compaction reduces soil permeability and infiltration, which can cause soil erosion. Displacement reduces plant growth where topsoil and organic matter are removed. Severely burned soils can become hydrophobic (water repellent) and lead to increased erosion, runoff, and/or reduced productivity.

Tractor, skyline/cable, and helicopter logging systems would be utilized under the Proposed Action. Roads and landings that are to remain on the landscape for future use cause irretrievable effects on productivity as those lands become "dedicated" lands. Those roads that are temporarily needed for project work and are

planned for decommissioning have detrimental effects initially, but rehabilitation efforts (decompacting, recontouring) would initiate a long-term recovery sequence. Vegetative recovery time is approximately 30 to 40 years as the second-growth timber becomes established around the disturbed areas and develops enough crown foliage to intercept and evapotranspirate moisture (Dykstra and Curran 2002, PF Doc. SOIL-R-12; and Froehlich et al. 1985, PF Doc. SOIL-R-16).

Table 3-SOIL-4. Potential detrimental disturbance coefficients used for various logging and prescribed fire scenarios.

Tractor Logging	Detrimental Disturbance Coefficients (%)
With spring burning	13
Skyline or Helicopter Logging	
Helicopter logging	0 - 1
Skyline or helicopter logging with fall burning on south/southwest aspects	2

Acres of detrimental disturbance were calculated by multiplying the areas of activity disturbance by the disturbance coefficient derived from monitoring reports. Coefficients used for proposed logging systems are displayed in Table 3-SOIL-4.

Road calculations used 30-foot widths that take into account a 14-foot wide running surface and includes the cut and fill slope disturbance. Log landing areas associated with proposed units are accounted for in the calculations. Log landings that are proposed outside of any harvest units are each calculated as one acre. Effects to these areas would be considered irretrievable and identified as “dedicated” lands.

Indirect effects include the loss of site productivity due to the removal of large woody debris and nutrients. Large woody debris is essential for maintenance of sufficient microorganism populations and long-term site productivity. Research has indicated that potassium (among other nutrients) is an important element for site productivity and may be deficient among certain Belt Supergroup formations. Design features are incorporated into the activities to meet the management of large woody debris and organic matter as detailed in the research guidelines contained in Graham et al. (1994, PF Doc. SOIL-R-21). These recommendations emphasize tons per acre and are defined as any woody residue larger than three inches in diameter.

On potassium limited sites, tree tops, foliage, and branches would be left to over winter, which allows potassium to leach out of these materials (Baker et al. 1989, PF Doc. SOIL-R-2; Barber and Van Lear 1984, PF Doc. SOIL-R-3; Edmonds 1987, PF Doc. SOIL-R-14; Garrison and Moore 1998, PF Doc. SOIL-R-17; Laskowski et al. 1995, PF Doc. SOIL-R-32; and Palviainen et al. 2004, PF Doc. SOIL-R-46). The reduction of available potassium leaching back into the soil profile could affect tree growth.

Since this is a fuels reduction project, determination of fire risk where slash is left untreated for prolonged periods of time will be made by the district fire management officer. Where fire risk is considered high, especially near structures, flexibility will be given to treat slash prior to it being left for 6 months.

Cumulative effects include the combination of direct and indirect effects from past, present, and reasonably foreseeable activities. Since direct and indirect effects on soils are measured within the activity areas, the cumulative effects analysis area for the soil resource consists of the cumulative impacts within each of activity areas. The additive effect of any reasonably foreseeable actions (identified in Table 2-1) would be considered.

Existing roads and landings designated as classified on the Forest transportation system are considered dedicated lands. The loss of soil productivity on these sites occurred when the roads and landings were constructed and are an irretrievable effect. These lands are not considered a part of the cumulative effects because they are now included as a capital investment to the permanent transportation system.

B. Direct and Indirect Effects to Soils under Either Alternative

Given the decades of fire suppression in the resource area, the chance of a lethal wildfire occurring could be high if an ignition starts in an untreated area during extreme dry weather conditions. The proposed vegetation and fuels treatment in the resource area would not necessarily prevent lethal wildfires from occurring, but would increase the ability to suppress such a fire should the ignition occur in the treated areas. The probability of a high severity fire is not certain to occur within the project area during a given timeframe. The fact, however, is that when a fire breaks out, the chances for high severity fire effects on soils can be much higher in untreated areas with excessively heavy fuel loads compared to those that have successfully completed treatment, including post-harvest logging slash (Certini 2005, PF Doc. SOIL-R-65, Cram et al. 2006, PF Doc. SOIL-R-66, Graham et al. 2004, PF Doc. SOIL-R-68, Gorman 2003, PF Doc.SOIL- 64, Keane et al. 2002, PF Doc.SOIL-R-67). Vegetation and fuels treatments would reduce the chance that a wildfire could have a severe effect on the soils in treated areas as it could in untreated areas because there would be a reduction in the tons per acre of fuels on those treated sites.

The occurrence of a high intensity wildfire would have a high potential for impacts to soils and soil productivity in severely burned areas, especially since the risk of soil erosion increases proportionally with fire intensity (Megahan 1990, p. 146; PF Doc. SOIL-R-37). Ashes that have burned white or a reddish color indicate that much of the organic carbon was oxidized and is no longer available to the soil. Other effects would include the loss of organics, loss of nutrients, and a reduction of water infiltration (Wells et al. 1979, p. 26; PF Doc. SOIL-R-57). 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 (Hungerford 1991, PF Doc. SOIL-R-26; Neary et al. 2005, PF Doc. SOIL-R-42). Nutrients stored in the organic layer (such as potassium and nitrogen) can also be lost or reduced through volatilization and as fly ash (DeBano 1991, pp. 152-153; PF Doc. SOIL-R-9; Amaranthus et. al. 1989, p. 48; PF Doc. SOIL-R-1).

Fire-induced soil hydrophobicity (is presumed to be a primary cause of the observed post-fire increases in runoff and erosion from forested watersheds (Huffman et al. 2001, PF Doc. SOIL-R-25). Though hydrophobicity is a naturally occurring phenomenon that can be found on the mineral soil surface, it is greatly amplified by increased burn severity from both prescribed burns and wildfires (Huffman et al. 2001, PF Doc. SOIL-R-25; Neary et al. 2005, PF Doc. SOIL-R-43).

Figure 3-3 A small hydrophobic patch with pooled water bead.

Soil hydrophobicity usually returns to pre-burn conditions in no more than six years (DeBano 1981, PF Doc. SOIL-R-10). Dyrness (1976, PF Doc. SOIL-R-13) and other studies have documented a much more rapid recovery of one to three years (Huffman et al. 2001, PF Doc. SOIL-R-25).

The persistence of a hydrophobic layer will depend on the strength and extent of hydrophobic chemicals after burning and the many physical and biological factors that can aid in breakdown (DeBano 1981, PF Doc. SOIL-R-10). This variability means that post-fire impacts on watershed conditions are difficult to predict and to quantify.

If hydrophobic soils result from severe, high temperature fire, low to moderate surface erosion would occur and the potential for mass failures would also be low to moderate because of the Deerfoot Resource Area's overall landtype characteristics. The areas of primary risk after a severe burn are toe slopes and breaklands adjacent to streams. Following a severe fire, rehabilitation efforts to mitigate the fire's effects on erosion and

sediment delivery would be performed as funding became available. If completed in a timely manner, rehabilitation work could negate most of the erosion concerns.

C. Direct and Indirect Effects to Soils under the No-Action Alternative

Under this alternative, no new management induced detrimental soil impacts would occur in the Deerfoot Resource Area. On a landscape scale the restoring of ponderosa pine, western larch and white pine would not occur. Timber stands would continue to reflect past management practices that selectively harvested seral species, leaving the more pathogenicly prone Douglas- and grand firs. Stand conversion to more site-appropriate tree species would be delayed or may never occur relative to the Proposed-Action Alternative.

No direct effects to the soil resource would occur under the No-Action Alternative since there would be no road construction, logging, or fuel treatment activities. There would be no compaction or displacement beyond what currently exists. Throughout the silvicultural landscape, tree mortality from pathogens, insects and weather events would continue as in the past, which has a direct influence on the area's recycling of organic matter and changes in fuel loading.

Stands currently at high risk for insect or disease mortality would not be treated, which may increase the risk of stand loss due to wildfire, severe burning, and loss of soil nutrients. Moreover, 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. However, stand conversion back to more site-appropriate tree species would be delayed in comparison to the Proposed Action.

D. Direct and Indirect Effects to Soil under the Proposed-Action Alternative

The effects of the Proposed-Action Alternative on the soil resource were assessed based on their potential to create detrimental impacts and to affect soil productivity. To reduce the impacts to soils and soil productivity, the Proposed Action utilizes Soil and Conservation practices as described in the Soil and Water Conservation Practices (SWCP) Handbook FSH 2509.22 (PF Doc. SOIL-R-72) and Appendix A, which outline the Best Management Practices (BMPs) that protect the soil and water resources at a higher level than do existing Idaho Forest Practices rules and regulations, thereby incorporating all Idaho state standards.

The techniques and their effectiveness are documented in several publications (Seyedbagheri 1996, PF Doc. SOIL-R-51; Lynch and Corbett 1989 and 1990, PF Doc. SOIL-R-34 and PF Doc. SOIL-R-33; Idaho DEQ 2001, PF Doc. SOIL-R-28). The BMPs would have a high effectiveness in minimizing soil compaction and displacement, address seeding of disturbed areas, limit operations when soil moistures are high, and address conduct of logging. "Features Designed to Protect Soil and Site Productivity," would be implemented (following guidelines in Niehoff, 2002; PF Doc. SOIL-44) as part of the Proposed-Action Alternative to ensure that activities are consistent with Forest and Regional guidelines in terms of soil compaction, displacement and nutrient retention (PF Doc. SOIL-21).

Proposed activities, existing and potential disturbance, and soil standards are displayed in Table 3-SOIL-5, reflecting effects of implementing Proposed-Action Alternative activities (PF Doc. SOIL-18).

Direct and Indirect Effects of Harvest Treatments - A direct effect of management actions would be an increase in detrimental soil disturbance such as compaction and displacement, particularly in harvest units where multiple activities such as road and landing construction, fuel treatments, and tractor logging are planned. Minor disturbances would occur on helicopter and skyline units and where hand fireline is constructed around a perimeter. Past monitoring shows these impacts result in virtually no detrimental conditions (USDA 1991, PF Doc. CR-007, Niehoff 2002, PF Doc. SOIL-R-44, USDA 2005-2006 Draft Forest Plan Monitoring Reports for Soils, PF Doc. SOIL-R-70).

Table 3-SOIL-5 displays activity units that contain tractor, helicopter, and skyline logging for the Proposed-Action Alternative as well as fuel treatments that will be discussed later in this section. Results show that none of the units would exceed any standard though five of the 23 proposed harvest units are near the Regional Standard for detrimental disturbance limit of 15 percent, with one harvest unit near the Forest Plan Standard of 20 percent. These results include all past disturbances as well as potential disturbance from proposed activities.

Units 6, 11, 15, 23 and 28 are all proposed as tractor yarding. All five of these units have had previous commercial harvest in the past using helicopter, cable, and tractor yarding systems. As outlined in Chaper II, re-use of old skid trails in those areas of previous tractor yarding, design features of designated skid trails of 100 feet apart when ever possible, and yarding when soil moisture is dry within the remaining portions of the activity area should limit the detrimental disturbance and keep the impacts below the required standards. Additionally in unit 11, directional falling of timber towards the haul road would drastically reduce or eliminate the majority of the potential detrimental disturbance, keeping the impacts well below the required standards.

Unit 14 is a two-acre skyline unit that has not been entered before and is well below the Regional Standard of 15 percent. The system road that borders Unit 14 is to be used during skyline operations. Forest Plan Standards accounts for all roads whether system or non-system in determining detrimental impacts. This road accounts for 16 percent of the impacts within the unit, however, with the use of skyline yarding system and potential of an additional 1 to 2 percent detrimental disturbance, it is not expected to exceed either the Forest Plan or Regional Standards.

Other units show varying degrees of elevated disturbance levels, mostly associated with existing non-system and system roads within the activity areas. Design features and ground skidding specifications are therefore incorporated into the harvest standards (Features Designed to Protect Soil and Site Productivity, PF SOIL-21) to reduce potential impacts.

Table3, SOIL-5. Existing and potential disturbance to soils under the Proposed-Action Alternative.

	Proposed Activities				Existing and Potential Disturbance						Standards	
Unit	Activity Area	Proposed Treatment	Harvest System	Proposed Slash Treatment	Existing Disturbance Acres	Potential Disturbance Acres	Non-system Road Ac.[4]	System Road Landing Ac[4]	Temporary and Skid Road Ac.	Total Acres	Regional Standard %	Forest Plan Standard %
1	28	SW	S	UB	0	0.56	0	1.85*	0	2.41	2	9
2	66	SW	H	UB	3.96	1.32	0.44	0	0	5.72	9	9
3	8	CT	S	UB	0	0.16	0	0.56	0	0.72	2	9
4	22	SW	H	UB	0	0.44	0	0	0	0.44	2	2
5	29	SW	S	UB	0	0.58	0	0.91	0	1.49	2	5
6	45	SW	T	UB	0.45	5.85	0	0	0	6.30	14	14
9	15	R	N/A***	UB	0	0.30	0.80	0	0	1.10	7	7
10	45	SW	S	UB	0	0.90	0	1.19	0	2.09	2	5
11	3	SW/CT	T	UB	0.12	0.39	0	0	0	0.51	13	13
12	48	SW	S	UB	0	0.96	2.22	0.67	0	3.85	7	8
13	38	SW	S	UB	0	0.76	0	1.31	0	2.07	2	5
14	2	SW	S	UB	0	0.04	0	0.32	0	0.36	2	18****
15	10	SW	T	UB	0.10	1.30	0	0	0	1.40	14	14
16	66	SW	S	UB	0	1.32	1.34	1.96	0	4.62	4	7
17	5	SW	H	UB	0	0.10	0	0	0	0.10	2	2
20	4	SW	H	UB	0	0.08	0	0	0	0.08	2	2
23	7	SW	T	UB	0	0.91	0	0	0	0.91	13	13
24	53	SW	S	UB	0.53	1.06	0	0	1.83	3.42	6	6
25	38	SW	H	UB	0	0.76	0	0	0	0.76	2	2
28	14	SW/CT	T	UB	0.14	1.82	0	0	0	1.96	14	14
29	33	CC/R	S	UB	0.33	0.66	0	0	0.68	1.67	5	5
30	30	SW	S	UB	1.2	0.60	0	1.95	0	3.75	6	14
31	16	SW	H	UB	0	0.32	0	0	0	0.32	2	2
50	22	B	N/A***	UB	0	0.44	0	0	0	0.44	2	2
51	27	B	N/A***	UB	0	0.54	0	0	0	0.54	2	2
52	55	B	N/A***	UB	0.55	1.10	0	0.32	0	1.97	3	4
53	6	B	N/A***	UB	0	0.12	0	0	0	0.12	2	2
54	122	B	N/A***	UB	0	2.44	0	3.09	0	5.53	2	5
55	52	B	N/A***	UB	0	1.04	1.34	2.63	0	5.01	5	10
56	88	B	N/A***	UB	0	1.76	0	0	0	1.76	2	2

Table 3, SOIL-5. Existing and potential disturbance to soils under the Proposed-Action Alternative, continued.

	Proposed Activities				Existing and Potential Disturbance						Standards	
Unit	**Activity Area**	**Proposed Treatment**	**Harvest System**	**Proposed Slash Treatment**	**Existing Disturbance Acres**	**Potential Disturbance Acres**	**Non-system Road Ac.[4]**	**System Road Landing Ac.[4]**	**Temporary and Skid Road Ac.**	**Total Acres**	**Regional Standard %**	**Forest Plan Standard %**
57	309	B	N/A***	UB	3.09	6.18	2.57	3.95	0	15.79	4	5
58	205	B	N/A***	UB	0	4.10	0.93	0	0	5.03	3	2
59	197	B	N/A***	UB	1.97	3.94	10.8	6.60	0	23.31	8	12
60	33	B	N/A***	UB	0	0.66	0	0	0	0.66	2	2
61	44	B	N/A***	UB	0.88	0.88	0	0.63	0	2.39	4	5
62	68	B	N/A***	UB	0.68	1.36	0	0	0	2.04	2	2
63	29	B	N/A***	UB	0	0.58	0	0	0	0.58	2	2

SW - Shelterwood CT - Commercial Thin CC – Clearcut / Reserves R - Rehab B - Burn Only RA - Resource Area	H - Helicopter S - Skyline T – Tractor UB - Underburn BB - Broadcast Burn	**Harvest acres** **Fuels-only acres** **Total Proposed-Action Alternative acres** **Total Resource Area acres**	**624** **1,257** **1,881** **10,540**	**Existing disturbance acres[1]** **Potential disturbance acres[2]** **Total disturbance acres[3]**	**61** **50** **111**

** Only 0.23 miles of the total new construction use as disturbance within unit 1, the remaining portion is outside the activity area boundary. There are 3 helicopter landings in the resource area, with one in unit 1. All helicopter landings assume 1 acre of disturbance.*
*** Any minor acre differences are due to rounding.*
**** The N/A under harvest system is associated with burn only and rehab units, no mechanical treatment will occur.*
***** Unit 14 is only two acres with a system road that borders the upper boundary that is proposed to be use for skyline yarding. Under Forest Plan Standards the activity area is not to exceed 20% detrimental disturbance, not only from harvest activities, but also from both system and non-system roads. Under Regional Standards the activity area is not to exceed 15% detrimental disturbance from harvest activities and non-system roads. The system roads and helicopter landings under Regional Standards are considered irretrievable effects on productivity as these lands become "dedicated" to the permanent transportation system. Of 18% associated disturbance for unit 14, 16% is due to the presence of the system road. Very little disturbance is expected from the actual harvest activities.*
[1]. Existing Disturbance Acres which includes; past harvest, yarding, landings and both system and non-system roads.
[2]. Potential Disturbance associated with proposed harvest activities, burning, new and temporary road construction and any new helicopter landings.
[3]. Total past and potential disturbance within the activity areas.
4 See PF Doc. Soil-5 for conversion of road miles to acres,

The fuel treatments in harvest units under the Proposed-Action Alternative consist of all underburns except one 15-acre rehabiltation unit that would be slashed and broadcast burned (Table SOIL-6).

Table 3-SOIL-6. Distribution of harvest treatments under the Proposed-Action Alternative.

Treatment	Proposed-Action Alternative
Helicopter	151
Cable	380
Tractor	78
Total	**609**
Underburn	609
Broadcast Burn	15
Total	**624**
Commercial Thin	8
Shelterwood/Commerical thin	17
Shelterwood	551
Clearcut with Reserves	33
Rehab	15
Total	**624**

Most of the proposed harvest activities (Table 3- SOIL-6), i.e. helicopter and skyline/cable, would occur during the dry summer and early fall months. Under the Proposed-Action Alternative, 151 acres are identified for helicopter yarding, 380 acres of skyline/cable yarding and 78 acres of tractor yearding. All tractor work would be scheduled during the summer months and early fall when the soil profile is dry or during the winter months if the ground was frozen. This scheduling would further reduce effects of compaction and displacement.

Under the Proposed-Action Alternative, approximately 111 acres are estimated to be potentially disturbed in accordance with the Forest Plan Standards and 84 acres with the Regional Standards throughout the entire Deerfoot Resource Area. The disturbance associated with the Proposed-Action Alternative is predicted to occur primarily in activity locations subjected to tractor logging during non-winter months. When considering all harvest activities existing and proposed, roads both system and non-system, landings and burning within the activity areas, the total disturbance level of six percent under the Forest Plan Standards and four percent under the Regional Standards. Results of disturbance calculations are included in the Project File (Doc. SOIL-8 and SOIL-19).

The proposed logging consists mostly of helicopter and skyline/cable which, based on past monitoring, would result in an overall soil disturbance level of approximately one to two percent. No grapple-piling or other ground-based disturbance is proposed with the treatment of fuels (Table 3 SOIL-6). As previously discussed, tractor logging is a minor yarding component, but can have the most detrimental effect to the soil resource. "Features Designed to Protect Soils and Site Productivity" (PF Doc. SOIL-21), in addition to BMPs would be used to decrease the effect of ground-based yarding systems (Appendix A). Based on monitoring of existing conditions and estimated potential impacts, proposed harvest Units 6, 11, 15, 23, and 28 should receive the highest attention levels to ensure that proper design features are used to meet required soil quality standards.

All skyline landings would be located on system roads. Disturbance on these sites due to compaction, displacement, rutting, and pile burning could have additional detrimental effects. Landings located within harvest units that have higher compaction levels (Units 1, 24 and 30) would be rehabilitated with scarification, seeding, and allowing slash to decompose on site. These measures would help restore soil productivity in the long term. From past timber sale activities within the resource area, 2 helicopter log landings have been established and 1 more would be constructed. These sites total approximately 3 acres that are irreparably disturbed and are considered part of the permanent transportation system.

The logging slash would remain within all harvest units and be allowed to overwinter one or two seasons before underburning. This would allow the nutrients from foliage and branches to leach into the soils organic layer to recycle nutrient capital, especially potassium. Where fire risk is considered high, flexibility will be given to hand pile slash prior to it being left for 6 months. The amount of coarse woody debris will likely be kept at the

lower end of the recommendations in several locations near the roadsides and private property boundaries in order to address the hazardous fuels reduction requirements. Determination of fire risk where slash is left untreated for prolonged periods of time will be made by the district fire management officer.

Direct and Indirect Effects of Prescribed Burning Treatments – The proposed prescribed burning associated with Alternative 2 would re-introduce fire to dry-site ecosystems using prescribed underburns that consist of a combination of underburn only fuel reduction units and broadcast burn in the rehab unit. (Table 3- SOIL-7). The total underburn fuel reduction only acres are 1257 acres and 15 acres of broadcast burning.

Table 3-SOIL-7. Distribution of prescribed and broadcast burning treatments under the Proposed-Action Alternative.

Treatment	Proposed-Action Alternative
Prescribed Burn	1257
Broadcast burn	15
Total	**1272**

Approximately 25 acres are estimated to be potentially disturbed by fuels treatment within the activity units (PF SOIL-8). This estimate is likely a maximum since every acre identified within the burn only units is considered. However, the actual number of acres potentially disturbed should be much smaller due to limitations of burning in some areas, especially since heavily canopied areas in these units will not be burned, reducing the potential disturbed acres. The disturbance is predicted to occur primarily from localized areas that may be subjected to increased temperatures during the burning, however recent monitoring has found less than two percent use in the disturbance model (PF Doc. SOIL-R-70 and PF Doc. SOIL-R-71). When considering all fuel treatment activities within the resource area, the total disturbance level is two percent. Results of disturbance calculations are included (PF Doc. SOIL- 8).

Burning under controlled conditions of high soil moisture reduces potential nutrient losses and the chance of creating hydrophobic soils that can lead to increased erosion, sedimentation, and debris flows (Neary et al. 2005, PF Doc. SOIL-R-43; Robichaud 2000, PF Doc. SOIL-R-50; Swanson 1981, PF Doc. SOIL-R-55). No measurable negative soil effects are anticipated from prescribed burning if soil moisture is 25 percent or greater (Niehoff 1985, PF Doc. SOIL-R-45). This is especially crucial for slopes with a more southerly aspect if prescribed burning takes place in the fall.

Direct and Indirect Effects of Road Construction - Under the Proposed Action, the construction of roads would produce detrimental effects to site productivity through compaction and displacement. Once sale activity ends, temporary roads would be decommissioned, which would reduce compaction of the soil and return a portion of the topsoil to the surface which helps restore soil productivity and decreases hydrologic effects from road surface runoff. (See PF SOIL-21, Features designed to protect soil and site productivity for temporary road construction and decompaction).

The Proposed-Action Alternative has scheduled approximately 0.6 mile of new system road associated with Unit 1, 0.6 mile of temporary road construction associated with Unit 24, and 0.4 mile of temporary skid road associated with harvest Unit 29. These activities will cause long-term soil compaction, displacement, and effects to site productivity on approximately 4.5 acres.

After all sale activities have ended, the temporary roads would be recontoured (decommissioned), topsoil would be replaced, and organic material would be redistributed over the surface. Road decommissioning and soil restoration would contribute to a reduction in compaction, thus improving infiltration and reducing surface runoff (Switalski et al. 2004, PF Doc. SOIL-R-56). No further roads have been identified for decommissioning under the Proposed-Action Alternative. One culvert would be upgraded to meet 100-year flow events in order to reduce the risk of failure, and one relief pipe would be installed. Where culverts are upgraded or installed, there would be short durations of increased sediment yields while in-stream work is accomplished. Roads classified for long-term storage are considered capital investments and an irretrievable disturbance as part of the permanent transportation system.

After field reviewing all harvest activity areas, including the new system road and temporary roads, the potential for soil mass movement is low.

Direct and Indirect Effects of Road Maintenance - No additional soil impacts would occur from proposed road maintenance activities such as blading, drainage improvements, and surfacing on existing dedicated roads.

Direct and Indirect Effects on Soil Productivity – Because of the lower rates of weathered potassium, it is necessary that fine residue (foliage and branches) is allowed to overwinter on-site within each proposed harvest unit. This allows potassium and other nutrients to leach out of the fine residue and back into the soil where it would be available for future uptake. Thinning harvest would reduce competition for soil nutrients resulting in higher nutrient concentrations available for uptake by the remaining stand vegetation.

As a direct effect, harvesting on all sites would remove within each tree bole about 14 percent of the potassium that is contained within a tree; this may have an indirect effect on some plants that remain in the stand. Douglas-fir and grand fir consume and store more potassium than other tree species (Garrison-Johnston et al. 2007, PF. Doc. SOIL-R-69). The release and availability of this stored potassium would benefit western larch, ponderosa pine, and western white pine, which require less potassium for growth and maintenance (Garrison and Moore 1998, PF. Doc. SOIL-R-17). These more potassium efficient tress would be planted as necessary in all post harvest silvicultural work. Measuring the effects of on-site productivity cannot be done with certainty until more research information becomes available. At this time, management recommendations from the IFTNC are used as guidelines for maintaining sufficient potassium on a site.

Approximately 7 to 14 tons per acre of coarse woody debris would be left on Douglas-fir/grand fir sites. The majority of harvest units presently display reduced coarse woody debris levels and could benefit from additional material. This would provide protection against soil erosion as well as a long-term source of nutrients and organic matter (Brown et al. 2003, PF Doc. SOIL-R-6; Graham et al. 1994, PF Doc. SOIL-R-21). However, removal of excess woody debris reduces the potential for high-temperature uncontrolled fires that could otherwise sterilize the soil at high temperatures, cause highly erosive hydrophobic soil conditions, and reduce overall soil productivity (Pritchett and Fisher 1987, PF Doc. SOIL-R-49).

Indirect effects of soil wood loss also includes altered processes of forest regeneration and growth, favoring species requiring lower soil moisture and nutrient levels. Additional effects could include loss of habitat for species requiring soil wood as dens or substrate for invertebrates, bacteria and fungi, which affect food availability for small rodents and their predators.

E. Cumulative Effects to Soils Resources

Cumulative effects include the combination of direct and indirect effects from past, present, and reasonably foreseeable activities. Since direct and indirect effects from soils are measured within "activity areas," the cumulative effects analysis area for the soils resource consists of the unit scale (activity areas where management activities are proposed).

Existing and proposed roads and landings designated as classified on the National Forest transportation system are considered dedicated lands. The loss of soil productivity on these sites occurred when the roads and landings were constructed and are an irretrievable effect. These lands are not considered part of the cumulative effects in meeting the Regional Soil Quality Standards because they are now included as a capital investment to the permanent transportation system. However, roads and landings designated as classified on the National Forest System are considered part of the cumulative effects in meeting the Forest Plan Soil Quality Standards

The indicator used in disclosing cumulative effects is adherence to both the Regional and Forest Plan Soil Quality Standards. These standards specify no more than 15% and 20% respectively, total detrimental disturbance from the past, proposed and reasonably foreseeable activities within the activities.

Cumulative effects of timber harvest activity areas. - Past actions contribute to the baseline conditions that provide a foundation for the soils analysis. The past activities that have contributed to the baseline conditions for soils are described in Appendix C and in the affected environment, and predominantly consist of past timber harvest activities and the associated road systems. The effects of these past harvest activities within the commercial harvest activity areas are displayed in Table-3 Soil-5 as existing disturbance acres. Those proposed activity areas with no past timber harvest disturbance (#1, 3, 4, 5, 9, 10, 12, 13, 14, 16, 17, 20, 23, 25, and 31) will meet both the Regional and Forest Plan Soil Quality Standards.

As shown in this table, harvest units (#2, 6, 11, 15, 24, 28, 29 and 30) have had past soil disturbance from logging activities, ranging from a high of six percent in unit 2, down to one percent in units 6, 15 and 24.). The proposed timber harvest and associated yarding systems, new and temporary road construction and landings will cause some level of additional localized detrimental disturbance, especially in areas where tractor yarding will occur (Table 3-Soil-5). The combinations of these past effects with the effects of the proposed action are displayed in Table-3 Soil-5. Existing roads associated within the proposed activity areas are also included when determining if the Regional or Forest Plan Standards are being met. There are no other ongoing or reasonably foreseeable activities scheduled to occur within these activity areas, so the cumulative effects for soils is the combined effects of the past activities and the proposed action. If the design features listed are implemented, with no foreseeable activities to occur, cumulative effects from past and proposed activities will remain under both the Regional and Forest Plan Standards of 15 and 20% respectively for detrimental disturbance.

Cumulative effects of Roads. - Cumulatively all the roads, both those on the National Forest System and those that are not classified within the activity areas are counted as detrimentally disturbed soils and used in determining whether an activity area meets either the Regional and Forest Plan Standards, displayed in Table-3 Soil-5. No reasonably foreseeable road related disturbances other than those under the proposed action are anticipated within any of the proposed activity areas. The combination of existing and proposed road related disturbances in conjunction with past and proposed harvest and burning are all within the Standards as displayed in Table-3 Soil-5.

Compaction and displacement can be expected from temporary road construction associated with unit 28. The restoration of the temporary usually is followed by a long recovery time due to the mixing of the topsoil's and other soil horizons. Mitigation associated with the temporary road construction and restoration is preserving the topsoil during the construction phase for redistribution during restoration in order to speed the recovery time. Additionally small and large course woody debris will be scattered across the surface to increase nutrient cycling.

Cumulative Effects of Prescribed Fire Activity Areas – Activity Areas 50, 51, 53, 54, 55, 56, 58, 60, and 63 have not been entered with any previous harvest activities and are proposed only for fuel reduction by burning under the proposed action. The proposed burning activities may cause some level of disturbance, however past monitoring has shown only minor soil disturbance (1 to 2%) to be associated with prescribed burning activities (Niehoff 2002, PF Doc. SOIL-R-44) and (IPNF Forest Plan Monitoring Report, 2007 Draft Soils Report PF Doc. SOILS-R-71). There are no other ongoing or reasonably foreseeable activities scheduled to occur within these activity areas, so the cumulative effects for soils is the combined effects of the past activities and the proposed action. All the burn only activity areas, including those with past disturbance under the proposed action alternative will meet both the Regional and Forest Plan Standards and remain under the 15 and 20 percent respectively for detrimental impacts within an activity area, Table 3 Soil-5.

Cumulative Effects from Recreation – Disturbance from general motorized use and recreational access has been occurring and will continue throughout the project area indefinitely. No changes in the existing recreation profile are anticipated. Forest use activities that are likely to continue within the project area into the future are firewood gathering, ATV use for recreation including hunting and gathering of forest products, and other miscellaneous activities such as horseback riding. All of these activities have the potential for incidental and dispersed impacts to soils.

Other recreational activities that occur off the developed roads, such as the gathering of miscellaneous forest products and hunting, are generally carried out on foot and have no additional effects on the activity areas.

Cumulative Effects Summary. - There are no other ongoing or reasonably foreseeable activities scheduled to occur within any of the commercial or burn only activity areas, so the cumulative effects for soils is the combined effects of the past activities and the proposed action. The combination of past activities and those proposed under the proposed action alternative all meet both the Regional Standard of not exceeding 15 percent detrimental disturbance as well as the Forest Plan Standard of 20 percent.

3.5.5. Consistency with Policy, Direction, and Legal Guidance for Soils

All alternatives would comply with Forest Plan standards (PF Doc. CR-002, pages II-32 and II-33) and Regional Soil Quality Standards (USDA 1999, PF Doc. SOIL-R-58) related to detrimentally disturbed soils.

A. Forest Plan Standards

Forest Plan Soil Standard #1

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

The action alternative would comply with this standard; soil disturbing management practices would not exceed 20 percent detrimental conditions and would maintain at least 80 percent of each activity area in a condition of acceptable productivity potential for trees and other managed vegetation (PF Doc. SOIL-18).

Forest Plan Soil Standard #2

Projects should strive to maintain sufficient large woody debris to maintain site productivity. Large woody debris is essential for maintenance of sufficient micro-organism populations.

The action alternative would comply with this standard; large woody debris would follow the research guidelines of Graham et al. (1994; PF Doc. SOIL-R-21) to ensure the maintenance of site productivity.

Forest Plan Soil Standard #3

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

There is no whole-tree logging proposed in any of the alternatives.

B. Regional Soil Quality Standards

Detrimental disturbance would not exceed the recommended 15 percent in any individual activity area. 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, PF Doc. SOIL-R-21) in each proposed activity area.

C. The Multiple Use-Sustained Yield Act of 1960.

Directs the Forest Service to achieve and maintain outputs of renewable resources.

The action alternative would comply with this standard and maintain soil productivity.

D. The National Forest Management Act of 1976 (NFMA)

Section 6 of the NFMA charges the Secretary of Agriculture with ensuring research and continuous monitoring of each management system to safeguard the land's productivity.

All Forest Plan and Regional Soil Quality Standards are incorporated into the Proposed Action Alternative to maintain long-term soil productivity.

3.5.6. References Cited in the Soils Analysis

Adams, P.W. 1997. Soil and water conservation: an introduction for woodland owners. OR St. Univ. Ext. Serv., EC-1143. 4 p. *PF DOC. SOIL-R-59*

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 and 48. *PF DOC. SOIL-R-1*

Baker, T.G., G.M. Will and G.R. Oliver. 1989. Nutrient Release from Silvicultural Slash: Leaching and Decomposition of *Pinus radiata* Needles. Forest Ecology and Management. Vol. 27, p. 53- 60. *PF DOC. SOIL-R-2*

Barber, B.L., and D.H. Van Lear. 1984. Weight loss and nutrient dynamics in decomposing woody Loblolly pine logging slash. Soil Sci. Soc. Am. J. 48:906-910. *PF DOC. SOIL-R-3*

Barnett, D. 1989. Fire effects on coast range soils of Oregon and Washington and management implementation: a state-of-knowledge review. R6 Soils Tech. Rep., 66 p. *PF DOC. SOIL-R-4*

Beschta, R.L., J.J. Rhodes, J.B. Kaufman, and others. 2004. Postfire management on forested public lands of the western United States. Cons. Biol. 18(4):957-967. *PF DOC. SOIL-R-5*

Brown, J.K., E.D. Reinhardt, and K.A. Kramer. 2003. Coarse woody debris: managing benefits and fire hazard in the recovering forest. Gen. Tech. Rep. RMRS-GTR-105, July, 16 pp. *PF DOC. SOIL-R-6*

Cacek, C.C. 1989. The relationship of mass wasting to timber harvest activities in the Lightning Creek basin. Master Thesis, Eastern Washington University. pp. ii-iv. *PF DOC. SOIL-R-7*

Certini, G. 2005. Effects of fire on properties of forest soils: a review. Oecologia 143:1-10.

Cram, D., T. Baker, and J. Boren. 2006. Wildland fire effects in silviculturally treated vs. untreated stands of New Mexico and Arizona. Research Paper RMRS-RP-55. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 28 p.

Code of Federal Regulations 36. 2005. Parts 219.6, Office of Federal Register National Archives and Records Administration, Washington, D.C. p. 1042. *PF DOC. SOIL-R-8*

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. *PF DOC. SOIL-R-9*

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. PF DOC. SOIL-R-10

Doerr S.H., R.A. Shakesby, and R.P.D. Walsh. 2000. Soil water repellency: its causes, characteristics, and hydro-geomorphological significance. Earth-Sci. Rev. 51:33-65. *PF DOC. SOIL-R-11*

Drlik, T., I. Woo, and S. Swiadon. 1998. Integrated vegetation management guide. Bio-Integral Resource Center. Berkeley, Ca. 16 pp. *PF DOC. SOIL-R-61*

Dykstra P. and M. Curran. 2002. Skid road recontouring in British Columbia: 7-year tree growth results. Res. Br. B.C. Min. For. Victoria, B.C. Tech. Rep. 001. *PF DOC. SOIL-R-12*

Dyrness C.T. 1976. Effect of wildfire on soil wettability in the high Cascades of Oregon. Res. Pap. PNW-202. 18 pp. *PF DOC. SOIL-R-13*

Edmonds, R.L. 1987. Decomposition Rates and Nutrient Dynamics in Small-Diameter Woody Litter in Four Forest Ecosystems in Washington, USA. Can. J. For. Res. 17: p. 499-509. *PF DOC. SOIL-R-14*

Frandsen, W.H., and K.C. Ryan. 1985. Soil moisture reduces belowground heat flux and soil temperatures under a burning fuel pile. Can. J. For. Res. 16:244-248. *PF DOC. SOIL-R-15*

Froehlich H.A., D.W.R. Miles, and R.W. Robbins. 1985. Soil bulk density recovery on compacted skid trails in Central Idaho. Soil Sci. Soc. Am. J. 49:1015-1017. *PF DOC. SOIL-R-16*

Garrison, M. T. and J. A. Moore. 1998. Nutrient management: a summary and review. *In*: Intermountain Forest Tree Nutrition Garrison-Johnston, M. T., J. A. Moore and G. J. Niehoff. 2001. Cooperative Supplemental Report 98: 5. *PF DOC. SOIL-R-17*

Garrison-Johnston, M.T., R. Lewis, and L.R. Johnson. 2007. Northern Idaho and Western Montana nutrition guidelines by rock type. IFTNC, Univ. of ID, Moscow, ID. 109 p.

Garrison-Johnston, T.M. Shaw, L.R. Johnson, and P.G. Mika. 2004. Intermountain Forest Tree Nutrition Cooperative, Presentation at the Potassium Meeting, IPNF, Coeur d'Alene, ID, April 23. *PF DOC. SOIL-R-18*

Garrison-Johnston, M., J.A. Moore, S.P. Cook, and G. J Niehoff. 2003. Douglas-fir beetle infestations are associated with certain rock and stand types in the Inland Northwestern United States. Env. Entomology, 32(6):1364-1369. *PF DOC. SOIL-R-19*

Garrison-Johnston, M. 2003. Geologic controls on tree nutrition and forest health in the Inland Northwest. Presented at GSA Ann. Mtng, Seattle, WA. 9 pp. *PF DOC. SOIL-R-20*

Gorman, J. 2003. How a forest stopped a fire in its tracks. New York Times article, July 22, 2003.

Graham, R. T., A. E. Harvey, M. F. Jurgenson, T. B. Jain, J. R. Tonn and D. S. Page-Dimroese. 1994. Managing coarse woody debris in forests of the Rocky Mountains. USDA Forest Service Intermountain Research Station. Research paper INT-RP-477. *PF DOC. SOIL-R-21*

Gray, D.H., and W.F. Megahan. 1981. Forest vegetation removal and slope stability in the Idaho batholith. Res. Paper INT-271. May. 23 pp. *PF DOC. SOIL-R-22*

Han, H.S., D. Page-Dumroese, S.K. Han, and J. Tirocke. 2006. Effect of slash, machine passes, and soil wetness on soil strength in a cut-to-length harvest. USDA FS Gen. Tech. Rep. PSW-GTR-194. 10 pp. *PF DOC. SOIL-R-60*

Harrison, J.E. and A.B. Campbell. 1963. Correlation and Problems in Belt Series Stratigraphy, Northern Idaho and Western Montana. Geo. Soc. Amer. Bull. 74. pp. 1413-1428. *PF DOC. SOIL-R-23*

Harvey, A.E., M.F. Jurgensen, M.J. Larsen, and J.A. Schlieter. 1986. Distribution of active ectomycorrhizal short roots in forest soils of the Inland Northwest: effects of site and disturbance. Research Paper INT-374, 9 pp. *PF DOC. SOIL-R-24*

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. *PF DOC. SOIL-R-25*

Hungerford, R.D., M.G. Harrington, W.H. Frandsen, K.C. Ryan, and G.J. Niehoff. 1991. Influence of fire on factors that affect site productivity. *In*: Proceedings – Mgtmt. And productivity of western Montana forest soils. USDA FS Gen. Tech. Rep. INT-280. p. 32-50. *PF DOC. SOIL-R-26*

Ice, G.G. 2003. Effects of wildfire on soils and watershed processes. In Conf. on post-fire restoration & salvage harvesting: applying our knowledge and experience, Cent. OR Soc. of Am. For., Deschutes NF, OR Dept. of For., Bend, OR, Oct. 21-23. *PF DOC. SOIL-R-27*

IDEQ 2001. Idaho's 2000 Forest Practices Water Quality Audit. Final Report. Idaho Department of Environmental Quality. Boise, Idaho. *PF DOC. SOIL-28*

Jones, J.A. 2000. Hydrologic processes and peak discharge response to forest removal, regrowth, and roads in 19 small experimental basins, western Cascades, Oregon. Wat. Resources Res. 36:2621-2642. *PF DOC. SOIL-R-30*

Keane, R.E., K.C. Ryan, T.T. Veblen, and others. 2002. Cascading effects of fire exclusion in the Rocky Mountain ecosystems: a literature review. General Technical Report. RMRSGTR-91. Fort Collins, CO: U.S. Dept. of Agr., Forest Service, Rocky Mountain Research Station. 24 p.

Krag, R. 1991. Options for reducing soil disturbance during timber harvesting. *In*: Canadian Forest Industries, CPPA Woodlands Paper. October/November, 1991. pp. 60-64. *PF DOC. SOIL-R-31*

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. *PF DOC. SOIL-R-32*

Lynch, J.A., and E.S. Corbett. 1990. Evaluation of best management practices for controlling nonpoint pollution from silvicultural operations. Water Resour. Bull. 26: 41–52. *PF DOC. SOIL-R-33*

Lynch, J.A., and E.S. Corbett. 1989. Effectiveness of BMPs in controlling nonpoint pollution from silvicultural operations. Am. Water Res. Assoc., Headwaters Hydrology, June. pp. 149-157. *PF DOC. SOIL-R-34*

McIver, J.D. and L. Starr. 2000. Environmental effects of postfire logging: literature review and annotated bibliography. USDA Forest Service Pacific Northwest Res. Sta. Gen. Tech. Rep. PNW-GTR-486. *PF DOC. SOIL-R-35*

McNabb, D.H., and K. Cromack, Jr. 1990. Effects of prescribed fire on nutrients and soil productivity. *In*: Natural and prescribed fire in Pacific Northwest forests. Walstad, J. D. et al., Corvallis, OR, OR State Univ. Press, p. 125-142. *PF DOC. SOIL-R-36*

Megahan, W.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. *PF DOC. SOIL-R-37*

Megahan, W.F., N.F. Day, and T.M. Bliss. 1978. Landslide occurrence in the western and central northern Rocky Mountain physiographic province in Idaho. In: Forest soils and land use, Proc. 5th North Am. For. Soils Conf., Ft, Collins, CO, Aug. p. 116-139. C.T. Youngberg, ed., CO St. Univ., Ft. Collins. *PF DOC. SOIL-R-38*

Mika, P. 2005. The Forest Health/Nutrition Experiment: Eight-year Growth and Mortality Results, Univ. of Idaho. Preliminary study, Annual meeting, Intermountain Forest Tree Nutrition Coop., Moscow, ID. *PF DOC. SOIL-R-39*

Moore, J.A., D.A. Hamilton, Jr., Y. Xiao, and J. Byrne. 2004a. Bedrock type significantly affects individual tree mortality for various conifers in the inland Northwest, USA. Can. J. For. Res. 34:31-42. *PF DOC. SOIL-R-40*

Moore, J.A., P.G. Mika, T.M. Shaw, and M.I. Garrison-Johnston. 2004b. Foliar Nutrient Characteristics of Four Conifer Species in the Interior Northwest United States. West. J. Appl. For. 19(1):13-24. *PF DOC. SOIL-R-41*

Morris, L. A. and R. E. Miller. 1994. Evidence for long-term productivity change as provided by field trials. *In*: Dyck, W. J., Cole, D. W., Comerford, N. B., comps., eds. Impacts of Forest Harvesting on Long-Term site productivity. London; Chapman and Hall: pp. 41-80. *PF DOC. SOIL-R-42*

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 p. *PF DOC. SOIL-R-43*

Niehoff, G. 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. *PF DOC. SOIL-R-44*

Niehoff, G. 1985. Technical guide to determine potential soil damage by prescribed burning and wildfire. Unpublished paper available from Soil Scientist (retired), Idaho Panhandle National Forests, Coeur d'Alene, Idaho. pgs. 6. *PF DOC. SOIL-R-45*

Page-Dumroese, D. M. Jurgensen, A. Abbott, and others. 2006. Monitoring changes in soil quality from post-fire logging in the Inland Northwest. USDA FS Proc. RMRS-P-41, p. 605-614, Fort Collins, CO. *PF Doc. SOIl-R-29*

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. *PF DOC. SOIL-R-46*

Poff, R. J. 1996. Effects of silvicultural practices and wildfire on productivity of forest soils. Sierra Nevada Ecosystem Project final report to Congress: status of the Sierra Nevada. Volume II: Resources, University of California, Davis. pp. 477-495. *PF DOC. SOIL-R-47*

Powers, R. F. 1990. Are we maintaining the productivity of Forest lands? Establishing guidelines through a network of long-term studies. *In*: Harvey, A. E. and L. F. Neuenschwander (Eds.). Proceedings-Management Productivity of Western Montane Soils. USDA, Forest Service Intermountain Research Station. pp. 70-81. *PF DOC. SOIL-R-48*

Pritchett, W.L., and R.F. Fisher. 1987. Effects of fire on soils and site. In *Properties and Mgmt. of Forest Soils*, 2nd Ed., 397-407. *PF DOC. SOIL-R-49*

Robichaud, P.R. 2000. Fire effects on infiltration rates after prescribed fire in Northern Rocky mountains forests, USA. J. of Hydr. 231-232:220-229. *PF DOC. SOIL-R-50*

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. pp. 7-9. *PF DOC. SOIL-R-51*

Shaw, T. 2005. Final Results from the Forest Health Experiment *Armillaria ostoyae* Root Disease Inoculation Project, Univ. of Idaho. Intermountain Forest Tree Nutrition Coop., Moscow, ID. *PF DOC. SOIL-R-52.*

Sheley, R., M. Manoukian, and G. Marks. 2002. Preventing noxious weed invasion. Montguide #199517. MT State Univ. Ext. Serv., Bozeman, MT. 3 pp. *PF DOC. SOIL-R-62*

Shen, E., J.A. Moore, and C.R. Hatch. 2001. The effect of nitrogen fertilization, rock type, and habitat type on individual; tree mortality. For. Sci. 47(2):2-3-213. *PF DOC. SOIL-R-53*

Smith, J.K., and W.C. Fischer. 1997. Fire ecology of the forest habitat types of northern Idaho. Gen. Tech. Rep. INT-GTR-363. 147 p. *PF DOC. SOIL-R-54*

Swanson, F.J. 1981. Fire and geomorphic processes. *In*: Fire regimes and ecosystems conference, Dec. 11-15, 1979, Honolulu, HI. Gen. Tech. Rep. WO-26, June. 19 p. *PF DOC. SOIL-R-55*

Switalski, T.A., J.A. Bissonette, T.H. DeLuca and M.A. Madej. 2004. Benefits and Impacts of Road Removal. Front. Ecol. Env. 2(1): p. 21-28. *PF DOC. SOIL-R-56*

USDA Forest Service. 2000. Coeur d'Alene River Noxious Weeds EIS. Idaho Panhandle National Forest, CDA Ranger District. *PF DOC. CR-029*

USDA FS. 1999. Region 1 Soil Quality Standards. 2554.03-R1 Suppl. 2500-99-1. 6p. *PF Doc. SOIL-R-58*

USDA Forest Service. 1997. Idaho Panhandle National Forests, Forest Plan and Monitoring and Evaluation Report. Coeur d'Alene, ID. pp. 32-34. *PF DOC. CR-013*

USDA Forest Service. 1993. Idaho Panhandle National Forests, Forest Plan and Monitoring and Evaluation Report. Coeur d'Alene, ID. pp. 55-57. *PF DOC. CR-009*

USDA Forest Service. 1991. Idaho Panhandle National Forests, Forest Plan and Monitoring and Evaluation Report. Coeur d'Alene, ID. pp. 24-29. *PF DOC. CR-007*

USDA Forest Service. 1988. Idaho Panhandle National Forests, Forest Plan and Monitoring and Evaluation Report. Coeur d'Alene, ID. pp. 26-30. *PF DOC. CR-004*

USDA Forest Service. 2005 and 2006. Idaho Panhandle National Forests, Forest Plan and Monitoring and Evaluation, Draft Soils Report. Coeur d'Alene, ID. *PF DOC. SOILS-70*

USDA Forest Service. 2007. Idaho Panhandle National Forests, Forest Plan and Monitoring and Evaluation, Draft Soils Report. Coeur d'Alene, ID. *PF DOC. SOILS-71*

USDA Forest Service. 1987. Forest Plan, Idaho Panhandle National Forests, Northern Region. pp. II-2, 32 and 33. *PF DOC. CR-002*

USDA Forest Service R1/R4. 1988. Soil and Water Conservation Practices (SWCP), FSH 2509.22. PF Doc. SOILS-R-72.

Wells, C.G., R.E. Campbell, L.F. DeBano, C.E. Lewis, R.L. Fredriksen, E.C. Franklin, R.C. Froelich and D.H. Dunn. 1979. Effects of Fire on Soil: A State of the Knowledge Review. USDA Forest Service Gen. Tech. Rep. WO-7. p.26. *PF DOC. SOIL-R-57*

3.6 WILDLIFE

3.6.1. Policy, Direction and Legal Guidance for Wildlife

Although a variety of sources are used to assess wildlife species and habitat including historic records, current data bases, large scale assessments, scientific studies and management recommendations, the regulatory framework providing direction for the protection and management of wildlife and habitat comes from the following principle sources:

- *Endangered species Act of 1973 (as amended)*: Section 7 of the Endangered Species Act (ESA) directs that actions authorized, funded, or carried out by federal agencies do not jeopardize the continued existence of any threatened or endangered species, or result in the adverse modification of habitat critical to these species.

- *National Forest Management Act of 1976:* The National Forest Management Act (NFMA) provides for balanced consideration of all resources. It requires the Forest Service to plan for a diversity of plant and animal communities. Under its regulations the Forest Service is to manage for diverse populations of existing and desired species, and to maintain and improve habitat of management indicator species.

- *Forest Plan:* The IPNF Forest Plan (1987), in compliance with NFMA, establishes Forest-wide management direction, goals, objectives, standards and guidelines for the management and protection of wildlife habitat and species, including old-growth habitat, management indicator species, sensitive species, and threatened and endangered species. Sensitive species are designated by each Region of the Forest Service according to the occurrence of the species and its habitat within Regional boundaries. Region 1 sensitive species are evaluated in this document. The Forest Plan goal is to manage wildlife habitat to maintain viable populations of all species.

- *Migratory Bird Executive Order:* The Migratory Bird Executive Order (2001) describes the responsibilities of federal agencies to protect migratory bird species through a Memorandum of Understanding (MOU) with the Fish and Wildlife Service. The order directs federal agencies to consider these species in agency plans, and to evaluate the effects of proposed actions on migratory bird populations and their habitat, with emphasis on species of concern (PF Doc. WL-R67).

- *Conservation Agreements and Strategies:* Conservation strategies and assessments are written to assist federal agencies in managing habitat for threatened and endangered species and other species of concern. They are most often joint efforts between participating agencies to increase awareness and knowledge of the species by describing life history strategies and habitat requirements. Conservation strategies usually present management recommendations and guidelines to assist in maintaining suitable habitat. This information, in conjunction with scientific literature, is used to assist in planning and in developing project design features that minimize or avoid effects to wildlife and wildlife habitat.

3.6.2. Methodology

A. Introduction

This section discloses the potential direct, indirect and cumulative effects of the alternatives on wildlife species and their habitat. Species considered include Threatened and Endangered species designated by the U.S. Fish and Wildlife Service, Sensitive species designated by Region 1 of the Forest Service and management indicator species designated by the Idaho Panhandle National Forests. Other species of concern with a probability of occurring in the Deerfoot Resource Area are considered when there is a potential for effects as a result of the proposed management alternatives.

USDA Forest Service policy (Forest Service Manual 2670.32) requires a documented review or biological evaluation of Forest Service programs or activities in sufficient detail to determine how an action may affect threatened, endangered, proposed, or sensitive species. This document serves as the primary biological evaluation for sensitive species. Effects to species listed under the Endangered Species Act are addressed separately in a Biological Assessment (BA). Consultation with the U.S. Fish & Wildlife Service has been ongoing throughout the planning and design of this project. The BA will be completed based on the alternative selected for implementation, with review and concurrence by the U.S. Fish & Wildlife Service. A copy of the BA will be included in the Decision Notice for the Deerfoot Resource Area project.

Much of the wildlife analysis is tiered to the following documents and information, which provide the primary direction and methods used to develop the analysis for potential effects on wildlife**:**

- *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin*
- *Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin*
- *The Roads Analysis Process for the project and the District Travel Plan*
- *Recorded species observations*
- *Suitable and potential habitat models*
- *Applicable scientific research, literature and management recommendations and conservation strategies*

The wildlife analysis is done at different levels (ranging from coarse filter to fine filter) as appropriate to address issues and concerns relative to each species. According to CEQ regulations, the level of analysis should be commensurate with the level of the impact, the risk associated with the project, the species involved, and the current level of knowledge (CEQ 1502.15). Species for which it has been determined there would be no measurable effects are not analyzed in detail. Direct, indirect, and cumulative effects are disclosed by alternative and by species.

Based on habitat relationships, appropriate indicators of habitat with a potential to be impacted by the proposed action have been measured. Queries of the Timber Stand Management Records System database (TSMRS) and Forest Inventory and Analysis (FIA) data were used to identify capable and suitable habitat within each wildlife analysis area (PF Doc. WL-18, WL-25, WL-26, WL-27, WL-28). Changes in habitat for each relevant species are disclosed with a discussion of the effects on species. Queries have been designed to best utilize the information stored within the two databases (PF Doc. WL-28 & WL-15). Field surveys by the wildlife biologist were conducted to verify the habitat queried in the TSMRS database (PF Doc. WL-1, WL-3, WL-16, WL-21).

B. Geographic Scope

The geographic scope of analysis varies by species according to the appropriate methodology and level of analysis needed to determine potential effects. A number of variables define the level of analysis for each species including, but not limited to, species occurrence, presence of suitable or potential habitat, existing condition, the potential for impacts and the difference in effects between alternatives. Generally, the geographic scope is the Deerfoot Resource Area; however, due to species and habitat distribution, home range size, linkages between suitable habitats or between winter and summer range, distances of dispersal, the potential for immigration and emigration into a population, and other variables, the analysis may include an area as large as the Idaho Panhandle National Forests.

Approximately 13 percent of the Deerfoot Resource Area consists of private lands. Detailed information is available only for National Forest System lands within the geographic areas considered in this analysis. Where information on land outside of Forest Service jurisdiction would assist in the analysis of effects, a combination of visual evaluation, aerial photo interpretation and extrapolation from available data was used to estimate habitat components associated with those lands. Due to the lack of detailed information, and the unpredictability of future management on the adjacent non-Forest lands, effects from activities on these lands are difficult to quantify. Potential effects resulting from activities on these lands are therefore measured in more general terms than activities on National Forest System lands.

C. Habitat Model Validation

The IPNF has developed Forest-wide wildlife habitat capability/suitability models for several Threatened, Sensitive, and Management Indicator wildlife species or species guilds (Canada lynx, fisher/marten, northern goshawk, flammulated owl, pileated woodpecker, and elk). Information used for suitable habitat included: habitat type, size class, past activities, forest type, elevation, basal area, number of snags and number of trees above a specific size class (PF Doc. WL-30). Information used varies with each species based on the species' particular needs. Vegetation data was validated to insure the stand characteristics queried were accurate (PF Doc. VEG-4 & VEG-44).

In addition, Forest Service personnel conducted site visits of representative suitable and capable habitats for these species, with emphasis placed on stands modeled as "currently suitable" (PF Doc. WL-1). The Deerfoot Resource Area provides suitable habitat for the black-backed woodpecker, goshawk, flammulated owl, pygmy nuthatch, fisher, marten and elk. Most proposed treatments units were visited by the wildlife biologist to validate habitat. A small number of proposed treatment areas were not visited if they were determined to be obviously either capable or unsuitable for modeled species based upon field notes and unit descriptions provide by the project team silviculturalist or verification by aerial photo interpretation (PF Doc. WL-1).

Capable habitat is determined by habitat type and topographic factors. Since these do not change over time, the data offers reliable information on habitat capability. Data used in wildlife habitat suitability models was validated for each species, as follows:

Northern Goshawk: Northern goshawk nesting habitat was initially determined using the Forest-wide habitat model (PF Doc. WL-25 and WL-26). Suitable habitat was identified for the Northern goshawk within the project area. Because of open canopies goshawk habitat is low in the Deerfoot Resource Area. However, goshawks have been documented in surveys during the breeding season and the habitat is considered occupied. Much of the validation for the lack of goshawk habitat was done using aerial photography, surveys by wildlife biologist and forester's reconnaissance notes (PF Doc. WL-21).

Marten: Within the Deerfoot Resource Area, low to moderate quality marten habitat was identified by using vegetative response units (VRUs) based on land types. The low quality habitat is provided by low elevation cedar-hemlock forest habitat types with an average diameter tree size of nine inches (PF Doc. WL-28). Although the cedar-hemlock is not usually associated with marten, a study of marten on the Idaho Panhandle National Forests found them occasionally using this habitat (PF Doc. WL-13). There are some small patches

of high quality marten habitat (high elevation spruce-fir) within the Resource Area located at higher elevation mountain peaks (PF Doc. WL-25).

Pileated Woodpecker: Pileated woodpecker habitat was assessed based on stands with an average live tree diameter of "equal or greater than 14-inch diameter" in Douglas-fir, larch, grand-fir, cottonwood or ponderosa pine (PF Doc. WL-25). All allocated old-growth stands were also mapped as pileated woodpecker habitat. Based on this information and knowledge about the stands, a prediction can be made that adequate snags would be found within these stands (PF Doc. WL-15). The delineation of this habitat was field verified by the wildlife biologist (PF Doc. WL-21).

Black-backed Woodpecker: Aerial insect and disease detection maps were used to locate forage habitat for the black-backed woodpecker (PF Doc. WL-31). This forage habitat was validated by field reviews (PF Doc. VEG-25).

Elk: The elk model relies on security acres, road density, cover/forage ratio, and distance to cover. Components of the model were verified using information provided by the transportation specialist regarding road densities and condition (PF Doc. TRAN-1). Security was calculated using GIS data (PF Doc. WL-29). The project wildlife biologist verified road and security status.

D. Wildlife Conservation Assessments and Strategies and Recovery Plans

Conservation assessments and strategies are written to assist federal agencies in managing habitat for Threatened and Endangered species and other species of concern. They are most often joint efforts between participating agencies to increase awareness and knowledge of the species by describing life history strategies and habitat requirements. Conservation strategies usually present management recommendations and guidelines to assist in maintaining suitable habitat. This information, in conjunction with scientific literature, is used to assist in planning and in developing project design features that minimize or avoid effects to wildlife and wildlife habitat.

The *Pacific Bald Eagle Recovery Plan*, the *Northern Rocky Mountain Wolf Recovery Plan*, the *Recovery Plan for Woodland Caribou in the Selkirk Mountains* and the *Grizzly Bear Recovery Plan* provide requirements for habitat management for these species. The Deerfoot Resource Area is not within a recovery area for the Threatened grizzly bear or the Endangered woodland caribou. In February of 2000, a *Lynx Conservation Assessment and Strategy* was released in an effort initiated by the Fish and Wildlife Service and in cooperation with the Forest Service and Bureau of Land Management. The purpose of the Strategy is to provide a consistent and effective approach to avoid or reduce adverse effects resulting from management activities to the species or its habitat. The assessment is based partly on the delineation of Lynx Analysis Units (LAUs) where habitat is managed to provide for lynx denning and foraging habitat. The bald eagle was delisted by the US Fish and Wildlife Service on August 5, 2007. The bald eagle is now addressed as a Sensitive species.

Conservation strategies have been developed through joint efforts of Idaho Fish and Game, Idaho Parks and Recreation Department, Bureau of Land Management and Forest Service for the following species: Northern goshawk, wolverine, boreal toad, Townsend's big-eared bat, harlequin duck, and Coeur d'Alene salamander.

E. Species Relevancy Screen

Wildlife species listed under the ESA, sensitive species and management indicator species known to occur on the Idaho Panhandle National Forests were screened for their relevancy to the Coeur d'Alene River Basin and to the Deerfoot Resource Area by reviewing sighting records, planning documents, habitat suitability models and other sources, such as historic records and scientific literature. Relevancy is determined based on whether there is evidence of species or habitat present within the affected area (coarse filter), and whether any such species or habitat could potentially be affected by the proposed alternative management actions (fine filter). Some habitat and species may occur within the Coeur d'Alene River Basin, but may not be applicable to the

Deerfoot Resource Area or surrounding areas. A coarse filter screen was applied at the Coeur d'Alene Basin level and then a finer screen was used to assess species relevancy at the watershed level.

For each species addressed, Section 3.6.4 provides a discussion of:

- *Life history*
- *Reference condition*
- *Management recommendations*
- *Affected environment*
- *Direct and indirect effects*
- *Cumulative effects*
- *Conclusions*

F. Viability

Viability of a species is considered in the broad scale and is determined at a Region 1-wide scale. The Northern Region, USDA Forest Service has developed a conservation assessment of the northern goshawk, black-backed woodpecker, flammulated owl and pileated woodpecker in the Northern Region (Samson, 2005; PF Doc. WL-R139). The assessment is intended to satisfy the statutory requirement to provide for diversity of native animal communities based on suitability and capability of the specific land area to meet overall multiple-use objectives as required by the National Forest Management Act (16 U.S.C. 1604 (g)(3)(B)). For each species, the conservation assessment includes:

1. *A brief overview of ecology, behavior and habitat use*
2. *A brief overview of habitat use in the Northern Region*
3. *Estimates of well distributed habitat and habitat amount by National Forest*
4. *Evaluation of short-term viability*
5. *Evaluation of long-term viability and ecosystem sustainability*

The conservation assessment was based on a principle-based approach to population viability (PVA). The methods and background for this principle-based approach use point observation data and vegetation inventory based on Forest Inventory and Analysis (FIA) to build wildlife habitat relationship models to analyze short-term viability. The conservation assessment included consideration of peer-reviewed literature, non-peer reviewed publications, research reports, and data accumulated by the Forest Service. Where possible, the peer-reviewed professional society literature is emphasized in that it is the accepted standard in science (Samson, 2005; p. 4, PF Doc. WL-R139).

In summary, the conservation assessment shows that short-term viability (less than 100 years) is not an issue in Region 1 for goshawks, black-backed woodpeckers, flammulated owls or pileated woodpeckers. Because of habitats trending away from historic range of variability, long-term viability (more than 100 years) is low. An explanation of the reasons viability would be maintained in the Northern Region for the next 100 years is provided in the following table.

Table 3-WL-1. Reasons why viability would be maintained in the Northern Region for the next 100 years, by species (from Samson, 2005; PF Doc. WL-R139, at pages noted)

Species	Reasons Viability is Maintained
Northern goshawk *(Samson, 2005; pages 38-39)*	• No scientific evidence exists that the northern goshawk is decreasing in numbers. • Increases in the extent and connectivity of forested habitat have occurred since European settlement. • Well-distributed and abundant northern goshawk habitat exists on today's landscape. • Level of timber harvest is insignificant (in 2004, harvest occurred on 0.09 percent of the forested landscape in the Northern Region). • The barred owl represents a significant threat to the northern goshawk. Habitat management (e.g., increasing the connectivity) should not favor the barred owl. • Suppression of natural ecological processes has increased and continues to increase amounts of northern goshawk habitat.
Black-backed woodpecker *(Samson, 2005; pages 51-52)*	• No scientific evidence exists that the black-backed woodpecker is decreasing in numbers. • Increases in the extent and connectivity of forested habitat have occurred since European settlement. • Amounts of small and mid-size trees have increased since European settlement. • Well-distributed and abundant black-backed woodpecker habitat exists on today's landscape. • Level of salvage timber harvest or overall timber harvest of forested landscapes in the Northern Region is insignificant.
Flammulated Owl *(Samson, 2005; pages 62-63)*	• No scientific evidence exists that the flammulated owl is decreasing in numbers. • Increases in the extent and connectivity of forested habitat have occurred since European settlement. • Well-distributed and abundant flammulated owl habitat exists on today's landscape. • Level of timber harvest in the Northern Region is insignificant. The barred owl represents a significant threat to the flammulated owl. Habitat management (e.g., increasing the connectivity) should not favor the barred owl.
Pileated Woodpecker *(Samson, 2005; pages 68-69)*	• No scientific evidence exists that the pileated woodpecker is decreasing in numbers. • Increases in the extent and connectivity of forested habitat have occurred since European settlement. • Well-distributed and abundant pileated woodpecker habitat exists on today's landscape. • Level of timber harvest in the Northern Region is insignificant.

For more detailed information on methodology, peer-reviewed background literature, and statistical analysis in the conservation assessment refer to Wildlife PF Doc. R-139.

G. Suitable and Potential Habitat

Of primary consideration in the wildlife analysis is the current and potential capability of the structure, composition, arrangement and patch size of the vegetation to provide the habitat components necessary to meet the life history requirements of a particular species.

Quantitative modeling to assess current habitat and potential effects are not always applicable due to a lack of available knowledge about many species and their habitat requirements, and to limited information regarding some key habitat components such as size and amount of down wood. Models are used when appropriate based on available information and applicability. When feasible, suitable and potential habitat is modeled using databases describing forest vegetation (TSMRS and FIA) and geographic information mapping systems delineating variables such as slope, aspect, soils, road density and riparian habitats.

Suitable habitat defines wildlife habitat that has a combination of features meeting the habitat requirements of a given species at the present time.

Potential habitat does not currently provide suitable habitat, but because of certain characteristics has the potential to provide suitable habitat in the future as stand conditions change. For example, changing stand conditions may include seral stage, cover type, stand density, tree size, stand age and stand condition.

This data is supported by species observation records, field verification, and field surveys for specific species and habitats (PF Doc. WL-16, WL-1, WL-21, WL-39, WL-38, WL-40, WL-24, WL-14, WL-11, WL-33). Acres displayed in this report should be considered approximate due to the way in which different habitat components are grouped and the detail of information available. Differences may occur in the values due to the scale at which the analysis is conducted, the level at which effects become apparent and the consequences of the action on different resource values. Detailed descriptions of the specific analysis method or modeling process used for each species can be found under the section of this chapter pertaining to that species and in the wildlife project files for this assessment.

H. Probability of Occurrence

The probability of a specific species occurring in the Resource Area is based on records of species sightings, presence of suitable habitat and the potential of the area under consideration to provide suitable habitat in the future. Following is an explanation of the categories for probability of occurrence:

- *No probability of occurrence* – No suitable habitat occurs in the area, and/or the area is outside the known range of the species, and there are no recorded observations in the area.
- *Low probability of occurrence* – Marginally suitable habitat is limited, isolated, and there are no recorded observations of the species in the area.
- *Moderate probability of occurrence* – Suitable habitat exists in the area and it is within the known range of the species, but there are no confirmed observations.
- *High probability of occurrence* – Suitable habitat is present in the area and there have been confirmed observations of the species using similar habitat on the district.

Recorded observations come from several sources including IPNF records, Idaho Conservation Data Center information and from other organizations that collect recorded observations or conduct surveys for wildlife species in the area such as the Coeur d'Alene Audubon Society. For each species in this analysis, modeling methods for suitable and potential habitat, field verification, current knowledge of species distribution, scientific studies and applicable management recommendations are discussed in detail.

3.6.3. Species Considered in the Wildlife Effects Analysis

A. Threatened and Endangered Wildlife Species

The USDI Fish and Wildlife Service provided an updated list of proposed, threatened or endangered species that may occur within the Idaho Panhandle National Forests (No. 1-9-07-SP- 0054; PF Doc. WL-R147). These species, their listing status and the probability that they occur in the Deerfoot Resource Area are shown in the following table.

The Deerfoot Resource Area is within the recovery area for the gray wolf. No critical habitat for the lynx or grizzly bear occurs within the Coeur d'Alene River Basin. The Northern Rocky Mountain Wolf Recovery Plan, the Recovery Plan for Woodland Caribou in the Selkirk Mountains and the Grizzly Bear Recovery Plan provide requirements for habitat management for these species. In February of 2000, a Lynx Conservation Assessment and Strategy was released in an effort initiated by the Fish and Wildlife Service and implemented in cooperation with the Forest Service and the Bureau of Land Management. The purpose of the Strategy is to provide a consistent and effective approach to avoid or reduce adverse effects resulting from management activities to the species or its habitat. The assessment is based partly on the delineation of Lynx Analysis Units (LAUs) where habitat is managed to provide for lynx denning and foraging habitat. The Deerfoot Resource area is not within any LAU and the nearest LAU is approximately 25 miles from the Deerfoot Resource Area.

B. Sensitive Wildlife Species

Sensitive species are designated by each Region of the Forest Service based upon regional variations in species and habitat occurrence. The probability of each R1 Sensitive species occurring on the Coeur d'Alene River Ranger District is indicated in the following table.

Table 3-WL-2. Probability of occurrence on the Coeur d'Alene River Ranger District.

Species Common Name	Species Scientific Name	Species or Habitat Present on District?	Probability of Occurrence in Resource Area?	Species or Habitat Potentially Affected?	Species Further Analyzed?
Threatened & Endangered					
Gray Wolf (E)	Canis lupis	Yes	Low	Yes	Yes
Canada Lynx (T)	Lynx canadensis	Yes	Low	No	No
Grizzly Bear (T)	Ursus horribilis	Yes	Low	No	No
Woodland Caribou	Rangifer tarandus	No	None	No	No
Sensitive					
Bald eagle	Haliateetus leucocephalus	Yes	Moderate	Yes	Yes
Coeur d'Alene salamander	Plethodon idahoensis	Yes	Moderate	Yes	Yes
Boreal toad	Bufo boreas	Yes	Moderate	Yes	Yes
Peregrine falcon	Falco peregrinus anatum	Yes	None	No	No
Black-backed woodpecker	Picoides arcticus	Yes	High	Yes	Yes
Common loon	Gavia immer	Yes	None	No	No
Harlequin duck	Histrionicus histrionicus	Yes	None	No	No
Black Swift	Cypeloides niger	Yes	None	No	No
Pygmy Nuthatch	Sitta pygmaea	Yes	High	Yes	Yes
Flammulated Owl	Otus flammeolus	Yes	Moderate	Yes	Yes
Northern bog lemming	Synaptomys borealis	No	None	No	No
Fisher	Martes pennanti	Yes	Moderate	Yes	Yes
Townsend's big-eared bat	Plecotus townsendii	Yes	None	No	No
Fringed Myotis	Myotis thysanodes	Yes	Moderate	Yes	Yes
Wolverine	Gulo gulo	Yes	Low	Yes	Yes
Old Growth Management Indicator Species					
Northern goshawk	Accipiter gentiles	Yes	High	Yes	Yes
Pileated woodpecker	Dryocopus pileatus	Yes	High	Yes	Yes
Pine marten	Martes Americana	Yes	Low	Yes	Yes
Big Game Management Indicator Species					
Rocky Mountain elk	Cervus elaphus	Yes	High	Yes	Yes
Moose	Alces alces	Yes	High	No	No
Other Species & Habitats					
Nongame & Neotropical birds	N/A	Yes	High	Yes	Yes

Those species with no probability of occurring in the Deerfoot Resource Area are not addressed in detail in this environmental assessment (refer to Appendix E for a brief discussion of rationale). The remaining species (goshawk, wolverine, fisher, bald eagle, black-backed woodpecker, flammulated owl, pygmy nuthatch, boreal toad, fringed myotis and Coeur d'Alene salamander) are addressed in detail. The analysis for Sensitive species serves as the primary biological evaluation for this project.

C. Management Indicator Wildlife Species

Management indicator species are designated in the Forest Plan as indicators of habitats of concern. There are two categories of management indicator species on the IPNF: big game indicator species representing general forest habitats, and old growth indicator species. The Forest Plan (Appendix L-4; PF Doc.CR-002) identified elk as a management indicator species because elk are a general forest species easily affected by management activities, particularly access management. The effect of management activities on elk is one of the main issues the IPNF has identified through public involvement (IPNF, 1987; PF Doc. CR-001). Elk are a

priority big game species of Idaho Department of Fish and Game and elk hunting is a significant economic factor in Northern Idaho.

The Forest Plan also designated three management indicator species for the monitoring and management of old growth, or late successional conditions: pine marten, pileated woodpecker, and northern goshawk. The status of these species indicates the ability of forest structure to support wildlife populations that inhabit older forests and use large diameter trees, snags and down wood for nesting and/or foraging. Old growth is discussed in more detail in the "Forest Vegetation" section of Chapter 3. The discussion of old growth habitats in this chapter tiers to that information.

D. NongameWildlife

Nongame species are those not managed by the State of Idaho as a hunted species. They include many species of furbearers, as well as raptors, amphibians, reptiles, small mammals and songbirds. Other non-game species (such as neotropical migrants) and those considered as management indicator species or sensitive species are addressed separately from nongame. Nongame species are often important prey for other furbearers and large predators like wolves and lynx.

Changes in vegetation composition and structure are used to assess effects to non-game species. Two basic types of forest have changed dramatically over the last 100 years in the Deerfoot Resource Area: riparian areas and old forests dominated by long-lived seral conifers like ponderosa pine, white pine and larch. The effects of human activities on these two habitats are analyzed, and the changes to populations of non-game species dependent upon these forests are discussed in the analysis for the flammulated owl, pygmy nuthatch, black-backed woodpecker, northern goshawk and pileated woodpecker.

E. Neotropical (Migrant) Birds

Neotropical birds are those that breed and nest in one area and migrate to Mexico, Central America or South America to winter. These birds are impacted in a variety of ways including loss of habitat due to agriculture, logging, and urbanization. The Upper Columbia Basin Draft EIS (USDA et al., 1994; PF Doc. WL-R55) states that breeding bird surveys on National Forests found an increase of 10 species of neotropical birds and a decrease of 5 species. Often the increases in populations are of less desirable species such as the brown-headed cowbird (Collopy and Smith 1995 in Upper Columbia River Basin Draft EIS; PF Doc. WL-R10). Changes in habitats that may favor less desirable species, or that may lead to fewer of the more desirable species are discussed in a qualitative manner. It must be noted that there are many species of neotropical migrant birds for which there is very little population or habitat data available, and changes that may benefit one species may, at the same time, have undesirable effects on other species.

> This analysis reflects changes in habitat conditions (such as stand structure) resulting from past, present and reasonably foreseeable actions.
>
> **Except where specifically stated, it is assumed that private lands do not provide habitat,** in order to provide the most conservative ("worst case") assessment on these lands, since the Forest Service has no authority or information base concerning private lands.

On January 10, 2001, President Clinton signed an Executive Order describing the Responsibilities of Federal Agencies to Protect Migratory Birds, directing executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act (PF Doc. WL-R67). Section 3 of the Order states that:

> *…each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement, within 2 years, a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (FWS) that shall promote the conservation of migratory bird populations.*

Item e-6 directs that each agency shall*:*

> *…ensure that environmental analyses or assessments of Federal actions evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern.*

3.6.4. Affected Environment and Environmental Consequences

A. Terrestrial Wildlife Habitat

Wildlife Cumulative Effects Analysis Areas

For each wildlife species analyzed, the cumulative effects analysis area has been identified based on the species' or guilds' relative home range size in relation to available habitat, topographic features that affect how species move and utilize their home range (such as watershed boundaries), and boundaries that represent the furthest extent of effects. The cumulative effects analysis areas are described for each species in the table below.

Table 3-WL-3. Deerfoot Environmental Assessment cumulative effects analysis areas for wildlife, by species.

Species	Description of Cumulative Effects Study Area
Gray Wolf	The gray wolf is a wide ranging species. Home ranges can be 50 square miles and they may travel over 1000 square miles if food is scarce. No wolf pack is currently using the Coeur d'Alenes. Wolves at this time are a transient visitor on the district. The Idaho-Montana border and the Coeur d'Alene River are potential dispersal corridors for wolves. Therefore, the Coeur d'Alene River Ranger District was used to measure the cumulative effects to wolves.
Bald Eagle	Bald eagles are associated with large bodies of water. The Deerfoot Resource Area is near Hayden Lake. Only the Mokins area of the Forest is adjacent to Hayden Lake. A nesting pair could potentially use the Deerfoot Resource Area for perching or foraging. The Hayden Lake watershed is the cumulative effects area for the bald eagle.
Black-backed woodpecker	Home ranges for the black-backed woodpecker are estimated to be around 1,000 acres in beetle-killed forests. There is potential habitat within the Deerfoot Resource area to provide for several home ranges for the species. Therefore, the cumulative effects area for this species was the resource area with consideration of adjacent areas.
Wolverine	The wolverine is a wide ranging species with home ranges sometimes as high as 800 square miles for males and 30 to 270 square miles for females with kits. Rearing habitat is found in high elevation cirque basins. Therefore, the cumulative effects area goes beyond the Deerfoot Resource area and is analyzed at the district level.
Northern Goshawk	Homes ranges for this species are approximately 6,000 acres in size. The Deerfoot Resource Area is sufficient in size to provide for home ranges for three nesting pairs. Therefore the cumulative effects area is the Deerfoot Resource area.
Pileated Woodpecker	Home ranges for this species are about 1,000 acres in size. The Deerfoot Resource area is large enough to accommodate several home ranges for the pileated woodpecker. It is recommended that an area of 2,500 acres be managed to accommodate a breeding pair. Therefore, the cumulative effects area for the pileated woodpecker is the Deerfoot Resource area.
Flammulated Owl	This owl migrates south during the winter. The Deerfoot Resource Area may provide breeding habitat for this species. The Deerfoot Resource area is large enough to accommodate many home ranges for nesting flammulated owls. Therefore, the cumulative effects area for the flammulated owl is the Deerfoot Resource area.
Pygmy Nuthatch	Home ranges for this species are about three acres or less in size. The Deerfoot Resource area is large enough to accommodate many home ranges for the pygmy nuthatch. Therefore, the cumulative effects area for the pygmy nuthatch is the Deerfoot Resource area.
Pine Marten, fisher	The resource area is of sufficient size to accommodate the home range of these species. Therefore, the Deerfoot Resource Area is the cumulative effects analysis area for the pine marten and fisher.
Boreal Toad, Coeur d'Alene salamander	The Deerfoot Resource Area provides for the year round needs of these species and is considered the cumulative effects analysis area for both species.
Fringed myotis	The Deerfoot Resource Area would provide for the needs of this species. The Deerfoot Resource Area is considered the cumulative effects analysis area.
Elk	The Deerfoot Resource Area would provide the year round needs of an elk herd. Therefore, the cumulative effects analysis area is Elk Habitat Units 9 and 10.

Old and Mature Forests

Many wildlife species occurring on the IPNF prefer or occur only in mature and old forests. Stands with old and mature structure provide habitat for species that rely on large trees, snags, down logs and maximum structural diversity for nesting, foraging and/or raising young. Existing structurally immature stands could provide mature stands and old growth characteristics over time. If managed for long-lived serals, such as larch, stands would maintain the large, old, dead and decaying structural components of the forest within the levels needed to provide suitable habitat. The IPNF requires maintenance of approximately ten percent across the Forest in old growth to provide for viable populations of old-growth dependent species (Forest Plan, p. II-5; PF Doc.CR-023). For more information on old growth, please refer to old growth discussion in the Forest Vegetation section of this chapter.

Dry Forest Habitats

Some wildlife species (for example, flammulated owls and pygmy nuthatches) prefer open, dry forests with large trees. Forests that have lost much of the larger structural component and that have developed a dense understory of shade-tolerant conifers are often no longer suitable for these species.

Dry forest habitats have evolved with frequent low or mixed intensity ground fires, which leave large seral trees and decrease fuels in the understory. To protect human developments and future timber resources, fire suppression is ongoing in the Coeur d'Alene Basin and has been practiced for an extended period of time. This allows the establishment of smaller shade-tolerant tree species under the canopy. This changes the structure of dry site habitat from an open-grown forest with a large diameter overstory into dense, multi-canopy stands with many immature trees. These stands are at higher risk of high intensity, stand-replacing fires. High levels of insects and disease are also found in these dense stand conditions.

About one-third of the Deerfoot Resource area is classified as dry forest. Salvage, timber harvest and fuelwood cutting have affected lower elevation seral conifer stands in the Deerfoot Resource Area. Historically, ponderosa pine was harvested for railroad ties to construct the Ohio Match Railroad that ran up Stump Creek within the resource area. Early harvest selectively cut the best and largest trees. Later timber harvest occurred over larger areas.

Snag and Down Woody Habitat

The amount of snags and down woody material present has been identified as a measure of forest integrity (Quigley et al. 1996; PF Doc. WL-R44). Dead trees, both standing and on the ground are critical habitat components for nearly all wildlife species as they depend on snags to differing degrees for nesting, forage and cover. Sensitive and management indicator species which nest in snags include pileated woodpeckers, black-backed woodpeckers, and flammulated owls. Some of these species cannot excavate cavities and depend on the other species to create cavities for nesting, denning or shelter. Retaining habitat for cavity excavators is vital to other wildlife dependent on snags such as marten and fringed myotis (*Figure 3-WL-1*). Large diameter snags provide habitat for the greatest variety of wildlife and remain standing longer than smaller snags. Ponderosa pine and western larch tend to last longer than other snags. Even after falling to the ground, large-diameter snags provide critical habitat. Down wood is essential in providing den sites, cover and foraging substrate for a variety of species including lynx, fishers, pine martens, boreal toads and other small mammals. Many birds that nest in snags promote forest health by controlling forest insect populations.

Figure 3-WL-1. Tree cavities provide habitat for a number of wildlife species.

Selective harvest and salvage logging of seral species has occurred extensively both historically and in the recent past within the Deerfoot Resource Area. Fire suppression and road construction has been ongoing. These types of activities have resulted in the changes to snag habitat in the Deerfoot Resource Area:

- *Old stands have shifted to mature or mid-aged resulting in a loss of large diameter, durable snags.*
- *Direct removal of large diameter snags and green trees has occurred*
- *The change to longer fire intervals has resulted in a reduction in snags (Refer to Sec. 3.3.3.in the Fire and Fuels section).*
- *Some patch size has decreased (Refer to PF Doc. VEG-10).*

Recognizing changes in snag habitat has led to management plans designed to provide an amount of snags and down wood shown to support viable populations of species that use these habitat components. Several studies have suggested the number of snags that should be made available or retained for snag-dependent species. This assessment uses the Region 1 Snag Protocol (USDA 2000; PF Doc. WL-R54) and Upper Columbia River Basin snag guidelines in Bull et al. 1997 (PF Doc. WL-R52). The 1998 IPNF Forest Plan Monitoring Report summarizing 10 years of monitoring information found that on monitored plots, snag retention guidelines were met (PF Doc. WL-CR-014).

In some areas of Region 1, monitoring has shown that snag retention may not be fully met following the many stages of project implementation. Several factors can impact snags during a project including inadequate marking of leave trees, inadequate contractual control, activities involved with felling and yarding, fuels treatment and firewood cutting following logging.

Road construction may also result in the removal of snag habitat due to the frequency of various harvests and fuelwood cutting near roads. Higher open road density increases the impacts of roads on snag availability.

Prescribed burning can create snags, but existing snags can also be lost during burning operations (Saab et al. 2006; PF Doc. WL-R146). The high incidence of insects and disease in the resource area currently provides some snag habitat, but large-diameter snags preferred by many wildlife species are limited.

Fragmentation and Road Density

One of the main habitat components considered in this analysis is road density. Road density affects the degree to which a species is vulnerable to disturbance and the degree to which the habitat has the potential for providing species needs. Roads may act as a barrier to some species. For other species, roads affect movement patterns and the ability for dispersal. Often roads are in preferred wildlife habitat such as riparian areas, ridge tops and flat benches, resulting in displacement or decreased habitat suitability. Roads increase habitat fragmentation and add to edge effects. The use of roads can cause direct and indirect mortality to wildlife. Direct mortality may result from vehicle collisions, incidental trapping and poaching. Indirect mortality results from disturbance and alteration of habitat.

The primary causes of fragmentation on forestlands are roads and regeneration harvests. Roads and urban development have caused fragmentation on private lands. Shelterwood harvest prescriptions may increase fragmentation over the short term, but these treatments would eventually restore more continuous stands of pine and larch. Leaving the large-diameter overstory trees on-site would reduce the effects of fragmentation of proposed shelterwood treatment units in the Deerfoot Resource Area.

The current level of open road density in the Deerfoot Resource Area is 1.1 miles/square mile. A road density less than 1 mile/square mile is considered a high security area, providing habitat for large ranging carnivores. (USDA Forest Service; PF Doc. WL-R95). Open road density does not include roads that are closed to motorized use according to the Travel Plan for the District, but whose barriers or gates have been breached by unauthorized motor vehicles. Despite increased law enforcement, motorized use can be high on some of these illegal routes.

B. Effects Analysis of Threatened and Endangered Wildlife Species

Gray Wolf *(Endangered Species with a Low Probability of Occurrence)*

Life History of Gray Wolves

Historically, wolves roamed widely throughout North America. In 1915, the United States Government began sponsoring control programs providing for the extirpation of the species to reduce perceived threats to humans and to reduce livestock and big game depredations. The program was very successful in its objective, and by the late 1930s wolves were virtually eliminated from the western United States. Although government control programs ceased in the early 1960s, it was over 50 years before wolf reproduction was again confirmed in the western U.S. in 1986.

Figure 3-WL-2. Gray wolf.

The northern Rocky Mountain wolf (a subspecies of the gray wolf) was listed as endangered in 1973 (*Figure 3-WL-2*). However, based on enforcement problems and a trend to recognize fewer subspecies of wolves, the entire species was listed as endangered throughout the lower 48 states, except Minnesota, in 1978 (USDI 1987; PF Doc. WL-R133). In 1994, the Fish and Wildlife Service published final rules in the Federal register (Volume 59, Number 224) making a distinction between wolves that occur north of Interstate 90 and wolves that occur south of Interstate 90, in Idaho. Gray wolves occurring north of Interstate 90 are listed as endangered species and receive full protection in accordance with provisions of the Endangered Species Act. Gray wolves occurring south of Interstate 90 are listed as a nonessential experimental population, with special regulations defining their protection and management.

Reference Condition for Gray Wolves

Conservation requirements for wolf populations are not fully understood, but the availability of prey (elk and deer) and limiting the risk of human-caused mortality are considered key components (USDI 1987 Northern Rocky Mountain Wolf Plan; PF Doc. WL-R133 and Tucker et al 1990; PF Doc. WL-R135). The risk of human-caused mortality is related to the density and distribution of open roads. Security for the wolf, primarily achieved through access management, is important primarily to meet the needs of its prey and as it relates to direct human-caused mortality. However, wolf packs have been found occupying areas in Montana with road densities greater than two miles of road per square mile of land. Reducing human-caused mortality is an important factor in maintaining wolf populations. Reducing access becomes an issue only when human-caused wolf mortality cannot be reduced. The primary method of reducing human-caused wolf mortality is through public education (Koch and Fontaine, 1993 pers. comm.).

Management Recommendations for Gray Wolves

Wolves are highly social animals requiring large areas to roam and feed. Key elements in gray wolf habitat include a year-round prey base (elk and deer), secluded areas for raising pups, and isolation from frequent human disturbance (Hansen 1986; PF Doc. WL-R134). Studies suggest that there is a strong relationship between key big game summer ranges and calving and fawning areas, and reliable reports of wolves (USDI 1987; PF Doc. WL-R133).

Affected Environment for Gray Wolves

Wolves may occur in the Deerfoot Resource Area as a transient visitor. There have been verified and unverified reports of wolves on the Coeur d'Alene River Ranger District. No pack activity has been documented on the district (PF Doc. WL-16). There is ample prey availability and wolves could occupy the Deerfoot Resource Area in the future; however, close proximity to human settlement makes the area less desirable for pack activity. Since the Deerfoot Resource Area is north of Interstate 90, the gray wolf is not part of the experimental population falls under the Endangered Species Act.

Direct and Indirect Effects to Gray Wolves

Under the No-Action Alternative, vigor of shrubs could be reduced because prescribed burning of these shrubs would not occur, resulting in a reduction of prey (elk and deer) for wolves.

Under the Proposed Action Alternative, elk habitat effectiveness potential for the EHU would return to existing levels after activities are complete (refer to section 3.6.11 A. in wildlife report) resulting in no change in the prey base. The Deerfoot Resource Area is close to human settlement and there is no known pack activity on the Coeur d'Alene River Ranger District.

Cumulative Effects to Gray Wolves

The cumulative effects area for the wolf is the Coeur d'Alene River Ranger District. The greatest impact to wolves in the past was the effort to extirpate them. Additionally, human settlement, conflicts with grazing and loss of habitat all contributed to their listing. Past harvest has increased browse for big game.

Most planned future forest improvement projects within the Deerfoot Resource Area (precommercial thinning and prescribed burning) would have little impact on the wolf. Recreational use is currently high and will continue at high levels in the future because of adjacency to private lands. This will result in disturbance to the ungulate prey base.

Future planned prescribed fire from past projects would benefit wolf prey species by improving forage on winter range. Future planned noxious weed activities would have little impact on the wolf or its prey.

Conclusion- Gray Wolf

- Viability of the species would be maintained, since the goal to have 30 breeding pairs well distributed throughout three states for three successive years has been met (2001 Wolf Recovery Report; PF Doc. WL-30).
- Wolves are not known to occur in the resource area. One wolf pack is thought to possibly use the northeast edge of the Coeur d'Alene River Ranger District. The pack has been documented outside Noxon, Montana across the Bitterroot Divide. The Deerfoot Resource Area is on the opposite side of the District and adjacent to urban development so does not provide preferred habitat for wolves.

Consequently, the proposed action **would not affect the gray wolf.**

C. Analysis of Sensitive Wildlife Species

Flammulated Owls & Pygmy Nuthatches *(Sensitive Species with a Moderate & High Probability of Occurrence)*

Due to similar habitat requirements, flammulated owls and pygmy nuthatches are addressed together. Both species inhabit the same open, old ponderosa pine stands and rely on large diameter ponderosa pine for foraging and for nesting in cavities. Pygmy nuthatches were given a high probability of occurrence within the resource area due to the presence of habitat and sightings in similar habitat on the district. Flammulated owls were given a moderate probability of occurrence because there is suitable habitat and suspected responses have been heard on the district, but the species has never been sighted.

Flammulated owls are a neo-tropical migratory species with a range that extends from the Canadian border through Mexico, including Washington, Wyoming, Idaho, California, Nevada, Utah, Colorado, New Mexico, Texas, and Arizona (Johnsgard 1988 in Atkinson 1990; PF Doc. WL-R68). This species is the only forest owl in Idaho classified as a neo-tropical, migrating long distances. Flammulated owls and pygmy nuthatches seem to prefer old growth ponderosa pine habitats, sometimes mixed with Douglas-fir (Bergman, 1983**;** PF Doc. WL-R4). Hayward found that flammulated owls tended to nest in old growth ponderosa pine stands (1986; PF Doc. WL-R23).

Moths make up the largest part of flammulated owl diets, with grasshoppers, beetles and other insects making up the rest (Bergman 1983; PF Doc. WL-R4). Hayward (1986; PF Doc. WL-R23) found that an incubating owl consumed about 22 insects per day. Flammulated owls are secondary cavity nesters relying on medium to large woodpecker species (such as flickers, sapsuckers and pileated woodpeckers) to excavate their nesting cavity (Reynolds et.al. 1989; PF Doc. WL-R45). As cavity nesters, these species are especially vulnerable to forest management and firewood cutting, which can reduce snags (Bergman 1983; PF Doc. WL-R4).

Pygmy nuthatches are non-migratory and only move short distances (Ghalambor, 2003 WL-R102). Pygmy nuthatches are primary cavity nesters and can excavate their own nesting structure or use existing holes Pygmy nuthatches appear to require well-spaced, old pines and vigorous trees of intermediate age (Balda et. al. 1983 in Ghalambor, 2003, PF Doc. WL-R102).

Management Recommendations for Flammulated Owls and Pygmy Nuthatches

Excavated snags greater than 20 inches in diameter are most commonly used by nesting flammulated owls (Goggans 1986, PF Doc. WL-R17; Hayward 1986, PF Doc. WL-R23; Bull et. al. 1990, PF Doc. WL-R8). Nearly all nesting occurs in mature or old-growth stands dominated or co-dominated by ponderosa pine and Douglas-fir (Hanna 1941 in Reynolds et al., PF Doc. WL-R45; Bull and Anderson 1978, PF Doc. WL-R6; Goggans 1986, PF Doc. WL-R17; Hayward 1986, PF Doc. WL-R23; Howie and Richie 1987, PF Doc. WL-R26). Reynolds and Linkhart (1992; PF Doc. WL-R45) found all but one nest site in forests with ponderosa pine at least present in the stand

Nest sites of the flammulated owl commonly occur on slopes less than 55 percent. Hayward found the owls nesting in ponderosa pine with 16 snags per acre, and 20 trees per acre greater than 20-inches diameter. Groggans found that nest-site canopies had less than 55 percent canopy closure, and Hayward recommended a minimum canopy closure of 35 percent. Based on these studies, in order to maintain suitable flammulated owl habitat, silvicultural prescriptions should lead to the retention of old ponderosa pine with an average of 20 inches in diameter (minimum 17 inches) such that upper canopy closure ranges from 35 to 55 percent. Region 1 protocols for snag retention are used to maintain sufficient snag habitat in areas where forest management occurs (USDA 2000; PF Doc. WL-R54).

Pygmy nuthatches appear to require well-spaced, old pines and vigorous trees of intermediate age (Balda et. al. 1983 in Ghalambor, 2003, PF Doc. WL-R102). Snags are very important to the pygmy nuthatch, not only for nesting but also for their communal roost sites (Sydeman et. al. 1988, PF. Doc. WL-R103). Pygmy nuthatches are very sensitive to extreme cold and cavity openings almost always face the south or east

(Ghalambor, 2003, PF Doc. WL-R102). Based on these studies, in order to maintain suitable habitat for pygmy nuthatches, silvicultural prescriptions should lead to the retention of old ponderosa pine with an average of 20 inches in diameter (minimum 17 inches) such that upper canopy closure ranges from 35 to 55 percent. Region 1 protocols for snag retention are used to maintain sufficient snag habitat in areas where forest management occurs (USDA 2000; PF Doc. WL-R54).

Reference Condition for Flammulated Owls and Pygmy Nuthatches

There are no historical records of these species specifically, but the Interior Columbia Basin Assessment (Quigly et al. 1996; PF Doc. WL-R44) found that the amount of interior ponderosa pine forest maintained by frequent, low intensity fires has declined by 80 percent across the Columbia Basin. A regional study by the National Fire Plan Cohesive Strategy Team in Region 1 (2002; PF Doc. WL-R69) suggests that 12 to 18 percent of the historical pine stands currently exist.

Figure 3-WL-3. Historic ponderosa pine stand on the Rathdrum Prairie (photo courtesy of the Museum of North Idaho

The Coeur d'Alene Geographic Assessment determined that historic amounts of dry-site large/mature and old growth ponderosa pine and large, old Douglas-fir were more common in the Coeur d'Alene River Basin than under current conditions. Records for the Coeur d'Alene Basin and the Deerfoot Resource Area indicate that open ponderosa pine stands had a larger distribution than today throughout the resource area and across the IPNF.

Historic photographs of the Rathdrum prairie indicate much larger and continuous stands of ponderosa pine with a well-stocked larger diameter overstory (*Figure 3-WL-3*). Historically, the Rathdrum Prairie and lower elevation, southerly aspects of the Deerfoot Resource Area provided flammulated owl and pygmy nuthatch habitat. It is expected that there were greater numbers, larger distribution and more stable populations of flammulated owls and pygmy nuthatches both locally and on the broad scale at that time.

Affected Environment for Flammulated Owls and Pygmy Nuthatches

Habitat for flammulated owls and pygmy nuthatches has changed in composition, distribution and abundance compared to historical conditions. Past selection harvest for seral species such as ponderosa pine and past salvage harvest have decreased pine and snags across the resource area. Fire suppression has resulted in dense Douglas-fir and grand fir regeneration that compete with ponderosa pine rather than being periodically burned (PF Doc. WL-37). These past activities have resulted in ponderosa pine and other fire-tolerant seral species decreasing in distribution, size and age.

Abundant mature habitat exists, but old stands are below historic levels. Some of the stands now classified as mature will move into the "old" category within the next 50 years or less. The old component of these ecosystems produced the largest snags, and is limited for these species (*Figure 3-WL-4*). Fragmentation has been caused by encroaching non-seral species, past harvests, road construction and activities on private lands within the resource area and across the Rathdrum Prairie.

Habitat modeling shows 1,039 acres of suitable flammulated owl habitat in the resource area. There are 1,694 acres of potential habitat that could become suitable for these species over the long-term. Suitability of the habitat has been confirmed through field reviews by the biologist and aerial photograph interpretation (PF Doc. WL-01).

Surveys for flammulated owls in the Deerfoot Resource Area were conducted in 2001 and in 2002; no flammulated owls were detected during these surveys (PF Doc. WL-38). No surveys for pygmy nuthatches were conducted. Surveys for flammulated owls have been ongoing across the District for several years with an unconfirmed response recorded outside of the resource area near Cottonwood Creek, a response in the Stella Creek drainage several miles south of the resource area, and two responses in the Eagle Creek drainage (PF Doc. WL-38, PF Doc. WL-16).

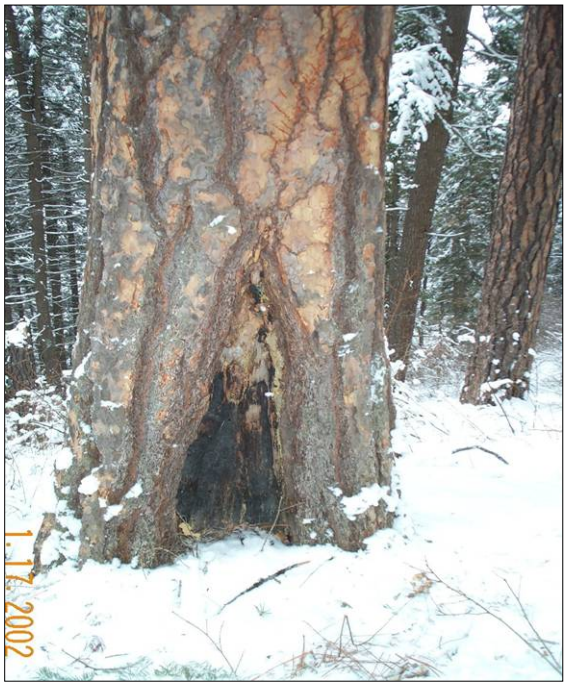


Figure 3-WL-4. Fire scar on a ponderosa pine within flammulated owl habitat on the District.

Direct and Indirect Effects to Flammulated Owls and PygmyNuthatch

Habitat for these species was evaluated using a habitat suitability model derived from data in the Forest timber stand database (TSMRS). Specifics of the model can be reviewed in the wildlife project file (PF Doc. WL-28 and WL-36). Impacts were assessed by predicting changes in current habitat and snag availability under each alternative.

Direct and Indirect Effects Under the No-Action Alternative: Currently there are 1,039 acres of suitable habitat and 1,694 acres of potential habitat for these species in the resource area. There would be no short-term change to suitable or potential flammulated owl habitat under this alternative. Predictions of canopy loss based on stand composition show that suitable stands within the Deerfoot Resource Area would maintain their suitability for the flammulated owl and pygmy nuthatch for the next 50 years (PF Doc. VEG-6). Over the short term, the No-Action Alternative would result in retention of all suitable habitats. Planned ecosystem burning may increase snag availability slightly and will benefit understory vegetation.

Due to the density of Douglas-fir and grand fir and the loss of fire tolerant species to harvest, seed sources have been lost. Over the long term, reductions in the seed source and competition with Douglas-fir and other species such as grand fir would result in a low potential for dry-site stands in the resource area to trend towards the desired ponderosa pine habitat for the flammulated owl and pygmy nuthatch. The potential for stand-replacing fire would be higher under the No-Action Alternative than under the Proposed-Action Alternative (Refer to the Fire and Fuels section).

In the absence of management, vegetation models have shown that both canopy closure and conifer diameters would slowly decrease due to the current conditions of the dry-site stands in the resource area (PF Doc. VEG-6). This would result in potential habitat trending away from providing suitable habitat.

Direct and Indirect Effects Under the Proposed-Action Alternative: The project was designed to avoid suitable flammulated owl/pygmy nuthatch habitat. Only a small amount of suitable habitat (< 1 acre) would be harvested under this alternative (*Table 3-WL-4*). This small harvest is due to logical topographical boundaries. Burning of suitable habitat would occur on 638 acres (PF Doc. WL-26). Burning would be implemented to help maintain open stands of ponderosa pine (flammulated owl and pygmy nuthatch habitat) over time. Outside of suitable habitat, some of the additional 612 acres of prescribed fire would benefit flammulated owl and pygmy nuthatch habitat by increasing snag availability and by increasing or maintaining

the open understory found in preferred habitat. Prescribed burning often occurs in spring so that burning conditions are most favorable to achieve the desired results. This could impact individual nesting birds that were not located during surveys if the nest tree were burned. Over the long term, current mature and immature stands would increase in age and diameter providing additional habitat for these species. Wherever possible, large-diameter trees, including Douglas-fir, would be retained singly and in groups. Where ponderosa pine occurs in the overstory it would be favored for retention.

Table 3-WL-4. Treatment activities in suitable flammulated owl habitat under the Proposed Action Alternative.

Silvicultural prescription	Treatment in suitable habitat (acres)
Shelterwood	1
Thin	.2
Slash/Underburn	638

Disturbance associated with roads would be a short-term effect to these species. The 1.6 miles of road constructed and temporary roads constructed would be closed to motorized travel during and following project activities.

Cumulative Effects to Flammulated Owls and Pygmy Nuthatch

The cumulative effects area for the flammulated owl and pygmy nuthatch is the Deerfoot Resource Area. The reduction in flammulated owl and pygmy nuthatch habitat that has occurred throughout the Rathdrum Prairie and on lower elevation private lands as a result of urban development and private timber harvest is reflected in the existing condition. Timber harvest, salvage logging, fuelwood gathering, road construction and fire suppression are all reflected in the existing condition and the amount of suitable habitat for the two species.

Potential future activities in the resource area such as continued prescribed fire, precommercial thinning and planting of additional seral species will eventually improve habitat for these species because larger trees and more open stands would result. Planned noxious weed treatments would have little effect upon these two species. Due to the objectives for management of these dry-site habitats, it is not foreseeable that any future activity in the area would degrade habitat for flammulated owls or pygmy nuthatches.

Currently, most projects proposed in ponderosa pine habitats across the region have the objective of restoring this conifer species and the ecological processes that maintain it. This should result in a trend towards improved habitat for wildlife species dependent on this habitat on both the small scale and the large scale.

Conclusions of the Flammulated Owl and Pygmy Nuthatch Analysis

Past activities on private lands and reductions in ponderosa pine habitats across the IPNF have probably contributed to decreased abundance of flammulated owls and pygmy nuthatches on the Coeur d'Alene District and adjacent private lands, particularly the Rathdrum Prairie (PF Doc. CR-025).

Based on the existing condition of suitable habitat and field survey results, flammulated owls and pygmy nuthatches potentially occur in the resource area. **The Proposed Action may impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or the species** because**:**

- The proposed action was designed to maintain habitat for the flammulated owl and pygmy nuthatch
- An analysis using Forest Inventory and Analysis (FIA) data was done for the Idaho Panhandle National Forest to estimate snag density. This analysis found across the forest snags in the 10-19.9" diameter class is 10.8 per acre. In the larger >20" diameter class there are 2 snags per acre (Bush et.al., 2006, PF Doc. WL-R140; PF Doc. WL-15)
- Creating additional snags with prescribed fire, adhering to the Region 1 snag management protocol (USDA 2000; PF Doc. WL-R54), and to the snag guidelines developed in association with the Upper Columbia River Basin (UCRB EIS as described in Bull et. al. 1997; PF Doc. WL-R52) would

maintain adequate snag habitat to support flammulated owl and pygmy nuthatch populations (UCRB EIS, Appendix K; PF Doc. WL-R52) under the Proposed-Action Alternative

- The proposed action is consistent with Forest Plan direction to manage the habitat of sensitive species to *prevent further declines* in populations, which could lead to listing under the Endangered Species Act (USDA 1987, p. II-28; PF Doc.CR-002). Therefore, these actions would be consistent with National Forest Management Act requirements for diversity of plant and animal communities
- A conservation assessment for the flammulated owl in the Northern Region found that viability will be maintained for the next 100 years (PF Doc. WL-R139).

Black-backed Woodpecker *(Sensitive Species with a High Probability of Occurrence)*

Black-backed woodpeckers forage for insects in the bark of live trees such as lodgepole pine and larch. Studies indicate that they also prefer to forage on burned snags and may be concentrated in areas that have recently burned (Dixon et al. 2000; PF Doc. WL-R16). Post-fire habitat is thought to have the greatest value as source habitat for black-backed woodpeckers (O'Connor et al. 2001; PF Doc. WL-R41). They forage in various levels of the canopy, from ground level to 60 feet high or more (Jewett, et al. 1953; PF Doc. WL-R28). Home range size appears to be between 180 and 820 acres with territories ranging from 35 to100 acres (Cherry, 1997; PF Doc. WL-R150). Black-backed woodpeckers are found within coniferous forests of North America including the Cascade Range, northern portions of the Sierra Nevada and the Rocky Mountains (Washington Department of Wildlife 1991; PF Doc. WL-R62). The heaviest concentrations of this species seem to be east of the Cascade crest. Black-backed woodpeckers have been found in Washington in scattered locations throughout the state, but their distribution in Idaho is largely unknown.

Management Recommendations for Black-backed Woodpeckers

Specific management recommendations for this species suggest the reintroduction of fire into the ecosystem, particularly in larch and lodgepole pine (Dixon et al. 2000; PF Doc. WL-R16). Black-backed woodpeckers often use stands with a minimum of 42 snags per acre (Ibid). This high snag density is usually results from wildfires in an area.

Reference Condition for Black-backed Woodpeckers

There is little information about historic sightings or populations of black-backed woodpeckers. It is likely that their habitat has declined over the past century because of their preference for post-fire habitats and ongoing fire suppression for that time period. Fire exclusion has potentially reduced the amount of young stands that originated from wildfire. Lodgepole pine may have had greater distribution and occurred in larger patches across the forest prior to fire suppression as this conifer species relies on fire to open cones and allow seeds to regenerate. Although the role of white pine in providing black-backed woodpecker habitat is largely unkown, this species may have used white pine snags when it existed in large blocks across the landscape.

The species has been sighted during their breeding season on the Coeur d'Alene River Ranger District (PF Doc. WL-34). Annual breeding season surveys for black-backed woodpecker in the Coeur d'Alene Mountains have also confirmed their presence in the basin (PF Doc. WL-24).

Studies in Region 1 suggest that from 1940 to 1987, black-backed woodpecker habitat was below the historical range of variation in the region. From 1989 to the present, black-backed woodpecker habitat is thought to be well above the historic range on a regional scale as a result of the frequent high intensity fires that have occurred since that time (USDA 2003; PF Doc. WL-R58). A Conservation assessment of black-backed woodpecker found habitat to be well-distributed and abundant across the Forest Service's Northern Region (Region 1) and concluded that viability for the species will be maintained for the next 100 years (Samson, 2005, p. 51-52; PF Doc. WL-R139).

Affected Environment for Black-backed Woodpeckers

Although some habitat exists for this species, the resource area is inherently low in habitat for black-backed woodpeckers due to the low amounts of lodgepole pine and larch. Foraging habitat has been affected by fire suppression since black-backed woodpeckers are primarily a post-fire obligate species and they use patches of burned tress for foraging.

Pockets of root disease and insect infestations in the resource area have created an abundance of snags in localized areas providing forage for black-backed woodpeckers. The larger concentrations of these infected trees are found outside of the resource area in Bottom Creek, Nichols Creek and the Canyon Forks drainages (PF Doc. WL-31).

In the past 5-10 years the district has retained all or portions of fire damaged trees to provide for black-backed woodpecker habitat (PF Doc. WL-9). Black-backed woodpeckers have been seen by the biologist using these fire scorched patches. In the Coeur d'Alene Mountains, the Ulm Peak fire near the Montana border also created a approximately 4,100 acres of high quality forage habitat for the black-backed woodpecker (PF Doc. WL-32) (*Figure 3-WL-4*).

Figure 3- WL-5. Ulm Peak Fire provides habitat for the black-backed woodpecker.

Direct and Indirect Effects for Black-backed Woodpeckers

The potential effects on black-backed woodpeckers and other snag dependent species were determined by estimating the change in distribution, quantity and quality of snag habitat as a result of the alternative management actions. Nesting and foraging habitat were modeled using stand data and fire occurrence.

Direct and Indirect Effects Under the No-Action Alternative: Lodgepole pine and larch make up only about 1% of area within the resource area. Insect killed trees, that could provide forage, are scattered throughout the resource area (PF Doc. WL-31). The habitat model indicates there are an estimated 323 acres of black-backed woodpecker **nesting** habitat across the Deerfoot Resource Area. The model is based in part on defective trees found during stand exams. Most nesting habitat reported by the model is in Douglas-fir stands, which may not provide optimal nesting habitat. Burning associated with Douglas-fir beetle projects resulted in additional habitat created as some trees were fire scorched. Insect outbreaks are expected to continue to occur at high levels in the resource area and will also provide nesting and foraging habitat into the future. Over the long term, natural mortality would result in additional snag recruitment.

Direct and Indirect Effects Under the Proposed-Action Alternative: Proposed prescribed burning on 1,257 acres, has the potential to create forage habitat. This treatment is expected to increase snag availability and foraging opportunities for the species (Saab et al. 2006 PF Doc. WL-R146). If a black-backed woodpecker were nesting in a snag that burned, the year's clutch could be impacted.

Potential snags would be reduced on 608 acres where regeneration and thinning methods of harvest are implemented. Where shelterwood harvests are proposed, mature and fire scorched trees would be retained that would provide some black-backed woodpecker habitat presently and into the future. These trees would also provide a future snag component and another age class as the stand regenerates. While this prescription will improve long-term snag habitat by perpetuating more resilient, longer-lived species, it represents a short term decline in the quality of snag habitat. Thinning would not have as great an effect on black-backed woodpecker habitat and may improve it over time.

Road construction under the Proposed-Action Alternative would not affect snag availability since those roads would be managed as closed to motorized use and access for fuelwood gathering would not increase.

Trees that are fire scorched during site-preparation activities would be retained for black-backed woodpecker foraging habitat. Fire-scorched trees would remain on site and improve habitat for the black-backed woodpecker (O'Connor et al. 2001; PF Doc. WL-R34). Guidelines assure that project activities will result in the retention of snags according to the Region 1 snag management protocol (USDA 2000; PF Doc. WL-R6), and to the snag guidelines developed in association with the Upper Columbia River Basin (UCRB EIS as described in Bull et. al. 1997; PF Doc. WL-R7) are included in Chapter 2 of this document. Design features described in Chapter 2 would protect these trees for black-backed woodpecker habitat.

Adhering to the Region 1 snag management protocol (USDA 2000; PF Doc. WL-R54), and to the snag guidelines developed in association with the Upper Columbia River Basin (UCRB EIS as described in Bull et. al. 1997, UCRB EIS, Appendix K; PF Doc. WL-R52) would maintain some snag availability for this species under this alternative however, these are below the high densities required by the black-backed woodpecker.

Cumulative Effects to Black-backed Woodpeckers

The cumulative effects area for black-backed woodpeckers is the Deerfoot Resource Area. The affected environment for the black-backed woodpecker includes:

- Past timber harvest and a reduction of fire in the ecosystem has reduced the number of snags across the Coeur d'Alene basin.
- Salvage harvest that occurred in the past with the Douglas-fir Beetle project removed snags from the resource area.
- High levels of insects and disease have mitigated this loss to some degree.

Proposed prescribed fire, thinning larch, regeneration of white pine and increased distribution of ponderosa pine proposed would result in a trend towards improved habitat. Site treatments (burning) could have beneficial impacts for the black-backed woodpecker by creating foraging habitat. In untreated areas, forest insects would continue to provide foraging opportunities (PF Doc. WL-31). Private lands within the resource area do not provide optimal habitat for black-backed woodpeckers because they are lower in elevation with less lodgepole pine, larch and white pine.

Planned pre-commercial thinning and noxious weed treatments would have little impact on the black-backed woodpecker.

Conclusions of the Black-backed Woodpecker Analysis

The Proposed-Action Alternative would reduce the quantity of available snag habitat for the black-backed woodpecker. However, impacts to the blacked-woodpecker would be low for the following reasons:

- The Deerfoot Resource Area in naturally low in habitat for the black-backed woodpecker, because it lacks the larch and lodgepole preferred by this species.
- All proposed alternatives are consistent with Forest Plan direction to manage the habitat of sensitive species to prevent further declines in populations, which could lead to listing under the Endangered Species Act (USDA 1987, p. II-28; PF Doc. CR-002).
- Bonn et al. (2007) concluded that habitat for the black-backed woodpecker is increasing in the region due to insect outbreaks, fire and a decrease in the salvage of dead trees (PF Doc. WL-R148).
- A conservation assessment of the black-backed woodpecker found habitat to be abundant and well-distributed across the northern region (Region 1) and concluded that viability for the species will be maintained for the next 100 years (PF Doc. WL-R139).
- No salvage logging of burned or insect infected trees occurs under the proposed alternative (Bonn et al. 2000; PF Doc. WL-R148 p. 24).
- More than 30,000 acres of black-backed woodpecker habitat is maintained in the Northern Rockies Ecological Province (Bonn et al. 2007 p. 24, p. 13)

Because of these reasons **the Proposed Action may impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or the species.**

Bald Eagle *(Sensitive Species with a Moderate Probability of Occurrence)*

Life History of Bald Eagles

Bald eagles select isolated shoreline areas with larger trees to pursue such activities as nesting, feeding, loafing, etc. Nesting habitat includes proximity to sufficient food supply, dominant trees, and within line-of-sight of a large body of water (often within 0.25 mile of water). Nest trees typically are large ponderosa pine, Douglas-fir, western larch or cottonwood trees with open crowns in areas that are relatively free from human disturbance (Montana Bald Eagle Working Group 1991; PF Doc. WL-R108).

Perch sites, roost sites and access to prey are the essential components of winter habitat. Bald eagles generally use traditional communal roost sites in the winter, especially during periods of severe weather. Roosts are often located in large trees at the head of sheltered draws that provide protection from wind and inclement weather. Although proximity to food resources is not critical, roosts are often in the closest available forest stand. Roosts at greater distances from food sources will require more energy expenditure (Montana Bald Eagle Working Group, 1991; PF Doc. WL-R108).

Reference Condition for Bald Eagles

All of the Resource area is included in Zone 7 were designated in the Pacific States Bald Eagle Recovery Plan. Historically, this area was likely to have more bald eagles than currently because of the abundant fisheries and less shoreline development. At the time of federal listing, bald eagles were uncommon in this zone. Recovery has progressed considerably in Zone 7. Currently, key areas in northern Idaho have contributed enough new territories to reach and exceed goals listed in the Recovery Plan (Figure 3-WL-6). The bald eagle has been removed from the Threatened and Endangered list on July 9, 2007 (PF Doc. WL-19).

After nearly disappearing from most of the U.S., the bald eagle is now flourishing and no longer needs the protection of the Endangered Species Act. The nation's symbol has recovered from an all-time low of 417 nesting pairs in 1963 to an estimated high of 9,789 breeding pairs today, and has been removed from the list of threatened and endangered species. (*http://www.fws.gov/migratorybirds/baldeagle.htm)*

Figure 3-WL-6. Current number of breeding bald eagle pairs in the northwest.
(http://www.fws.gov/migratorybirds/issues/BaldEagle/baldeaglepopmapfinal.pdf)

Bald eagles are winter visitors and yearlong residents of northern Idaho and northeast Washington. They are attracted to the area's larger lakes and rivers, which provide most of their foraging opportunities (i.e. fish, waterfowl).

Winter roosts are relatively uncommon in the Idaho Panhandle and none are located in or near the Deerfoot Resource Area. The majority of wintering eagles leave their nesting areas and congregate on unfrozen open water because of forage availability (spawning kokanee). These include Lake Pend Oreille, Pend Oreille River, Kootenai River, and Lake Coeur d'Alene. Only a limited number of winter roost sites are known in this entire area, despite annual aerial winter counts.

The highly vegetated shorelines found locally are likely to provide adequate protection such that habitual roosts appear to be generally unnecessary. Of the three known roosts associated with Lake Coeur d'Alene, two roosts are within 0.5 miles, and one is 1 mile from the associated water body (pers. comm. with S. Robinson, BLM wildlife biologist, to S. Jacobson, April 14, 1999). Of the three known winter roost sites associated with Lake Pend Oreille, two sites are less than 0.1 mile from shoreline and the other is approximately 0.1 mile from shoreline (Crenshaw 1987).

Figure 3-WL-7. Bald eagle. (Photo by Sue Matthews)

Management Recommendations for Bald Eagles

The National Bald Eagle Management Guidelines (PF Doc. WL-R145) made general recommendations for the management of the bald eagle in May 2007:

- *Avoid disturbance at nest sites through buffers, design and timing of activities.*
- *Protect alternate nests and time temporary impacts such as loud machinery to occur outside the breeding season.*
- *Avoid clear cutting or removal overstory trees within 330 feet of a nest and avoid any type of timber harvest operations during the breeding season within 660 feet of a nest. Other activities close to a nest tree, such as thinning or prescribed burning, should be undertaken outside the breeding season.*

Affected environment for Bald Eagles

Bald eagles are occasionally sighted on Hayden Lake, adjacent to the Deerfoot Resource Area (*Figure 3-WL-6*). A nest was documented on private lands along the shore of Hayden Lake in 2000, just west of the Resource Area (PF Doc. WL-11). Later that year the nest tree was felled by the private landowner after it was determined that the leaning nest tree posed a threat to the landowners home and safety (PF Doc. WL-11). The territory was determined to be active again in 2001, but the new nest location was not located during aerial surveys. Only Mokins Bay along Hayden Lake is in Forest Service ownership. The remaining shoreline is in private ownership. There is suitable bald eagle nesting habitat along Hayden Lake. However, continued extensive development along the lakes shoreline has greatly reduced suitable nest sites for the bald eagle.

Although no known winter roosts are found adjacent to Hayden Lake, a few wintering bald eagles are usually sighted along the lake during the mid-winter bald eagle surveys each year.

Field surveys did not result in an observation of this species in the resource area (PF Doc. WL-16). Design features would protect of any nest or roost sites that may be found.

Direct and Indirect Effects to Bald Eagles

No known nest lies within the project area. No harvest treatments would occur near Hayden lake shoreline under either alternative.

Cumulative Effects to Bald Eagles

The cumulative effects area for the bald eagle is the Hayden Lake watershed. The most significant effect upon the bald eagle and its habitat is the continued development of private lands along the Fernan Lake, Hayden Lake and Coeur d'Alene Lake shoreline. Past, ongoing and future activities in the Deerfoot Resource Area have little impact on the bald eagle and its habitat because very little of the lake shoreline is National Forest System lands.

Conclusions of the Bald Eagle Analysis

There would be no direct or indirect effects to bald eagles as a result of the proposed action. Viability of the species would be maintained because the bald eagle has exceeded recovery goals in zone 7 http://www.fws.gov/migratorybirds/issues/BaldEagle/baldeaglefinaldelisting.pdf consequently, **the Proposed Action would have no impact on the bald eagle or its habitat.**

Fisher *(Sensitive Species With a Moderate Probability of Occurrence)*

Fishers are associated primarily with northern coniferous forests (Powell 1982 in Arthur 1989; PF Doc. WL-R42). However, fishers probably inhabited more southern areas of deciduous forest before European settlement (Hagmeier 1956 in RM #254; PF Doc. WL-R20; Powell 1982 in Arthur 1989; PF Doc. WL-R42). This species inhabits late successional coniferous forests preferring old growth or spruce-fir stands (Gibilisco et al. 1995; PF Doc. WL-R70). Fishers den in hollow logs, under rocks, and in holes in trees. They are mostly arboreal and hunt in the trees. However, they also forage on the ground.

Today the range of the fisher in the United States includes portions of the Appalachian Mountains from New England south to West Virginia, northern Wisconsin, Minnesota, Michigan, northern Idaho, western Montana, and as far south as northern California along the West Coast (Allen 1983 in: Washington Department of Wildlife 1990; PF Doc. WL-R1).

Management Recommendations for Fisher

Witmer et al (1998; PF Doc. WL-R64) describes the major issues of concern to fisher conservation and management in the Columbia River basin in "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates":

- *Issue 1: Conservation of late successional forest at low to mid elevations* - Fishers can probably tolerate small patch cuts or other small-scale disturbances, provided these occur in a larger matrix of relatively dense, closed canopy, late successional forest (Powell and Zielinski 1994, p. 64; PF Doc. WL-R43). The Habitat Conservation Assessment and Conservation Strategy for Forest Carnivores in Idaho" (Idaho Fish and Game et. al. 1995, p. 55; PF Doc. WL-R30) state that drainages with moderate quality fisher habitat should be managed for 40% late successional habitat in preferred or suitable habitat types for fisher. Fishers prefer moist to wet habitat types (Gibilisco et al. 1995; PF Doc. WL-R70).
- *Issue 2*: *Maintenance of links between populations* - Barriers to movement may include large non-forested openings and highways.
- *Issue 3: Maintenance of riparian corridors* – Waterways and riparian habitat provide travel corridors and often are found at the lower elevations fishers prefer within a given area.
- *Issue 4: Trapping pressure and human disturbance* - Fisher trapping in Idaho is closed. Road densities of less than 1 mile per square mile are a deterrent to incidental trapping of fisher (Gibilisco et al. 1995; PF Doc. WL-R70).

Reference Conditions for Fisher

The status of the fisher in the Western United States is poorly known but generally perceived as precarious and declining (Powell and Zielinski 1994 in USDA 1998, pp. 65-66; PF Doc. WL-R43). Current populations may be extremely vulnerable to local and regional extirpation because of their lack of connectivity and their small numbers (USDA Forest Carnivore Conservation and Management in the Interior Columbia Basin, Witmer et al 1998; PF Doc. WL-R93).

Large fires between 1910 and 1934 were probably responsible for declines in fisher in Idaho (Jones 1991 in Idaho Fish and Game 1995; PF Doc. WL-R29). Fishers are also susceptible to over trapping and habitat loss. During the late 1800's and 1920's, fisher pelts were worth up to $300 and demand was high. Over trapping, habitat losses from settlement and logging, and the widespread use of poisons as a predator control agent caused population reductions in many areas (Gibilisco et al. 1995; PF Doc. WL-R70). Current status of fisher populations on the Coeur d'Alene River Ranger District is largely unknown. Several fisher hair snare trapping efforts have occurred on the Coeur d'Alenes between 2005 and 2007 (*Figure 3-WL-8*). These efforts have involved the Idaho Fish and Game, Coeur d'Alene Tribe and a joint effort between Gonzaga University

and the Forest Service (PF Doc. WL-33). Fisher populations appear to be low on the Idaho Panhandle National Forests.

The largest population of fisher in Idaho appears to occupy the area north of the Salmon River to the Silver Valley (Jones et al., USFS Eastside Assessment Team, Maj and Garton 1994, all in Idaho Fish and Game 1995; PF Doc. WL-R35). Reports of fisher north of the Silver Valley are few (Maj and Garton 1994 in Idaho Fish and Game 1995; PF Doc. WL-R35).

Figure3- WL-8. Fisher near hair snare on the IPNF .

Affected Environment for Fisher

Late Successional Forest: If 40 percent of a drainage is in late successional stage, the drainage provides moderate quality habitat for fishers (Idaho Fish and Game et. al. 1995, PF Doc. WL-R30). Historically in the Coeur d'Alene River Basin late successional stage forests (mature and old growth) were found across 23% to 55% of the landscape (mean value of 46%) (Geographic Assessment, Appendix A: Report #2; PF Doc. CR-025). The loss of late successional habitat in the Coeur d'Alene Mountains is probably the most important issue for the fisher in this area. Currently, across the Coeur d'Alene Basin about 31% of the forest is in late successional stage (mature and old growth) forest (Geographic Assessment, p. 39; PF Doc.CR-025). In the Deerfoot Resource Area, late successional stages are at 46%, slightly higher than the 40% recommendation. However, about 30% of this late successional habitat within the Deerfoot Resource area is in dry habitat types which are not preferred by the fisher. Table 3-WL-5 shows the distribution of late successional habitat across the resource area.

Linkages: In "Forest Carnivores in Idaho Habitat Conservation Assessments and Conservation Strategies" (1995, Figure 1, page 32; PF Doc. WL-R30), Idaho Fish and Game mapped the Coeur d'Alene Mountains as fisher habitat. The only linkage corridor mapped on Coeur d'Alene River Ranger District is the St. Joe Divide, over 20 miles southeast of the Resource area. Past decades of land management activities in the Coeur d'Alene basin have fragmented forest habitat, thereby reducing the contiguous area and creating barriers to movement. In addition, I-90 is a significant barrier to movement of carnivores. Since the Deerfoot area is adjacent to rural development and on the edge of the Forest, the watershed is outside any major linkage for forest carnivores.

Riparian Habitat: The quality of riparian habitat in the Deerfoot Resource Area has been reduced by road construction. Roads are present along most major creeks. Past road decommissioning has improved riparian habitat in some drainages. Just outside the resource area, roads are present in riparian habitat in Hayden Creek and many tributaries to that drainage system. Road construction in riparian areas has occurred along streams within the Resource Area and throughout the Coeur d'Alene River Basin.

Trapping Risks: Trapping fisher is illegal in Idaho. However, due to the proximity of the Deerfoot Resource Area to urban development, incidental trapping risks may be increased. The area receives high levels of recreational use, which increases the potential for disturbance. Current open road density in the resource area is 1.1 miles per square mile. Closed roads improve access by foot travel and there is potential for unauthorized motorized use on these roads. Snow machines may also use closed roads in winter during the peak trapping season. Some of these closed roads are obliterated, decommissioned or closed by heavy brush, others have no effective barrier and are sometimes used by motorized vehicles. The amount of closed roads in the resource area is high.

Fishers have been trapped in the past on the Coeur d'Alene River Ranger District, confirming their presence. No fishers have been reported in the Deerfoot Resource Area, but there are periodic reported observations to the north, east and south of I-90. Surveys by Idaho Fish and Game in 2005 and 2006 found two fishers on the east side of the district. A query for fisher habitat (late successional forest at low to mid elevations) in the Deerfoot Resource Area found 568 acres of suitable fisher habitat and 6,127 acres of potential habitat. The habitats are distributed across the resource area and often occur along the riparian corridors. Field reviews by the biologist found good fisher habitat in the upper reaches of Mokins Creek and lower portions of Jim Creek. These areas had large standing trees, high amounts of large diameter downed wood and dense canopies (PF Doc. WL-21).

The Deerfoot Resource Area is analyzed as two home ranges for fisher. Home ranges vary from 1 fisher per 2.6 square kilometers to 1 fisher per 20.0 square kilometers or about 12.5 square miles (Arthur et al. 1989a; Coulter 1966; Kelly 1977 all in USDA Tech Rep RM-254 1994; PF Doc. WL-R14).

Direct and Indirect Effects to Fisher

The major issues of concern for fisher as described in the Columbia River basin "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates" (Witmer et al 1998; PF Doc. WL-R64) are analyzed using TSMRS data, delineated corridors and security areas (GA) and roads information. TSMRS data was also used to describe late successional habitats used by fishers in the Deerfoot Resource Area.

Late Successional Forest: Under the No-Action Alternative, this percentage would not change over the short term; however, the vegetation analysis shows canopy closure in the area declining rather than increasing over the long term, which could decrease the value of existing late successional forests. There would be a slight decrease in late successional forest with the implementation of the proposed action.

Table 3-WL-5. Percent of late successional stage forest and acres of suitable fisher habitat in the Deerfoot Resource Area under each alternative.

Structural Stage	No-Action Alternative	Proposed-Action Alternative
Percent Late Successional Forest	46%	35%
Acres of suitable fisher habitat	568	527

Linkages: Linkage corridors for fisher on the Coeur d'Alene River Ranger District were mapped in a joint effort with Idaho Department of Fish and Game (PF Doc. WL-R30). The Deerfoot Resource Area is well outside any linkage corridor mapped for fisher and is adjacent to urban development on the edge of the Forest. Minor riparian corridors exist in the resource area. Riparian management objectives in place for this project would prevent any impacts to riparian corridors as a result of either of the alternatives. Increased disturbance is likely to occur on some ridges although ridges are less likely to be used as a corridor by this species.

Riparian Habitat: Past road decommissioning and in-stream improvements have improved habitat for the fisher. There is no road decommissioning proposed under either alternative

Trapping Risks: Alternatives can be ranked partly by their risk to incidental trapping of fishers based on the number of roads that would be left in place for continued prescribed fire and stand tending. Even closed roads pose a risk since they provide access for snowmobiles during the peak trapping season, and since the resource area is relatively close to urban areas, this risk may be increased. There would be no change in the risk under the No-Action Alternative. Under the Proposed-Action Alternative, 1.6 miles of road construction and temporary road construction would occur. All newly constructed roads would be closed (with gates and/or other physical barriers) during project activities. Following all project activities, these roads would be closed with gates, barriers or decommissioning.

Under either alternative, patches of unroaded habitat outside the project area in the Upper Coeur d'Alene River would provide security for the fisher and other large ranging carnivores (Geographic Assessment, page 42; PF Doc. CR-025). These patches would also help facilitate movement of fisher between the Coeur d'Alene basin and Montana. Providing security and movement corridors that link to "refugia" areas in western Montana are consistent with management recommendations by Idaho Fish and Game in the Habitat Conservation Assessment and Conservation Strategy for Forest Carnivores in Idaho (1995, pp. 45-47; PF Doc. WL-R30).

Direct and Indirect Effects Under the No-Action Alternative: No-Action Alternative would not result in a decrease in late successional forests or fisher habitat in the resource area over the short term. Vegetative modeling shows a high loss of canopy closure over time due to Douglas-fir root disease and other insects and diseases. Therefore, this alternative may not result in maintaining quality late successional habitat over the long term as shown in the vegetation section of this assessment. Risks to late successional habitat are moderate to high as a result of dense stand conditions and the presence of insects and disease. There would be no road construction or reconstruction under this alternative keeping security at present levels.

Direct and Indirect Effects Under the Proposed-Action Alternative: Under the Proposed-Action Alternative, 41 acres of suitable fisher habitat would have harvest activities (*Table 3-WL-5*). Burning activities would occur on 16 acres of suitable habitat, primarily due to logical boundary locations associated with topography. Although the proposed prescribed burns would improve the resiliency of existing stands, loss of canopy closure as described under the No-Action Alternative would also occur. Riparian corridors would not experience a decrease in quality as a result of the burns because riparian management objectives would be implemented. Security would be improved after project activities are completed because illegally-pioneered trails would be closed off as part of the project.

The 41 acres of suitable habitat harvested would not provide habitat for the fisher for a long period of time. Prescribed burns and harvest activities will decrease the dead and down component that these species rely on for shelter and denning. Improved abundance and distribution of old, seral forests would benefit fishers in the long term. Late successional forest habitat would be reduced from 46% to 36% of the resource area. Some of the reduction would occur within dry habitat types that are not preferred by the fisher (*Table 3-WL-5*).

Cumulative Effects to Fisher

The cumulative effects area for the fisher is the Deerfoot Resource Area. Reductions in late successional stage habitat, due to past activities is reflected in the affected environment.

Riparian corridors through private land within and adjacent to the resource area likely do not provide high quality habitat due to the proximity to urban development. Forest riparian areas will be protected. The implementation of the District Travel Plan should increase security for the fisher across the Coeur d'Alene River Ranger District. Planned pre-commercial thinning would result in a slight short-term disturbance for the fisher. However, pre-commercial thinning operations would result in larger diameter trees that would benefit fisher in the long term.

Conclusions of the Fisher Analysis

- Both alternatives address the four issues of concern to fisher conservation and management as outlined in *Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Coordinates* (Witmer et al. 1998; PF Doc. WL-R64).
- The *Habitat Conservation Assessment and Strategy for Forest Carnivores in Idaho* (IDFG 1995; PF Doc. WL-R30) recommends the maintenance of 40 percent late successional stages in suitable fisher habitat. The proposed action results in only 36% of the resource area in the late successional stage.

- The Forest Plan provides guidelines to insure viability of old growth-dependent species. Forest Plan monitoring reports indicate that these conditions are being met (1998, pp. 31-33 and 38-40; PF Doc. CR-014).
- Both alternatives are consistent with Forest Plan direction to manage the habitat of sensitive species to prevent further declines in populations which could lead to listing under the Endangered Species Act (USDA 1987, p. II-28; PF Doc. CR-002).
- Viability for the fisher would be maintained under both alternatives based on the following: movement corridors are available both inside and outside the analysis area, the fisher is not a legally trapped species in Idaho, R1 snag protocol (exceeding Forest Plan standards) would be implemented, and old growth would be maintained at 10 percent across the IPNF (Witmer et al 1998, PF Doc. WL-R64, WL-41; USDA 2000, PF Doc. WL-R54; and IPNF 1987, PF Doc.CR-002).

Because of the reasons listed above, **there would be no impact to the fisher under the No-Action Alternative. The Proposed Action would impact individuals but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**.

Wolverine *(Species with a Low Probability of Occurrence)*

Wolverines are rare inhabitants of montane forests. They are primarily nocturnal, but will also hunt during the day. Their primary food source is big game carrion, but they also eat small mammals such as marmots, gophers, and mice. Males seem to be territorial (Chapman et al. 1982; PF Doc. WL-R12). Wolverines are solitary animals that have large territories. A male's home range may be up to 790 square miles. Their habitat includes mature or younger forests with natural openings, riparian habitats, and high-elevation subalpine fir areas (USDA-Forest Service R1, 1989; PF Doc. WL-R56). Wolverines are particularly fond of marshy areas, and are most at home in regions with snow on the ground during winter. They are most successful in capturing big game in the winter where the snow is deep (Chapman et al 1982; PF Doc. WL-R12) and are often associated with wilderness (Krott 1960, PF Doc. WL-R34; Van Zyll de Jong 1975, PF Doc. WL-R60; Hornocker and Hash 1981, PF Doc. WL-R27; and Whitman et. al. 1986 in Austin, PF Doc. WL-R63; Banci 1994, PF Doc. WL-R3). Female wolverines in Idaho appear to use subalpine cirque basins for natal denning and kit rearing; home ranges in Idaho vary from 80 to over 700 square kilometers (Copeland 1995 in Idaho Fish and Game 1995, p. 104; PF Doc. WL-R13).

Management Recommendations for Wolverines

Idaho Fish and Game (1995; PF Doc. WL-R13) in the Habitat Conservation Assessment (HCA) and Conservation Strategies for Forest Carnivores in Idaho states that habitat connectivity with Montana, Canada and northern Washington most likely provide subpopulations of wolverines interspersion throughout the northern region of Idaho. The HCA also emphasizes the importance of dispersal corridors for linking subpopulations and the presence of relatively undisturbed “refugia” areas to protect wolverines from human activities (Copeland 1995; PF Doc. WL-R13).

Witmer et al (1998; PF Doc. WL-R64) in the USDA’s “Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates” describe three issues of concern to wolverine conservation and management in the Columbia Basin:

Issue 1: Maintenance of large, remote areas of habitat (including denning habitat).

Issue 2: Prey populations

Issue 3: Incidental trapping and predator control mortality

Reference Condition for Wolverines

When Europeans first arrived in the United States, the wolverine's range extended from Maine to Washington, but by the early 1800's its range was greatly reduced. Although wolverines were widespread in presettlement times, they likely occurred at low densities (Banci 1994; PF Doc. WL-R3). Reports from the mid 1930s and 1940s suggest that the wolverines mostly occurred in the inaccessible mountains in the center of the state (Davis 1939 in Groves 1987; PF Doc. WL-R72). Records of sightings in the late 1940s came from the northern panhandle of Idaho (Pengelley 1951 in Groves 1987; PF Doc. WL-R73). Nowak later reported several animals taken from the central mountains, apparently reflecting a comeback (1973; PF Doc. WL-R40).

Affected Environment for Wolverines

Present distribution of the wolverine in the western U.S. includes Alaska, northern Washington, Wyoming, Oregon, northern California, northern Idaho, central Idaho, western Montana, and along the Idaho-Montana border to approximately Fremont county, Idaho (Nowak 1973, PF Doc. WL-R40; Groves 1987, PF Doc. WL-R19). In the interior Columbia basin, wolverines occur widely at very low densities, but only in northwestern Montana are wolverine populations considered to be healthy and thriving (Butts 1992 in Witmir et. al. 1998; PF Doc. WL-R9).

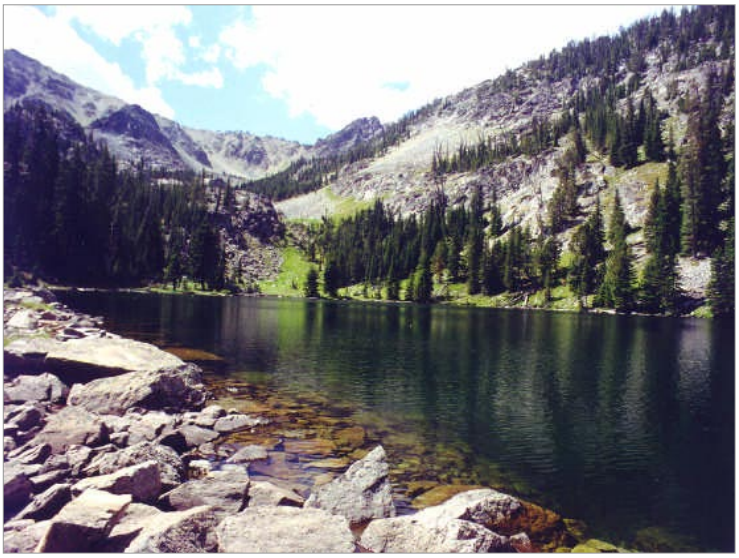


Figure 3-WL-9. Cirque basins that provide denning habitat for wolverine are not found in the Deerfoot Resource Area

Within the last 20 years eleven wolverine reports have been recorded on the District. Of these 11 observations, 4 were trapped incidentally or found shot. The closest observations occurred in the Wolf Lodge area, near Rose Lake, in Latour on the southwest section of the District, and southeast of the watershed near Skitwish Creek in 1993. A wolverine was detected in 2003 south of Kellogg, Idaho during winter carnivore surveys conducted by the Idaho Department of Fish and Game. (PF Doc. WL-16)

The Deerfoot Resource Area lacks high elevation cirque basins that could be used by denning female wolverines (*Figure 3-WL-9*). Since this species prefers large blocks of undisturbed areas, the resource area does not provide preferred habitat. Because wolverines periodically make long distance movements, they could use the area during these movements. But, due to the lack of denning habitat and wilderness, the high level of recreational use and the proximity of the area to development, the resource area is not considered optimal habitat (PF Doc. WL-17). If a wolverine were to occur in the area, it would likely be a transient individual traveling through the area. The relative lack of snow in the area makes it more difficult for wolverines to capture game during the winter months even though the watershed does provide ungulate winter range.

Direct and Indirect Effects for Wolverines

Elevation and other habitat elements were delineated using GIS. Issues of concern for wolverine according to Witmer et al (1998; PF Doc. WL-R64) in the USDA's "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates" are evaluated.

Refugia: Refugia is probably the most important factor affecting any potential wolverine habitat within the Coeur d'Alene Basin. The resource area is well roaded and does not provide large, remote areas of habitat. The closest area of potential "refugia" (large, remote areas of habitat) is over 20 air miles from the area. Small patches of unroaded areas lie a few miles to the north near Chilco Mountain and over 5 miles to the south near Wolf Lodge Creek. These patches are generally no greater than 350 acres in size. Because these patches lack wilderness quality and are small in area, they do not function as "refugia" for the wolverine. Since there is no refugia habitat within or adjacent to the resource area, refugia for wolverine will not be affected by this project.

Prey and Populations: Wolverines are generalists foraging for anything that is available. Prey is available for this species in the Deerfoot Resource Area. The area provides some winter range for big game species, which is often a prey item during winter for wolverine. Road construction under the Proposed-Action Alternative as well as disturbance associated with project activities, including burning activities associated with the previous salvage harvests may affect big game distribution, but not likely to the extent that they would be displaced from the area.

Trapping and Mortality: Wolverine trapping is illegal in Idaho. Some potential for incidental trapping of wolverine does exist because occasional trapping for other species still occurs. Although all constructed roads will be closed during project activities, the potential for unauthorized motorized use still exists, particularly for snow machines during winter, the peak trapping season. Roadwork associated with Proposed-Action Alternative may increase the potential for incidental trapping if a wolverine were to occur within the resource area.

Direct and Indirect Effects Under the No-Action Alternative: No short-term effects or changes would result to any habitat wolverine may use in the resource area. Winter range in the resource area may contribute to foraging opportunities for wolverines, but these opportunities are limited due to the absence of the wolverines preferred habitat and low snow depths. Some of the burning associated with previous salvages will improve forage quality on winter range. Existing areas of security would not be impacted. Continued implementation of the District Travel Plan will result in more effective road closures and better enforcement of the closures.

Direct and Indirect Effects Under the Proposed-Action Alternative: A transient individual may avoid an area of disturbance. Treatment areas are limited under this alternative and a transient wolverine could easily avoid these areas of disturbance. The 1,270 acres of under burning proposed under this alternative would improve winter range forage. Existing areas of security would be slightly impacted during activities (PF Doc. WL-41). Illegal off-road ATV trails within the resource area have been delineated and would be closed with debris barriers as part of this alternative. In addition, continued implementation of the District Travel Plan will result in more effective road closures and better enforcement of the closures.

Cumulative Effects to Wolverines

The cumulative effects area for the wolverine is the Coeur d'Alene River Ranger District. Private lands within the resource area are not considered habitat for the wolverine. These private lands receive a high amount of human use and are probably avoided by the species. Patches of unroaded habitat nearest the Deerfoot Resource Area in the Wolf Lodge and Chilco Mountain areas provide some security for the species. Other security areas and travel habitat for the wolverine and other large ranging carnivores designated in the Geographic Assessment would maintain some security and connectivity for the species. These large security patches would also help facilitate movement of wolverine between the Coeur d'Alene River Basin and Montana, where refugia is provided. Providing for refugia and movement corridors are consistent with

management recommendations by Idaho Fish and Game in the Habitat Conservation Assessment and Conservation Strategy for Forest Carnivores in Idaho (Copeland 1995; PF Doc. WL-R13). Because of the transient nature of the wolverine future planned activities, such as pre-commercial thinning, are unlikely to impact the wolverine.

Conclusions of the Wolverine Analysis

- The Deerfoot Resource Area provides possible foraging habitat for a transient wolverine, but due to the lack of denning habitat and nearby security areas, the area is not considered optimal habitat.
- Based on the unlikely occurrence of wolverine, the lack of preferred habitat and the presence of security areas and corridors on the District connected to refugia in Montana, both alternatives are consistent with Forest Plan direction to manage the habitat of sensitive species to prevent further declines in populations which could lead to listing under the Endangered Species Act (USDA 1987, p.II-28; PF Doc. CR-002).
- Viability would be maintained because security patches in the Coeur d'Alene Mountains are provided and large patches of refugia are available in Montana on the Kootenai and Lolo National Forests. Prey base would also be maintained. In addition, there is no trapping season in Idaho for the wolverine (Copeland 1995; PF Doc. WL-R13).

Due to the transitory nature of the wolverine, lack of potential denning habitat, high recreational use by humans and the proximity to urban development and the probability of avoidance of the Deerfoot Resource Area during activities by wolverine both alternatives **would have no impact on individual wolverines or their habitat.**

Coeur d'Alene Salamander *(Sensitive Species wth a Moderate Probability of Occurrence)*

Coeur d'Alene salamanders are restricted to cool, damp aquatic habitats that have stable temperatures and moisture levels. The species has been found in three main types of habitat in northern Idaho; springs seeps, the spray zones of waterfalls and along stream edges between 1,800 and 3,500 feet in elevation (*Figure 3-WL-10*). Known populations have been located at sites where the presence of fractured bedrock, combined with high substrate moisture, high humidity and moderate air temperatures create favorable habitat conditions (Groves 1989; PF Doc. WL-R74). They are often associated with low elevation areas having dense canopies (USDA-Forest Service R1, 1989; PF Doc. WL-R56).

Figure3- WL-10 Coeur d'Alene salamander along stream edge.

Reference Conditions for Coeur d'Alene Salamanders

The Coeur d'Alene salamander is a remnant of a once diverse salamander fauna in the northern Rocky Mountains that was likely reduced by climatic changes over the past 10 million years. Surveys have found some known populations extinct due to roads, landslides, heavy metals and extensive logging. Historically, populations were probably higher in the Coeur d'Alene basin having been reduced by past human activities.

Management Recommendations for Coeur d'Alene Salamanders

Any changes in peak flows could have detrimental effects upon the Coeur d'Alene salamander by either flooding or drying habitat (Cassirer et al 1994; PF Doc. WL-R11). Forest Plan riparian management objectives decrease the potential for effects from management activities in riparian or wet areas.

Affected Environment for Coeur d'Alene Salamanders

Coeur d'Alene salamanders have a patchy distribution below 5,000 feet in northern Idaho. There are no known populations of the species in the Deerfoot Resource Area or adjacent watersheds although potential habitat exists along streams, seeps and in wet areas. Extensive surveys have not been done in the area, and the species could be present. There have been observations of Coeur d'Alene salamanders on the east side of the District, along Coeur d'Alene Lake, in the vicinity of Wolf Lodge Bay and Beauty Bay and Skitwish Creek. The closest reported observation to the resource area is an unconfirmed sighting in the vicinity of Fernan Lake reported in 1996 (PF Doc. WL-16). Past road building, primarily those roads that encroach on riparian areas have altered habitat for the Coeur d'Alene salamander in the Resource area.

Direct and Indirect Effects to Coeur d'Alene Salamanders

Direct and Indirect Effects Under the No-Action Alternative: No change to Coeur d'Alene salamander habitat would occur under the no action alternative. Prescribed burns scheduled for stands treated under previous salvages within the resource area would not affect streamside vegetation.

Direct and Indirect Effects Under the Proposed-Action Alternative: Any changes in peak flows could have detrimental effects upon the Coeur d'Alene salamander by either flooding or drying the habitat for the salamander (Cassirer et al 1994; PF Doc. WL-R11). The Proposed-Action Alternative may result in a slight increase in peak flows within portions of the main drainages in the Deerfoot Resource Area (Table 3-AQ-7 in the Aquatic Resources section of this chapter). These slight changes in peak flows are too low to alter habitat for the salamander. Road construction is not located near any potential salamander habitat.

Cumulative Effects to Coeur d'Alene Salamanders

The Deerfoot Resource Area is the cumulative effects area for the Coeur d'Alene salamander. Watershed restoration projects sometimes may result in a short-term alteration of habitat, but over the long term, habitat for the salamander is improved. Past road decommissioning and restoration of Stump Creek have resulted in long-term benefits to the Coeur d'Alene salamander. Future planned activities within the Resource Area would not impact the Coeur d'Alene salamander or its habitat.

Conclusions of the Coeur d'Alene Salamander Analysis

- The Proposed-Action Alternative would be consistent with Forest Plan direction to manage the habitat of sensitive species to prevent further declines in populations which could lead to listing under the Endangered Species Act (USDA 1987, p.II-28; PF Doc.CR-002).
- Changes in peak flows are too low to alter habitat for the salamander within the Resource Area.

Because of the reasons listed above, the implementation of the Proposed Action Alternative **would have no impact on individual Coeur d'Alene salamanders or their habitat.**

Boreal Toad *(Sensitive Species with a Moderate Probability of Occurrence)*

Boreal toads lay their eggs in ponds in the spring, attaching them to submerged vegetation in shallow water usually less than 6" deep (Maxell 2000; PF Doc. WL-R149, p. 86). Tadpoles are hatched and grow through the summer. Toad tadpoles feed on algae and other small plants. After tadpoles metamorphose into toadlets with legs, they generally leave their natal pond by late summer. Some toads remain close to the pond where they were born, but most toads are terrestrial except during the breeding season. Juvenile toads may disperse over 4 km (2.5 miles) from their natal ponds (PF Doc. WL-R149, p. 86). Toads prey on insects and other invertebrates. They use logs and burrows for cover from predators and severe weather. They winter in burrows, under buildings and other sites where the temperature remains above freezing.

Reference Conditions for Boreal Toads

Globally declines in amphibian populations have been documented. Population crashes of this species have occurred throughout the western United States. Surveys in the late 1990s in the northern Rocky Mountains found the toad to be absent from some historical localities. Habitat for the boreal toad currently exists on all forests in the Northern Region. A variety of impacts have contributed to the decline of boreal toads in the west including: introduced fish and bullfrogs, chemical use, timber harvest, recreational activities, grazing and road kill (PF Doc. WL-R149).

Figure3- WL-11 Boreal toad tadpoles found on the Coeur d'Alene River Ranger District.

Management Recommendations for Boreal Toads

If a boreal toad breeding site is found in the resource area, it should be monitored annually to determine the status of boreal toad populations in the resource area (PF Doc. WL-R149, p. 89). Debris retained on site can mitigate impacts of harvest on the toad and its habitat (PF Doc. WL-R149).

Affected Environment for Boreal Toads

Boreal toads (*Figure 3-WL-11*) have been found at three sites on Coeur d'Alene River Ranger District; none of these were in the Deerfoot Resource Area (PF Doc. WL-16). There are ponds in the resource area that could provide habitat for the toad. These have been surveyed. Although these ponds currently have several species of frogs breeding in them, no boreal toad tadpoles were identified.

Direct and Indirect Effects for Boreal Toads

Direct and Indirect Effects Under the No-Action Alternative: The No-Action Alternative would have no effect on the boreal toad or its habitat.

Direct and Indirect Effects Under the Proposed-Action Alternative: Prescribed burning would reduce the number of logs which provide foraging and cover sites for toads. However, enough logs would remain on burned sites to provide some foraging and cover opportunities for boreal toads. Prescribed burning will improve winter habitat for toads by burning tree roots, leaving empty burrows which could be used by toads for over-wintering where the tree roots had been. For the first few years after harvest or burning, prey availability will be reduced due to loss of understory vegetation. After the forbs, shrubs and tree seedlings grow back, insect availability will return to and possibly exceed pre-treatment levels. Woody debris retained on site to meet soil mitigations would provide cover for boreal toads after harvest activities are completed. None of the treatment areas are adjacent to riparian areas and known ponds, so treatments would not impact breeding habitat for the boreal toad. The 1.6 miles of road construction would not occur near riparian habitat.

Cumulative Effects to Boreal Toads

The cumulative effects area for the boreal toad is the Deerfoot Resource Area. Historic road construction in riparian areas has reduced habitat for the boreal toad and is incorporated into the "*affected environment*". Future pre-commercial thinning would not impact the toad. Planned noxious weed treatments are designed to protect riparian vegetation and would not impact the boreal toad.

Conclusions of the Boreal Toads Analysis

- Project design avoids impact to riparian habitats of the boreal toad
- Some loss of cover and prey for the toad would occur with the implementation of prescribed burning

Consequently, activities under the proposed action **may impact individual boreal toads or their habitat, but would not likely contribute towards federal listing or cause a loss of viability to the population or species.** There would be no impact to the boreal toad or its habitat with implementation of the No Action Alternative.

Fringed Myotis (*Sensitive Species with a moderate probability of occurrence*)

Life History of the Fringed Myotis

Fringed myotis (Figure 3-WL-11) use caves, mines, and buildings as hibernacula and maternity roosts (Montana Animal Field Guide, PF Doc. WL-R100; Schmidt 2003; PF Doc. WL-R101). Snags, especially those sloughing bark, are important day roost habitat for the fringed myotis (Schmidt 2003, PF Doc. WL-R101).

Figure 3-WL-12. Fringed myotis bat. (Photo courtesy of the Salmon National Forest)

Reference Conditions for Fringed Myotis

Past mining has created roost habitat for the fringed myotis. In northern Idaho, these bats primarily roost in snags, although they will also roost in caves, mines and tunnels (Schmidt 2003, PF Doc. WL-R101). Loss and disturbance of hibernacula and roosting habitat are the limiting factors for the species.

Management Recommendations for the Fringed Myotis

Managing for large long-term snags, emulating historic fire regimes, and snag retention are recommended management practices (PF Doc. WL-R101).

Affected Environment for the Fringed Myotis

Surveys have been done on abandoned mine adits within the Coeur d'Alene Mountains (PF Doc. WL-39). Fringed myotis were identified in the Varnum Creek and Eagle Creek drainages of the Coeur d'Alene River Ranger District. These are the only sightings on the IPNF. No adits are found within the Deerfoot Resource Area (PF Doc. WL-4 & WL-40). There is potential day roost habitat within the Deerfoot Resource Area, since snags and the preferred dry site habitat are present.

Direct and Indirect Effects to the Fringed Myotis

Under the No-Action Alternative, there would be no effects to the fringed myotis.

Under the Proposed Action, changes in snag densities could alter habitat for the fringed myotis; however, snags would be retained in accordance with the Region 1 snag protocol.

Cumulative Effects to the Fringed Myotis

The cumulative effects area for the fringed myotis is the Deerfoot Resource Area. Past logging has reduced snags with sloughing bark for fringed myotis roost habitat and is incorporated into the "*affected environment*". Planned noxious weed control would have no impact upon habitat for the fringed myotis. Future harvest and urbanization on private lands within and adjacent to National Forest System lands could further reduce snag densities. On National Forest System lands, high levels of insects and disease will continue to provide snags in the future.

Conclusions of the Fringed Myotis Analysis

- Design features would ensure protection of the fringed myotis should they occur within the Deerfoot Resource Area.
- Retaining snags at levels recommended in the R1 Snag Protocol would insure viability of the fringed myotis.
- An analysis using Forest Inventory and Analysis (FIA) data was done for the Idaho Panhandle National Forest to estimate snag density. This analysis found across the forest snags in the 10-19.9" diameter class is 10.8 per acre. In the larger >20" diameter class there are 2 snags per acre (Bush et.al., 2006, PF Doc. WL-R140; PF Doc. WL-15)

Therefore, the implementation of the Proposed Action **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.**

D. Analysis of Old-growth Management Indicator Species (MIS)

Pileated Woodpecker ***(MIS With a High Probability of Occurrence) Figure 3-WL-12***

Figure 3-WL-13. Pileated woodpecker in cavity.

Pileated woodpeckers nest in mature to old-growth stands of about 50 to 100 acres that are found within their home ranges, with relatively closed canopies (greater than 65% closed) and large (greater than 20 inch diameter) trees (Bull et al. 1986, PF Doc. WL-R76; McClelland 1977 and 1979, PF Doc. WL-R37 and R38). They prefer stands with high snag densities (greater than 12 per acre) for feeding (Warren 1989; PF Doc. WL-R75). Nest trees are large snags, usually averaging 24 inches in diameter and 60 feet tall (Aney and McClelland 1985; PF Doc. WL-R2). However, pileated woodpeckers can excavate a nest in a live ponderosa pine if heart rot is present (Bull 1975; PF Doc. WL-R5). Both larch and ponderosa pine are preferred nest trees (Bull 1975; PF Doc. WL-R5). They feed mostly on carpenter ants (McClelland 1977, PF Doc. WL-R37; Bull 1986, PF Doc. WL-R76), but also eat other insects and fruits and berries. They usually avoid openings for foraging, and prefer dense canopies with many snags and down logs. Pileated home ranges are usually about 1,000 acres. Large, continuous habitat blocks are more desirable than more fragmented patches.

Reference Conditions for Pileated Woodpeckers

No historic population information is available for pileated woodpeckers. There is some information on historic forest structure in the area from sources including the Geographic Assessment for the Coeur d'Alene Basin, the Assessment of Ecosystem Components in the Interior Columbia River Basin and modeling done based on historic records by the Idaho Panhandle National Forests (PF Doc. WL-R95, WL-R139, WL-R140). These records and models indicate that more habitat existed for pileated woodpeckers historically. The amount old forests are believed to be less than under historical conditions due to the disproportionate amount of timber harvesting done in older stands in the past and the decreased amount of older stands remaining following stand replacing wildfires on the District in the early 1900s.

Management Recommendations for Pileated Woodpeckers

Adhering to the Region 1 snag management protocol (USDA 2000; PF Doc. WL-R54), and to the snag guidelines developed in association with the Upper Columbia River Basin (UCRB EIS as described in Bull et. al. 1997, UCRB EIS, Appendix K; PF Doc. WL-R52) help to assure snag availability for this species. Warren (1989; PF Doc. WL-R75) recommends that pileated woodpecker habitat be managed to support at least one pair per 2,500 acres. Shelterwood cuts and small group selection cuts are suitable, but not preferred, in feeding areas (McClelland 1979; PF Doc. WL-R38). Often, old growth habitats will be found along stream courses in linear patterns. To provide suitable pileated woodpecker habitat, strips should be at least 300 feet in width (McClelland 1979; PF Doc. WL-R38). Habitat components include continuous blocks of 50-100 acres, 65% canopy closure and 20-inch diameter or larger trees, high snag density, large down wood, larch and pine preferred, and 1,000-acre home ranges.

Affected Environment for Pileated Woodpeckers

Pileated woodpeckers are found in the Pacific Northwest and throughout the Northern Rocky Mountains, including Idaho and Montana. This species occurs throughout the IPNFs and there is evidence of pileated use in the Deerfoot Resource Area. Pileated woodpeckers often use ponderosa pine and mixed conifer habitats for nesting and foraging and this type of habitat is found throughout the resource area. Snags are abundant. However, large diameter snags are in short supply. Canopy closure in many stands is less than optimal for pileated woodpeckers because of mortality resulting from insects and disease and the more open canopies that are inherent in dry habitat types on south facing slopes.

Watershed Scale

There are two old-growth management units (OGMU) in the resource area. Both these OGMU boundaries extend beyond the Deerfoot Resource Area. All stands known to meet the regional definition of old growth in the two old growth management units were allocated. Both OGMUs have more than the recommended 5 percent. The total old growth allocation for the Coeur d'Alene Basin is greater than Forest Plan recommendations. Stand data was reevaluated and additional information gathered over the past two years to confirm that the best possible stands were allocated towards old growth. Existing allocated old growth and potential stands to be added to the allocated old growth in OGMUs 3-021 and 3-024 were evaluated using stand exams in 2002-2006 (Refer to the Vegetation Section, Table 3-VEG -3). Due to the dynamic, changing conditions inherent in forested stands of timber, some stands that had previously been allocated no longer met the criteria for old growth and other stands that were not previously allocated did meet standards. The old growth allocation in the two OGMUs was changed to reflect current conditions of the stands in the resource area and across the basin. The two old growth management units have 8.1% of the land within the OGMUs allocated as old growth. An explanation of the methodology used for the allocated old growth analysis is found in PF Doc. Veg-27. Definitions for allocation of old growth are from the Forest Plan (PF Doc. Veg-28), the Regional Task Force Report Old Growth Forest Types of the Northern Region (Green et al., 1992; PF Doc Veg-R20) and Forest Supervisor letters of direction for implementing Forest Plan old growth standards (PF Doc. Veg-28). In addition to the old growth, there are about 800 acres of stands that have trees with an average diameter over 14". These stands with big trees do not qualify as old growth but provide feeding and nesting habitat for the pileated woodpecker (PF Doc. WL-25).

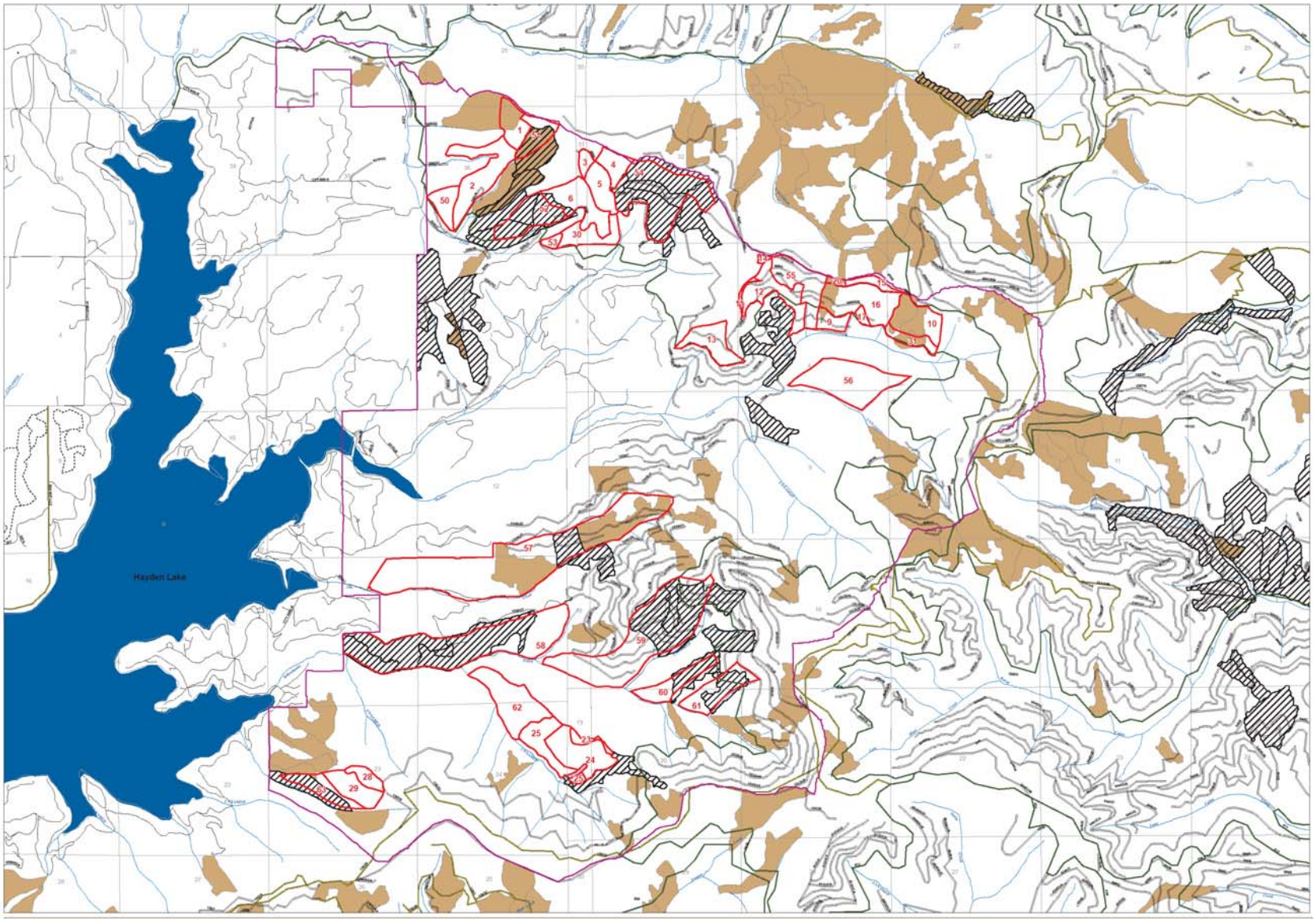


Figure 3-WL-14. Pileated woodpecker habitat (shown in tan) in relation to old growth (shown with hatching) and proposed treatments units (depicted by a red boundary line) in the Deerfoot Resource Area.

Direct and Indirect Effects to Pileated Woodpeckers

Pileated woodpecker habitat was assessed focusing on stands with an average live tree diameter of 14 inches or greater in Douglas-fir, ponderosa pine or larch (PF Doc. WL-28). It was also based on old growth allocation on the Coeur d'Alene River Ranger District and the presence of old growth within the Deerfoot Resource Area. The assessment also used the Forest Inventory and Analysis data (FIA) for snag distribution across large geographic units of National Forest System lands. Forest Inventory and Analysis (FIA) data shows that across the Central North Fork Coeur d'Alene landscape area, there are 11 snags per acre that are 10 to 19 inches in diameter, and 2 snags per acre that are 20 inches or greater in diameter (PF Doc. WL-15).

Direct and Indirect Effects Under the No-Action Alternative: No short-term effects or changes would result from the implementation of the No-Action Alternative. Although the No-Action Alternative would not result in a decrease in mature or late successional forests in the Deerfoot Resource Area over the short term, over the long term vegetative modeling shows a substantial loss of canopy closure over time due to Douglas-fir root rot and other insects and diseases currently at high levels. The white pine and larch components in the resource area would continue to be low. Beetle activity and insects and diseases will continue to provide snag recruitment although size of snags would not be optimal. Risks to late successional habitat are greatest under this alternative as a result of dense stand conditions due to the long-term absence of fire from the ecosystem. This could result in stand replacing fire. There is no road construction under this alternative.

Direct and Indirect Effects Under the Proposed-Action Alternative: The Proposed-Action Alternative attempts to reduce this risk of fire to stands within the resource area. Harvest activities would occur in 67 acres of pileated woodpecker habitat in the Deerfoot Resource Area (Figure 3-WL-13). These stands treated would not provide suitable habitat for pileated woodpeckers again for 100 to 150 years. There are no silvicultural treatments proposed for stands that are allocated towards the total acres of old growth within OGMU 21 or OGMU 24. There would likely be additional snags created under this alternative due to prescribed fire on 128 acres of pileated woodpecker habitat. Most large diameter ponderosa pine would survive the fire. Large diameter and less fire-tolerant grand fir, that are often used by this species, may experience some mortality as a result of prescribed fire. Snags and scorched trees resulting from prescribed burns will provide additional nesting and foraging habitat. Prescribed burning often occurs in spring to achieve the most favorable results. This could directly impact this species if a snag with nesting birds is burned. Field personnel will avoid burning near snags with large cavities whenever possible as described in Chapter 2. Over time, this alternative would trend toward more suitable habitat for pileated woodpeckers as the goal of the proposal is to increase the distribution of older ponderosa pine forests that are used by this species.

Cumulative Effects for Pileated Woodpeckers

The cumulative effects area for this species is the Deerfoot Resource Area. Past timber harvest selecting for the removal of seral species and salvage harvests which impact snag availability have decreased the quality of habitat for pileated woodpeckers in the Deerfoot Resource Area and across the IPNF. This decrease is incorporated in the "affected environment". Fire suppression and road construction have contributed to these effects. Private lands adjacent to and within the resource area provide some habitat for this species. Future planned precommercial thinning will result in a larger diameter trees in the long term. This would result in additional habitat over time that meets the needs of the pileated woodpecker. Planned noxious weed control efforts would not affect the habitat of the pileated woodpecker.

Conclusions of the Pileated Woodpecker Analysis

- The Proposed Action is consistent with Forest Plan direction to manage the habitat of management indicator species for viable populations (USDA 1987, p.II-28 PF Doc. CR-002).
- In addition, old growth would be maintained at 10 percent across the IPNF (PF Doc. CR-002)
- Forest Plan standards for snag retention would be exceeded with adherence to the R1 Snag Protocol (USDA Forest Service 2000; PF Doc. WL-R54 and IPNF 1987, PF Doc. WL-R53)
- A conservation assessment for the pileated woodpecker in Region 1 found short-term viability (100 years) is not an issue for the pileated woodpecker (PF Doc. WL-R139)

Because of the reasons listed, activities under the Proposed-Action Alternative may impact individual pileated woodpeckers or their habitat**,** but would not likely contribute towards a loss of viability to the population or species. There would be no impact to the pileated woodpecker or its habitat with the implementation of the No-Action Alternative.

Northern Goshawk *(Management Indicator Species with a High Probability of Occurrence)*

Goshawks occupy coniferous and mixed forests throughout much of the northern hemisphere (Wattel 1981 in Warren 1990; PF Doc. WL-R61). They prefer to nest in mature to over-mature coniferous forests with large trees, and canopy coverages of 60 to 80% (Hayward 1983, PF Doc. WL-R24; Saunders 1982, PF Doc. WL-R47). Other characteristics include a stand size greater than 25 acres, gentle to moderate slopes and small, scattered openings (Hayward 1983; PF Doc. WL-R24). North-facing slopes are often preferred for nesting (Reynolds et al 1982, PF Doc. WL-R46), although ridges and benches are often used in the Coeur d'Alene River Basin, probably due to a shortage of gentler slopes. The species prefers single-storied to multi-storied stands with open understories for hunting (Hayward 1983, PF Doc. WL-R24). Goshawks use snags for hunting and consuming their prey. Prey species include small mammals, songbirds, and game birds such as grouse and waterfowl (Hayward et al 1990 in Warren 1990; PF Doc. WL-R22). Home ranges are defined as foraging areas of 5,000 to 6,000 acres. Goshawks are sensitive to disturbance, and may leave a nest if prolonged activity occurs nearby.

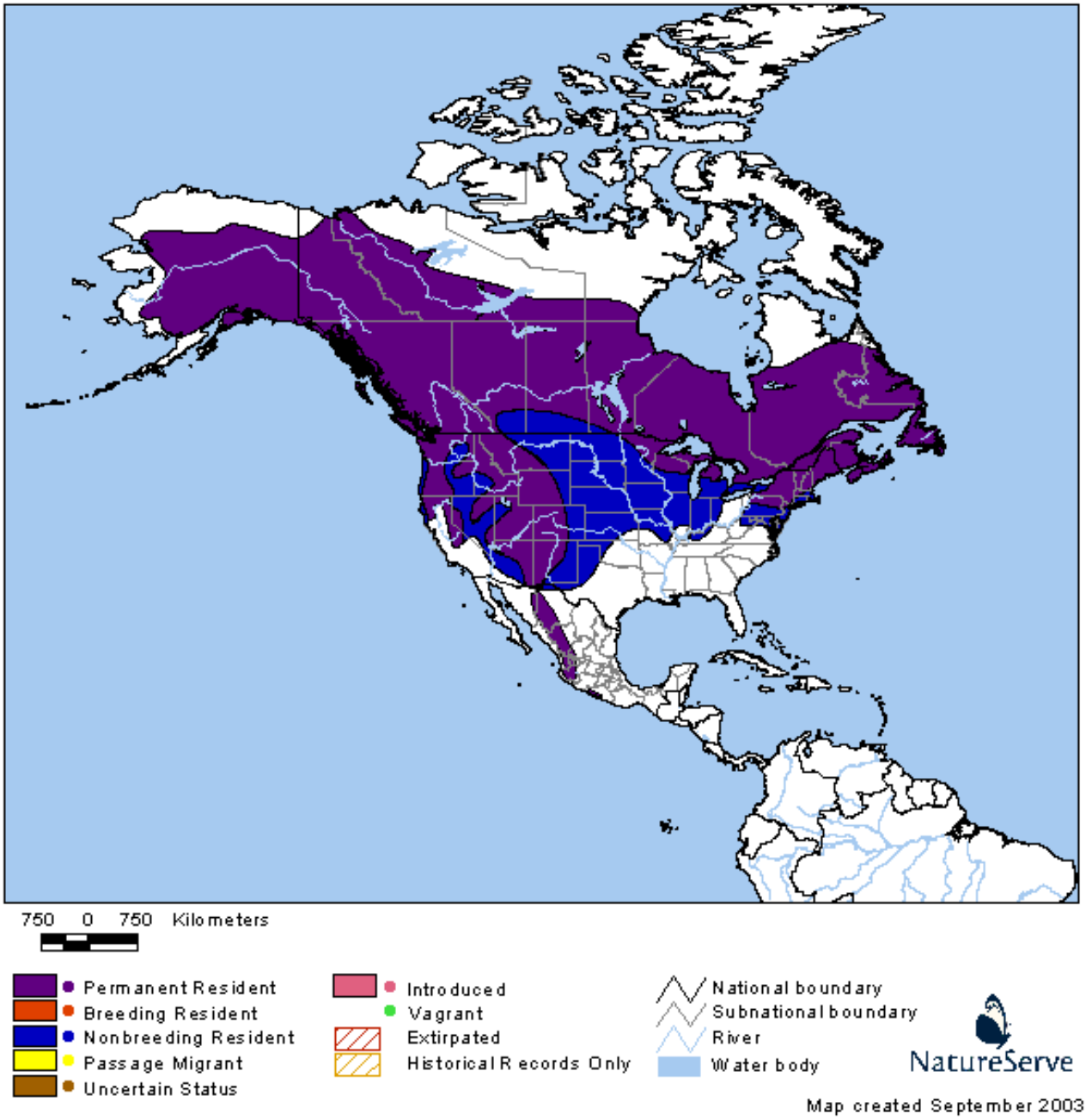
Reference Condition for Northern Goshawk

Little historical information is available for goshawks. Urbanization, road construction and timber harvest have decreased the quality of mature forests and riparian habitat in the resource area and across the goshawks range. Losses of nesting habitat and decreased variety and abundance of prey species often tied to riparian areas indicates that goshawks may have historically been more abundant than they are today.

Goshawks are listed as a management indicator species in Region 1 by the Forest Service. Populations appear to be stable and the species has a national ranking of G5, globally secure, abundant and widespread, as shown in the figure on the following page (USDA Forest Service Northern Region 2004 Sensitive Species changes; PF Doc. WL-R145).

A conservation assessment for the goshawk in Region 1 found goshawk habitat to be well distributed and abundant on the current landscape and that viability of the species will be maintained for the next 100 years (PF Doc. WL-R139). In addition, a 2005 survey of nesting goshawks determined with a 95 percent confidence level that 30 to 50 percent of forested lands in roaded areas of the Forest Service's Northern Region are occupied by goshawks (PF Doc. WL-14).

Figure 3-WL-15. North American goshawk distribution. *(Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy - Migratory Bird Program, Conservation International - CABS, World Wildlife Fund - US, and Environment Canada – WILDSPACE; http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Accipiter%20gentilis).*



Management Recommendations for Northern Goshawk

Region 1 has defined viability for the goshawk as one pair every 10,000 acres (Warren 1990; PF Doc. WL-R61). Recommendations have been established for management of the Northern goshawk in the southwestern United States (Reynolds et al. 1992; PF Doc. WL-R46). These recommendations suggest goshawk home ranges are about 6,000 acres in size and consist of a nesting area of 20 to 25 acres, a post-fledgling family area (PFA) of 400 acres, and a foraging area approximately the size of the home range. Brewer et al. 2007 (PF Doc. WL-R150) defines a goshawk home range of 5,000 acres in size.

- *<u>Nest Areas</u> - Three suitable and three replacement nest areas are established for each known pair of nesting goshawk (30 acres each for a total of 180 acres). Nest areas include the stand with an active nest. Other suitable nest stands include alternate or historic nests followed by the best remaining nearby suitable habitat. The three replacement nest areas are established as near to the stand they are intended to replace and are selected based on the condition of the effective or suitable nest stand and the likely time frame needed to provide for a replacement area. In western Montana nest areas were found to be slightly larger at 40 acres each (Clough 2000 in Brewer et al 2007; PF Doc. WL-0150).*

- *<u>Post Fledgling Areas</u> – PFAs provide cover from predators and sufficient prey to develop hunting skills for newly fledged goshawks (Reynolds et al. 1992; PF Doc. WL-R46). They are described as being about 400 acres in size and correspond to the defended territory of a breeding pair of goshawks (Reynolds et al 1992; PF Doc WL-R46).*

- *<u>Foraging Areas</u> – The Southwest Guidelines recommended a vegetative stand structure of 20% old forest, 40% mid-aged and mature forest, 30% seedling, sapling and young forest, and 10% grasslands, forbs and shrubs. Greenwald et al. 2005 (PF Doc. WL-R141) disputes these recommendations for vegetative stand structure. However, supporting documentation for the recommendations in the Southwest guidelines can be found in Reynolds et al. 2005 (WL-R142).*

Affected Environment for Northern Goshawk

Northern goshawks occur throughout the western United States and in several northeastern states. Nesting pairs of goshawks have been documented in sixteen areas of the Coeur d'Alene River Basin.

Suitable nesting habitat has been identified in the Deerfoot Resource Area based on forest structure and continuity. Maps with goshawk sightings and known nest sites were compared to the suitable nesting habitat map. Foraging habitat of about 5,000 acres was mapped around nesting habitat (PF Doc. WL-R46).

Broadcast vocalization surveys using the juvenile begging call were conducted in suitable habitat within the resource area in 2002, 2006 and 2007 with one response received in 2002 (PF Doc. WL-38, WL-21, WL-16). There was one confirmed nest identified as a result of these surveys and therefore one known occupied territory in the Deerfoot Resource Area. There are two additional territories that could be occupied. One has had goshawk sightings within the past five years, although no recent responses were solicited during 2007 surveys. Having three nesting territories within the Resource Area is in compliance with the Region 1 viability standard.

The wildlife project files include maps displaying goshawk nesting, post-fledgling and foraging areas (PF Doc. WL-25, WL-35). Table 3-WL-8 displays vegetative stand structure, current composition and desired composition for the resource area. This table represents only the vegetative stand structure on National Forest System lands. Private lands make up a large portion of the foraging areas. The specific structure on private lands is not quantified, but most stands on these lands are either mature or mid-aged with dense canopies. There are more meadow and open habitats on private lands which may account for the grass/forb/shrub component that is lacking on forest lands in the foraging areas.

The Stump Creek Foraging Area is the smallest at approximately 4,000 acres. Of the 4,000 acres, less than 500 of these acres are on National Forest System lands, with the remainder on private lands. According to the

desired composition of goshawk foraging areas presented in the Southwest Guidelines, the Stump Creek Foraging area lacks seedling/sapling and grass/forb components. Private lands included as part of this foraging area contain several meadows that contribute to the grass/forb component.

The Two-Forks Foraging Area is 5,800 acres total with about 1,600 of those acres occurring on private lands. This foraging area is low in mature stands and high in mid-aged stands. The seedling/sapling and grass/forb components are also less than recommended. Private lands toward the bottom of Nilsen Creek provide openings consisting of flood plains and agricultural land where prey species are abundant. This territory is occupied.

The Yellowbanks Foraging Area is 5,100 acres in size with about 1,000 acres on private lands. It exceeds the amount of mature stands needed and is high on mid-aged forest with little seedling/sapling or grass/forb components. Private lands in this foraging area are mostly treed with a high degree of urban development.

Habitat queries found 489 acres of suitable goshawk nesting habitat within the Deerfoot Resource Area. There are an additional 2,760 acres of potential habitat (PF Doc. WL-27). Field reviews by wildlife biologist found some open canopies due to insects and disease. Large snags are present in adequate amounts to meet the needs of the goshawk (PF Doc. WL-42). The queries used to locate nesting habitat select only stands $\leq$ 40% slope. This underestimates suitable nesting habitat since the slope in the database is across the entire stand. In reality, there are benches and ridges within stands that provide suitable nesting habitat with less than 40% slopes.

Direct and Indirect Effects to Northern Goshawk

The following effects analysis for northern goshawks uses two methods of assessment; 1) comparison to the Southwest Guidelines (Reynolds et al 1992; PF Doc. WL-R46) desired condition for goshawk foraging areas, and 2) modeling to determine the abundance, distribution and characteristics of nesting habitat within each foraging area and show the changes that would occur in nesting habitat based on the alternative management actions evaluated.

Direct and Indirect Effects Under the No-Action Alternative: No short-term effects or changes would result from the implementation of No-Action Alternative. Existing suitable goshawk nesting habitat would remain at 489 acres in the resource area. Habitat within the foraging areas would continue to support breeding pairs of goshawks.

Over the long term, natural mortality would result in snag and downed log recruitment and some immature stands would move towards mature and old. However, canopy closure would continue to decline under this alternative due to the large percentage of Douglas-fir already dying or expected to die before maturity due to present conditions (refer to the Forest Vegetation discussions in this chapter). Predicted decreases in canopy closure would eventually lead to loss of nesting habitat in affected stands. At the same time younger stands, now classified as potential habitat, would continue towards maturity and provide nesting habitat in the future. Long-term risks to stands may be increased in the absence of periodic fires to decrease fuels and potential fire severity.

Direct and Indirect Effects Under the Proposed-Action Alternative: Regeneration treatments (shelterwood and clearcut) are proposed on 46 acres of suitable goshawk nesting habitat (*Table 3-WL-9*). Mid-age class would trend towards desired future condition. The seeding-sapling age class would increase by 594 acres. Sufficient nesting habitat would be retained in the three territories to support 3 nesting goshawk pairs.

The proposed treatments would decrease mature stands by 11% in forage habitat and would bring the sapling component closer to desired condition. The thinning and burning could create additional habitat for prey species.

Table 3-WL-6. Changes in vegetative stand structure in goshawk foraging habitat, by alternative.

Age Class	Desired vegetative stand structure for goshawk foraging habitat	Existing Condition/ No-Action Alternative	Proposed-Action Alternative
Mature/Old	40%	46%	35%
Mid	20%	47%	39%
Seed/Sap	10%	4%	10%
Grass/Forb/Shrub	10%	0%	0%

All newly constructed roads would be closed to public motorized use during project implementation and would be permanently closed to motorized use following project activities, which would minimize any effects to this species. Closures of non-authorized ATV routes proposed as part of the project will maintain or improve security following project activities. User-created routes have been located and will be closed with earth and log debris as part of this project.

Table 3-WL-7. Effects to suitable goshawk nesting habitat in the Deerfoot Resource Area.

Indicator	No-Action Alternative	Proposed-Action Alternative
Acres of treatment in suitable goshawk nesting habitat	489	443

Cumulative Effects to Northern Goshawk

The cumulative effects area for the Northern Goshawk is the Deerfoot Resource Area. Past timber harvest on the Idaho Panhandle National Forests has resulted in decreased available habitat for northern goshawks. This decrease is incorporated into the "affected environment".

Private lands within the foraging areas provide some habitat for nesting and foraging goshawks. Additional decreases in habitat could occur if private landowners harvest mature timber or develop their lands.

Disturbance associated with road construction, reconstruction, removal of barriers and traffic associated with other project activities could affect goshawks during critical nesting and post fledgling periods. Overall management direction has been to eliminate travel that is not on a designated route and provide for more effective road closures.

Future planned pre-commercial thinning activities would result in improved goshawk habitat in the future since the activity would result in larger diameter trees in the long-term. Treatment of noxious weeds would have no impact upon the goshawk or its habitat.

Under the Proposed-Action Alternative, specific design features would be applied to protect goshawk nesting (see Chapter 2, Features to Protect Wildlife Habitat).

Since design features would avoid effects to this species in the Deerfoot Resource Area, it is unlikely that the proposed activities would cause declines in populations. Nesting and foraging habitat would be maintained in all three foraging areas, and Region 1 viability criteria of one goshawk nesting pair for each 10,000 acres would be met (Warren 1995; PF Doc. WL-61).

Conclusions of the Northern Goshawk Analysis

- Goshawk surveys were conducted in the resource area during the 2000, 2002, 2006 and 2007 breeding period. No activities are proposed near the occupied nest area. If other nests are found they will be protected according to project design features and mitigation presented in Chapter 2 of this assessment.
- Three nesting territories would continue to provide suitable goshawk nesting and foraging habitat.
- There is a slight chance an undetected nest could be lost during activities. Therefore, since a slight chance an undetected nest could be in the resource area
- The proposed action is consistent with Forest Plan direction to manage the habitat of sensitive species to prevent further declines in populations, which could lead to listing under the Endangered Species Act (USDA 1987, p. II-28; PF Doc.CR-002). Therefore, these actions would be consistent with National Forest Management Act requirements for diversity of plant and animal communities.
- Adhering to Region 1 snag protocol (which exceed standards of the Forest Plan), maintaining 10 percent allocated old growth across the forest as described in Forest Plan (2004 Forest Plan Monitoring Report, pp. 66-74, PF Doc CR-026), maintaining mature/large structure forests within historic range of variability and implementing the design features identified in Chapter 2 would insure the viability of the goshawk on the Coeur d'Alene River Ranger District
- Viability across Region 1 is assured for the short term (PF Doc. WL-R139).

Because of the reasons listed above the Proposed Action may impact individuals, but would not likely contribute to a trend towards a loss of viability to the population or the species. There would be no impact to goshawks under the No-Action Alternative.

.

Pine Marten *(MIS With a Low Probability of Occurrence)*

Pine marten inhabit late successional coniferous forests, preferring old-growth fir or spruce-fir stands (Koehler and Hornocker 1977, PF Doc. WL-R 90; Spencer 1981, PF Doc. WL-R50) and are used by the IPNF as management indicators of those habitats (IPNF Forest Plan 1987; PF Doc.CR-002). Pine marten prefer spruce-subalpine fir stands with large overstory trees (greater than 19 inches in diameter), and many down logs (more than 20 per acre), (Patton et al. 1990; PF Doc. WL-R94). An important component for marten is dead trees including snags, stumps, and down logs (*Figure 3-WL-16*). These are used for regulating temperature in the winter, resting, hiding from predators and reproducing (Simon 1980, PF Doc. WL-R49; Spencer 1981, PF Doc. WL-R50). In north Idaho, pine marten usually live above 4,000 feet in elevation, although they are also found in lower elevations along drainages with a spruce-fir component.

Tomson (PF Doc. WL-13, PF Doc. WL-R144) found marten distributed across elevations on the Idaho Panhandle National Forests. Marten on the IPNF were associated with older stands with high accumulations of large woody debris and complex understories. Healthy small mammal populations were also found to be important. In addition to the spruce-fir habitats, Tomson found marten using riparian cedar and hemlock dominated stands on the Idaho Panhandle. Marten were rarely found to be using Douglas Fir or grand fir habitats in northern Idaho.

Figure 3-WL-16. Pine marten in a tree.

Reference Condition for the Pine Marten

The marten was selected by many National Forests in the Northern Region as a management indicator species. It is used to represent species using mature and old-growth habitats (Patton and Escano; PF Doc. WL-R94).

The marten ranges throughout most of northern North America's late successional stage forests (Patton and Escano in: Warren 1990; PF doc. WL-R94). Marten are found throughout the forested regions of Idaho. In north Idaho, pine marten habitat usually exists above 4,000 feet in elevation, although they are also found in lower elevations, especially along drainages.

Management Recommendations for the Pine Marten

Witmer et al (1998; PF Doc. WL-R93) describe the three major issues of concern to marten conservation and management in the Columbia River Basin in "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates."

- ***Conservation of late successional forest -*** *Over mature stands are found to consistently be preferred habitat for the marten. Martens do not travel far from substantial forest overhead cover. Large-diameter snags, logs, and stumps provide important resting habitat for the marten. Although used as a management indicator species for old growth, in a habitat suitability model developed by Patton and Escano (PF Doc. WL-R94) stands with moist cover types, an average overstory tree size greater than 9 inches in diameter and canopy closure greater than 30 percent provide moderate habitat for the marten (PF Doc. WL-R94). Within the Deerfoot Resource Area Stands stands of this diameter class include small/medium structural stages.*
- ***Maintenance of links between populations -*** *Martens will not use habitat with minimal canopy cover. Forested travel corridors are essential for maintaining links among individuals and populations. Patton and Escano (1990; PF Doc. WL-R94) recommend that suitable pine marten home ranges be provided every 1 to 2 square miles in order to maintain viable populations. Marten rarely venture greater than 150 feet from forest cover, especially in winter (Patton and Escano; PF Doc. WL-R94). To ensure that a viable population of marten is maintained across its range, suitable habitat for individual martens should be distributed geographically in a manner that allows interchange of individuals between habitat patches (Patton and Escano, 1990; PF Doc. WL-R94).*
- ***Trapping pressure and human disturbance*** *- Marten are trapped commercially. Road densities contribute to trapping pressure. Pine marten are very susceptible to trapping; high road densities probably increase vulnerability. They prefer areas with road densities of less than 1 mile per square mile (Patton and Escano, 1990; PF Doc. WL-R94).*

Affected Environment for the Pine Marten

Pine marten may use some general habitats that do not fit specifically within the higher elevation spruce-fir habitats known to be preferred by the species. Pine marten habitat does occurs in the Deerfoot Resource Area. However, the preferred spruce/fir habitats and only found in limited amounts within the Resource Area. The species is rare or absent in stands dominated by ponderosa pine. Habitat for the marten includes VRU (vegetative response units) 6, 7/8, 9 and 10/11 in the saw timber, mature or multi-size class. Pine marten are most likely to occur within the cool/moist habitats within the Deerfoot Resource Area. There are 106 acres of habitat for the marten within the Deerfoot Resource Area (PF Doc. WL-26). VRU 10/11, which provides optimal habitat for the marten and represents cold moist habitat, is absent in the Resource area. VRU 9 is also absent in the resource area.

Direct and Indirect Effects to the Marten

Direct and indirect effects under the No-Action Alternative: No change to habitat for the marten would occur under this alternative. The area would remain inherently low in the cold/moist spruce-fir habitats preferred by the marten.

Direct and indirect effects under the Proposed-Action Alternative: Since the Deerfoot Resource Area is inherently low in marten habitat the implementation of this alternative would result in minimal impacts to the marten. None of the marten habitat identified would be altered by harvest activities (PF Doc. WL-25 and WL-26). An increase in forage and snag numbers as a result of burning could benefit the marten. Road construction could slightly increase risk for trapping. However, this is a minimal risk since the area is low quality habitat for the marten. The area would continue to be inherently low in the high elevation cold/moist and cool/moist habitats preferred by the marten.

Cumulative Effects for Marten

The cumulative effects area for the marten is the Deerfoot Resource Area. Because the Deerfoot Resource Area lacks high elevation subalpine fir and spruce habitats preferred by marten, historically marten were either absent or at very low populations within the resource area. Past timber harvest selecting for the removal of seral species and salvage harvests which impact snag availability have decreased the quality of habitat for marten in the Deerfoot Resource Area. Fire suppression and road construction have contributed to these effects. This decrease in habitat is incorporated into the "affected environment". Private lands adjacent to, and within, the resource area provide little habitat for this species. The development of the campground at Mokins Bay in the 1960s eliminated a small patch of habitat for the marten (VRU 6).

Future planned precommercial thinning will result in a larger diameter trees in the long term. This would result in more habitat that meets the needs of the marten. In addition, past stream restoration work within the resource area will continue to improve marten habitat over time.

Conclusions of the Pine Marten Analysis

- The Proposed-Action Alternative is consistent with Forest Plan direction to manage the habitat of management indicator species for viable populations (USDA 1987, p.II-28 PF Doc. CR-002).
- In addition, allocated old growth would be maintained at 10 percent across the IPNF (PF Doc. CR-002)
- Forest Plan standards for snag retention would be exceeded with adherence to the R1 Snag Protocol (USDA Forest Service 2000; PF Doc. WL-R54 and IPNF 1987, PF Doc. WL-R53).

For these reasons and because the area lacks high elevation habitats required by the marten activities under the Proposed Action would not impact the marten or their habitat. There would be no impact to the marten or its habitat with the implementation of the No-Action Alternative.

E. Analysis of Big-Game Management Indicator Species (MIS)

Rocky Mountain Elk *(MIS With a High Probability of Occurrence)*

Elk are the management indicator species for big game on the central and southern portion of the IPNFs, therefore the analysis for big game will focus on elk. Other big-game species occurring in the resource area can adequately be represented through the discussions on elk.

Reference Conditions for Rocky Mountain Elk

Early records indicate the Rocky Mountain elk occurred throughout most of Idaho, but large herds were apparently absent from the panhandle. Settlement led to exploitation of the species which caused elk to be reduced to a few isolated herds in the state. A translocation program initiated in 1915 and continuing for the next 30 years restocked elk in Idaho. Today, elk exceed their population level of a century ago. However, high road densities in elk habitat in northern Idaho have increased hunter success and have lead to changes in hunting regulations. Winter range for the species has been greatly impacted by urban development and agriculture. Noxious weeds have had an impact on forage in some areas.

Management Recommendations for Rocky Mountain Elk

The Forest Plan directs that forest management for elk should be coordinated with the Idaho Department of Fish and Game. The plan recommends using *Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho* (IDFG 1984; PF Doc. WL-R78) to evaluate elk habitat potential. Elk Habitat Units (EHUs) are the land area recommended for tracking elk habitat potential in the Forest Plan. EHUs consist of several compartments used for database management of timber stand information. Compartments are groups of stands topographically delineated and used for tracking current condition and land management activities. Road miles, road status, forage, cover, security areas and other factors that could affect elk habitat are considered in the model. A detailed report on the status of each road within the resource area is available in the wildlife project files and in the Roads Analysis for this project (PF Doc. TRAN-01). Other information used in the model includes miles of each road, whether it is open year long, open seasonally or closed, the type and effectiveness of the closure device and the condition of the road such as drivable, gated, brushed in or obliterated (PF Doc.WL-29).

Affected Environment for Rocky Mountain Elk

While elk populations are greater in number and more stable today in the Coeur d'Alene Basin than 100 years ago, high road densities have increased elk vulnerability to hunting loss, have lead to over-harvesting of some local populations and have changed the age structure and bull: cow ratio in other populations.

Overall, open road density in the Deerfoot Resource Area is 1.1 miles per square mile. In greater density across the watershed than open roads are closed roads. Closed roads can be drivable roads that are considered closed according to regulations. Some closed roads have gates, signs or barriers; others are closed by regulation. There have been two closures in the watershed completed as a result of cost-share agreements between the Forest Service and the Rocky Mountain Elk Foundation. These are effective closures because they include partial road obliteration. There have been a series of road closures and obliterations in the resource area over the past ten years to improve wildlife security, aquatic habitat and elk habitat.

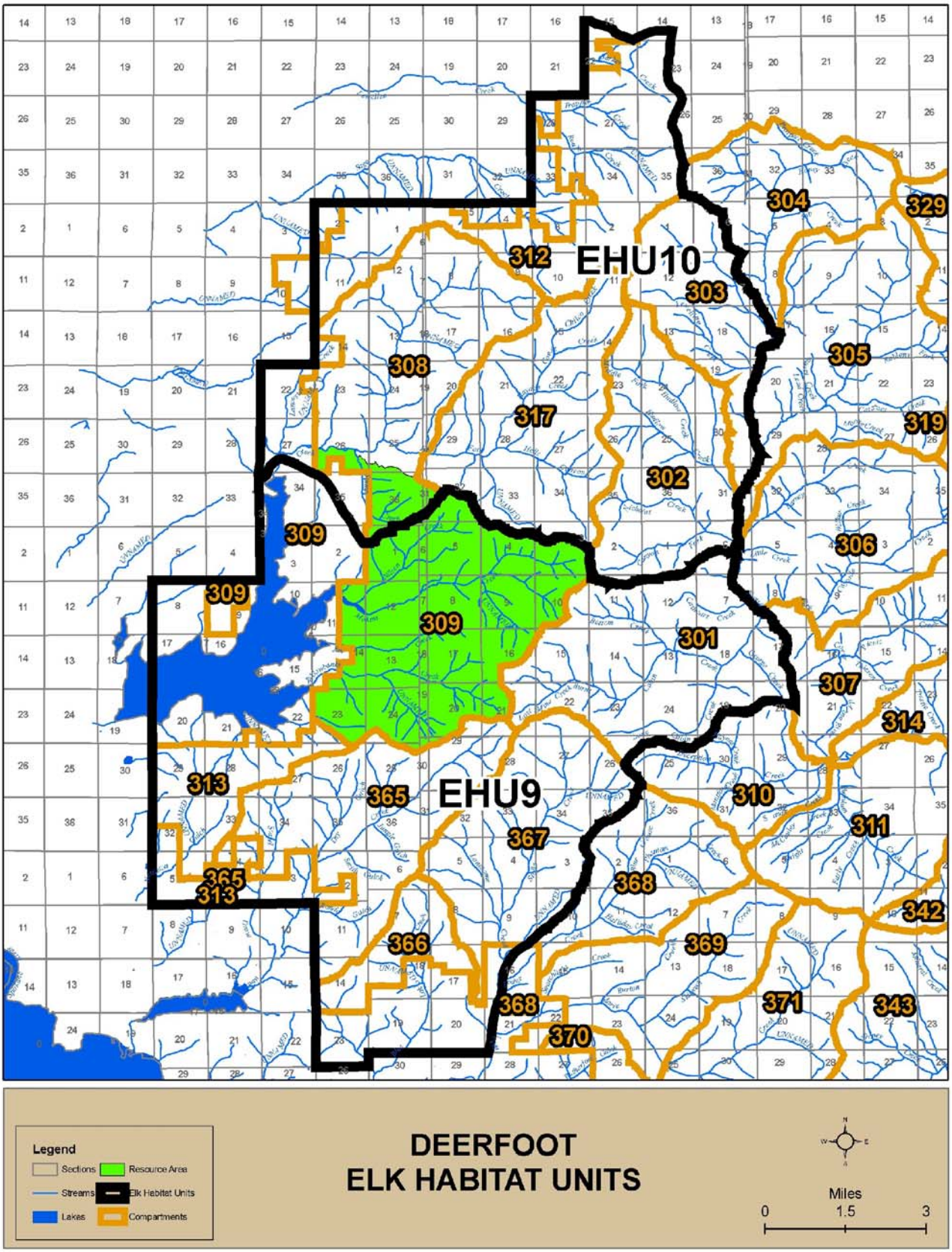
Some of the smaller drainages near Deerfoot Ridge have pioneered ORV trails along them. Although a great deal of effort has gone into trying to effectively close specific roads in the resource area for wildlife security, many of the physical closures have been breeched by ORV users. There are several other pioneered trails throughout the watershed. An assessment of these areas has been done (PF Doc. TRAN-01). Pioneered trails and closed roads in the resource area are considered in the elk habitat potential analysis. The district is currently finalizing an access plan that will establish designated routes. Travel off these designated routes is not allowed.

As shown in Figure 3-WL-17, the Deerfoot Resource Area is within portions of two Elk Habitat Units (EHUs). EHU 9 covers 35,472 acres of National Forest System lands. Almost all of the resource area is within EHU 9, except for about 700 acres between Stump Creek and Deerfoot Ridge on the northern edge of the resource area. EHU 9 continues south through the Canfield, Fernan and Stella Creek areas. EHU 10 totals 33,152 acres, with just a small portion lying within Deerfoot Resource Area. Elk habitat values are calculated for each compartment and each EHU in the Resource Area.

Elk Habitat Unit 9: The current elk habitat potential for EHU 9 is 48 percent. This is above the Forest Plan goal of 38 percent (Forest Plan Appendix B, Summer Range Elk Management Plan; PF Doc. WL-R78 and PF Doc. WL-29). Compartment 309 lies in the Deerfoot Resource Area. The other compartments within EHU 9 fall outside of the resource area. Compartment 309 has a current EHU potential of 46 percent

Elk Habitat Unit 10: The current elk habitat potential for EHU 10 is 47 percent which is above the Forest Plan goal of 44 percent Compartment 308 is the only compartment in the EHU that falls within the Deerfoot Resource Area. This compartment has an elk habitat potential of 50 percent.

Figure 3-WL-17. Location of the Deerfoot Resource Area in Relation to Elk Habitat Units.



A portion of the salvage harvest activities completed under the Douglas-fir Beetle Project was located within Elk Habitat Units 9 and 10. This represents the existing condition, and does not include the effects of activities under the Deerfoot proposal, which are disclosed under the environmental consequences discussion later in this chapter.

The existing average elk habitat potential for the western half of the Coeur d'Alene River Ranger District (formerly known as the Fernan Ranger District) is currently 52% (PF Doc. WL-20), which exceeds the Forest Plan goal (48%) for this area.

Security: Large secure areas are important for big game. These secure areas are used for calving, fawning and rearing of young. They also provide places for elk to escape from hunting pressure. The recommended security minimum is 20 percent in an area the size of the Deerfoot Resource Area. Due to road closures and decommissioning, the Deerfoot Resource Area does have some security areas; however, unauthorized ORV use could occur in some of these areas. There are two security areas in the Deerfoot Resource Area. The Buckles Mountain security area totals 404 acres; of this, 137 acres are within the Deerfoot Resource Area. The Horse Ridge Security Area lies entirely within the resource area and is 1,105 acres in size (PF Doc. WL-41). Only security areas that were within one-half mile from a road are considered by the elk model.

Cover: Cover is not a limiting factor within the area and ranges from 89 to 100 percent. Most areas that have lower overstory canopy closure have fairly high brush. There are only a few areas in the watershed that have been clear-cut. Most previous harvest has either been selective or salvage so cover is maintained. Cover values are incorporated into the elk habitat effectiveness model.

Forage: Some parts of the resource area provide winter range, but it may not be heavily used or preferred due to high recreational use. Some of the private lands in and adjacent to the Deerfoot Resource Area are heavily used by wintering big game. The availability of palatable brush species is high with moderate to low occurrence of grasses and forbs. Although occurrence of shrubs and brush is high, fire suppression has caused this component to become older, more decadent and of lesser nutritional value to big game species as winter forage. Past timber harvest, which is often followed by prescribed fire, has provided additional forage for elk and other big game species in the resource area. Noxious weeds can impact forage for elk and occur in localized areas at high levels.

Direct and Indirect Effects to Rocky Mountain Elk

As discussed, the methodology presented in *Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho* (Leege 1984; PF Doc. WL-R78) was used to evaluate current elk habitat potential. Changes in this potential under each alternative are used to evaluate potential effects to elk habitat. The elk habitat potential model determines a numerical value for habitat suitability using factors such as the length of road, type of road, whether the road is open or closed and the distribution of forage and cover. When all habitat factors are optimum in abundance and distribution, elk potential is 100%. The Idaho Fish and Game recommends a minimum value of 50% or greater for general elk summer range (Leege 1984; PF Doc. WL-R78).

Direct and Indirect Effects Under the No-Action Alternative: No short-term vegetative effects or changes would result from the implementation of No-Action Alternative. Foraging habitat may decline over time as fire suppression continues and the brush component continues to become more decadent. Burning associated with the Douglas-Fir Beetle project will improve forage in the areas burned. According to vegetative modeling, canopy closure, which can provide thermal and hiding cover, will decline over the long term (vegetation section). Security would be maintained under this alternative with no additional road construction or reopening of closed and brush-in roads. Illegal ATV routes would not be closed with project funds and closure of the routes may be delayed until other funds are available.

Direct and Indirect Effects Under the Proposed-Action Alternative: The prescribed burning under the Proposed-Action Alternative would provide benefits to elk winter range forage palatability and nutrition. There is some potential for the spread of noxious weeds with burning, but noxious weed treatments would

occur prior to and following project activities. The project will implement regeneration harvest across 567 acres. These regeneration areas will be planted with long-lived seral species. Activities on this scale will result in disturbance to big game during project activities.

Over time there will be a net improvement to security where illegal ORV trails are closed after sale activities are completed. Project design features are in place to minimize disturbance. The openings created as a result of this alternative would decrease cover over the short term, but would create foraging habitat. Cover is generally not a limiting factor for elk in the resource area or across the district. The proposed commercial thins will also decrease existing cover, but not to the point where elk vulnerability would be greatly affected. Commercial thins would retain more cover than shelterwood harvest. Prescribed burning for site preparation on acres treated would result in improved forage conditions.

This alternative would require 1.6 miles of road construction or temporary road construction. All roads that are constructed for the project would be gated during activities. If unauthorized access occurs, additional barriers and closures would be considered depending on the circumstances to prevent this use while the project is ongoing. New road construction can decreases elk potential even if the road is closed following activities depending upon the closure method.

Disturbance associated with sale activities can displace elk. In some cases this may mean that elk just move over the ridge to an area with no activities. Activities are not likely to be widespread enough that elk displace for a long distance. They are likely to displace to other areas within the watershed. However, there is a concern when elk continue to be disturbed that they may use more energy and go into the winter season in poorer condition. Females with young are more vulnerable to disturbance. Past Rocky Mountain Elk Foundation closures in the Mokins drainage will provide a secure displacement area for elk during activities (Horse Ridge Security Area).

Table 3-WL-8. Percent elk habitat potential during and after project activities (PF Doc. WL-29).

Analysis Area	Goal (%)	Existing/ No-Action Alternative	Proposed-Action Alternative (during project)	Proposed-Action Alternative (post project)
Elk Habitat Unit 9	38	48	48	48
Compartment 309	NA	46	46	46
Elk Habitat Unit 10	44	47	47	47
Compartment 308	NA	50	49	50

The elk habitat potential in the table above includes all past activities that have occurred or are occurring in EHU 9 and EHU 10.

Effects of new road construction in the Deerfoot Resource Area (displayed in the following table) would be somewhat diluted since the proposed roads would occur in two different EHUs that are about 13 square miles each. Since these roads would be gated during project activities and partially obliterated following project activities, effects shown in the model are less than they would be if the roads remained open during the project.

Table 3-WL-9. Acres of elk security.

Elk Habitat Unit	Existing security (acres)	Security during activities under the Proposed-Action Alternative (acres)
EHU 9	5,779	5,779
EHU 10	3,949	3,949
Within the Deerfoot Resource Area	1,244	1,244

Elk security areas (as defined by the elk habitat model) would not change as a result of activities associated with the Deerfoot project since the 1.6 miles of newly constructed roads would be gated during project activities. Security is low in Compartments 308 and 309, which affects elk habitat potential. The security areas delineated on private lands were not used in the elk habitat potential model since all roads on private lands may not be included in the data bases, and since other road and trail uses may be occurring.

Cumulative Effects for Rocky Mountain Elk

The cumulative effects area for the Rocky Mountain elk analysis includes EHUs 9 and 10. Activities associated with previous salvage harvests in the resource area would continue under both alternatives. These activities may cause some disturbance, but would trend toward more resilient stands. The prescribed fire would also result in improved forage conditions in big game habitat. The Blue Alder project is foreseeable and would occur outside the resource area but within EHU 9, which is within the cumulative effects area used for the wildlife analysis.

The elk habitat model used is a cumulative effects model that includes past, current and proposed activities. Elk habitat potential was calculated for both Elk Habitat Units 9 and 10 and for the Deerfoot Resource Area (compartments 308 and 309). All alternatives would maintain a weighted elk habitat potential for the west side of the District (Fernan) of 52 percent. This is exceeds the Forest Plan goal.

The District is developing a new Travel Plan that addresses travel off designated routes, ineffective road closures and unauthorized motorized use on closed roads (Chapter 2, Ongoing and Reasonably Foreseeable Activities). This management will improve the effectiveness of elk security areas within the resource area and across the District by making closures and restrictions clearer to forest users and improving closure devices. These improvements, with the *travel on designated routes only* policy, should move the District towards more effective security although gaining full compliance may be a gradual process.

Conclusions of the Rocky Mountain Elk Analysis

- The Proposed-Action Alternatives is consistent with Forest Plan direction to manage the habitat of management indicator species to prevent further declines in habitat or populations, which could lead to listing under the Endangered Species Act (USDA 1987, p.II-28; PF Doc. WL-R17).
- Viability is insured because elk are managed as a hunted species in Idaho by the Idaho Fish and Game Department.
- The project would not decrease current elk populations.

F. Analysis of Non-Game Habitat

Affected Environment for Non-Game Habitat

Vegetation in the Deerfoot Resource Area, and the non-game habitat it provides, has changed considerably over the last 100 years as a result of settlement and associated activities in the area. Due to past selective harvest of seral species like ponderosa pine, western larch and white-pine, the species composition of the resource area has changed to include more grand fir, hemlock and Douglas-fir. Past timber harvests and road construction has decreased the size and distribution of seral conifers across the resource area.

Land management activities have decreased the mature/old component in the resource area. Currently over half the resource area is in seedlings and small to medium sized timber. Mature stands do make up about 46 percent of the resource area, but many of these stands have just entered the mature age class. Some of the stands that are mature have had some of the larger trees harvested at one time or another. While mature age classes are similar to historic levels, the old component is substantially reduced. Historically, dry-sites with

ponderosa pine had an open canopy of very old trees. Historic harvests, road construction and fire suppression have combined in effect to leave only small isolated patches of old growth. Fragmentation and lack of interior habitat has decreased the quality of the old growth that does exist in the resource area. Mature stands are generally denser with fewer very large trees.

One of the effects of the decrease in old trees is the lack of snag and down wood habitat they provide. Almost all non-game species use large snags and down wood for some part of their habitat requirements whether it is for nesting, cover, foraging substrate or just resting. The loss of down wood has greatly reduced habitat for non-game. Some snag habitat is being provided as a result of root disease and other insects and diseases at high levels throughout the resource area. The mortality from this disease and other agents is currently providing some snags and down wood of smaller sizes.

Another element of change for non-game habitat is the absence of fire on these dry-sites, which depend on frequent fires to maintain the structure preferred by the species that inhabit these sites. Currently dense understories of Douglas-fir, grand fir and western hemlock have changed the composition of stands, decreased forage availability and increased the risk of loss to high-intensity fire. Noxious weeds are at high levels in parts of the resource area, which can affect forage for non-game.

Riparian areas are another important habitat for non-game species, generally providing large trees in the overstory, and a hardwood component. They are areas of abundant herbaceous vegetation on the forest floor, and complex habitat structures including the bed and banks of the stream. Often they are associated with floodplains, ponds or wallows and wetlands. Many of the riparian areas have been disrupted by roads and are no longer providing as extensive wet areas. Past road construction in riparian areas and through flood plains has filled and isolated these low areas, reducing their abundance. Roads, along with their associated disruption of riparian habitat, and the trapping access they provide, have probably led to a reduction in forest non-game species. Stream restoration has occurred within the resource area, most recently in Stump and Shamrock Creeks. These restoration efforts will have a positive effect on non-game habitat over the long-term.

Direct and Indirect Effects to Non-Game Habitat

Direct and Indirect Effects Under the No-Action Alternative: Taking no action at this time would allow changes in vegetation to continue, these changes may not be within the normal successional pattern due to management activities that have caused loss of seed sources and excluded fire from the system. Ponderosa pine, white pine and western larch forests, and the wildlife species associated with them would remain below historic levels for the long term. Lack of existing seral species and associated seed sources may preclude these species from returning to historic levels.

Root diseases would continue to kill the susceptible firs and hemlock, continually adding to snags and downed log recruitment of smaller sizes. Drier site ponderosa pine stands would slowly decrease in canopy closure and overall tree diameter, as root diseases and beetles continue to work in the stands. Some stands would move toward mature and old, but most stands on the drier sites would experience a high degree of mortality in all age classes. This is likely to be more pronounced in the older trees that are more susceptible to the insects and diseases currently present in the resource area. Some mature stands, particularly on the moister northerly slopes, would move towards climax species of hemlock, cedar and grand fir. As some of these moist site stands mature they may start to take on old growth characteristics, and some could eventually be added to the old growth allocation for the Old Growth Management Units associated with the resource area.

The current high stand densities would remain the same or decrease slightly over time as competition for resources, and insects and diseases cause additional mortality. The fire risk to wildlife habitat within the resource area would remain high due to lack of fuels reduction after decades of fire suppression.

Direct and Indirect Effects Under the Proposed-Action Alternative: The underburning proposed under this alternative would decrease the complexity of vegetation on the forest floor as well as cover and shelter for nongame species. North slopes would continue to provide the complexity of habitat preferred by many non-game species. Reintroduction of fire as an ecological component would increase habitat for species that depend on dry-sites that evolved with fire. Some non-game species (including certain species of birds) evolved with fire. These species would likely benefit from the regeneration of ponderosa pine and western larch forest over the long term. If stands were managed into the future to promote frequent low intensity fire and to increase the old, early seral conifers as proposed, non-game species would benefit over the long term. Having open ponderosa pine sites on south slopes with more densely vegetated north slopes would increase biodiversity across the resource area. There is some potential for the spread of existing noxious weeds with the reintroduction of fire. This could affect foraging habitat for some non-game species.

The openings created with the harvest proposed under this alternative would reduce non-game habitat for those species dependent upon mature forests, and on large diameter snags and down wood. Reserve trees within the shelterwood units would provide some stand structure and diversity in the future and provide for future legacies (old, large trees) as long as these trees are not harvested at a future date. Loss of down wood as a result of harvest and down wood would decrease habitat quality for most non-game species.

This alternative will potentially result in the restoration of ponderosa pine stands to have characteristics more similar to historical conditions over the long term (100 to 150 years or more). This alternative would have short-term impacts on non-game species through further loss of mature forests, and loss of snags. Over the long-term, the regeneration of healthy long-lived seral species like ponderosa pine, white pine and larch could benefit non-game species.

Cumulative Effects to Non-Game Habitat

Past salvage and timber harvest has reduced the occurrence of large snags, down wood and old forests. Fire suppression has caused stands to become more dense leading to higher incidence of insects and disease.

Restoration of fire as an ecological process in the resource area under the Deerfoot project will trend it towards historical conditions and provide additional biodiversity with open, large diameter stands on south slopes and dense stands of various conifers on north slopes. Short term losses in habitat would occur with this project and it will be over 200 years before these stands would provide snags, large-diameter trees, and downed logs, all of which are now in short supply within the resource area. Species that have evolved with fire, and that depend on large diameter open ponderosa pine stands, will benefit over the long term, but may experience a short-term loss of habitat in areas treated with shelterwood prescriptions.

Private lands around Hayden Lake and large blocks in the interior of the Deerfoot Resource Area provide habitat for non-game species. These lands provide low elevation riparian habitats, meadows and the lowest elevation conifer habitats in the resource area. There are some activities planned within these private lands as discussed in Chapter 2. These projects, depending on their scope, could have effects on non-game species in the resource area. The effects are difficult to predict as the plans of private landowners do not appear to propose major activities, but that could change over a short period of time.

Although some current habitat may be lost over the short-term as a result of project activities, no action may have similar effects. Efforts to trend stands in the resource area towards historic species composition and age structure and to maintain the ecological processes which created these conditions will eventually benefit non-game species.

G. Analysis of Forest Land Birds

Forest land birds include avian species sometimes termed neotropical migrants, migratory songbirds or resident songbirds. Most forest land birds breed and nest in one area, and migrate to another area (sometimes thousands of miles away) to winter. Many of their wintering grounds are outside the United States and it is difficult to monitor habitat components in these critical winter ranges. This group of birds is an extremely

diverse group of species requiring a wide range of different habitats. In Idaho there are about 250 birds that breed in the state, about half are neotropical migrants. Although these species have not been specifically addressed in Land and Resource Management Plans until recently, the National Forest Management Act and Migratory Bird Treaty Act contain direction to consider these species as an issue in forest management.

In the Interior Columbia River Basin, five habitats were identified for management priority based on declines in species, vulnerability to human activities and habitat loss. These habitats are riparian, old growth/mature coniferous forests, shrub steepe, grasslands and juniper woodlands. In Idaho, the priority habitats in the Idaho Bird Conservation Plan are riparian, non-riverine wetlands, sagebrush/shrublands, old growth/mature conifer habitats and ponderosa pine.

Changes in forest composition, structure and landscape patterns such as fragmentation are often mentioned as contributing to declines in forest land bird populations. The Upper Columbia Basin Draft EIS (USDA Forest Service et.al. 1997; PF Doc. WL-R3) states that breeding bird surveys on National Forests found an increase of 10 species of neotropical birds and a decrease of 5 species. Vaux's swift, pileated woodpecker, Hammond's flycatcher, pygmy nuthatch, and Swainson's thrush are thought to have decreased (USDA, Upper Columbia River Basin Draft EIS 1997, Chapter 2, pp. 66-67; PF Doc. WL-R3). Often the increases in populations are less desirable species such as the brown-headed cowbird (Collopy and Smith 1995 in Upper Columbia River Basin Draft EIS; PF Doc. WL-R3). Neotropical birds are generally on the decline throughout most of their habitat (Richie 1994; PF Doc. WL-R77).

Forest landbirds are best addressed at the programmatic level, or on a large scale and by ecosystem and habitat conditions than on a species by species basis, particularly since the effects of an activity on one species may be detrimental, while the effects of the same action on another species may be beneficial. Landbirds are represented by habitats and/or species that are included in this analysis. These habitats include old growth/mature habitats (pileated woodpecker, fisher, northern goshawk), general forest species (elk), dry site species (flammulated owl, pygmy nuthatch), wetland/riparian species (Coeur d'Alene salamander, boreal toad, fisher), and snag dependent species (black-backed woodpecker, pileated woodpecker, flammulated owl). The impacts of an activity on forest landbirds are therefore reflected by the impacts shown in project level analysis, which assesses current habitats and potential effects on species representing the habitat components used by the different forest land birds.

3.6.5. Consistency with Policy, Direction and Legal Guidance

A. Consistency with the Forest Plan

Both alternatives would be consistent with Forest Plan management direction, goals, objectives, standards and guidelines for the management and protection of wildlife and species, as described below.

Elk

a. Coordinate with the Idaho Fish and Game Department to allocate the distribution of habitat potential.

Idaho Department of Fish and Game participated in the allocation of Elk Habitat Units and goals during the Forest Planning process, which is consistent with standard 1. (a). However, our current and proposed management would not meet the established Elk Habitat Potential goals. The following table shows where meet Elk Habitat Potential goals are currently being met and where they would be met for each alternative.

Table 3-WL-10. Forest Plan compliance for elk habitat potential

Portion of the District	Existing Condition	No-Action Alternative	Proposed-Action Alternative
Fernan (west side)	meets	does not meet	meets
Wallace (east side)	meets	does not meet	meets

b. Identify and delineate existing and potential winter range for each elk habitat unit and establish goals for forage production suitable to support desired population levels, including such tools as designation of permanent forage areas, scheduling of timber harvest, and habitat movement.

The Forest Plan delineated winter range management areas. This project does not affect forage production, the designation of forage areas, the scheduling of timber harvest, or habitat movement.

c. Utilize the "Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho" (Wildlife Bulletin No. 11, 1984, Idaho Department of Fish and Game) for evaluation of effects of proposed activities on elk habitat (Appendix Y, Idaho Panhandle National Forests Forest Plan).

The analysis of potential effects on elk utilized this methodology.

d. Include lands of all cooperators for habitat analysis where mixed ownership is within Elk Habitat Units.

Because the Forest Service has no jurisdiction over habitat management on private lands, Elk Habitat Units for this analysis only include National Forest System lands.

Threatened and Endangered Species

a. Management of habitat and security needs for threatened and endangered species will be given priority in identified habitat. Results of research regarding habitat of threatened and endangered species will be incorporated into management direction as it becomes available.

Recovery plans, habitat conservation strategies and management plans for threatened and endangered species address the habitat and security needs for these species. These are included in the analysis of potential effects. Information from current and ongoing research is used in the analysis.

b. Biological evaluations will be done on any project likely to have an adverse effect on identified habitats of threatened or endangered animals.

The potential effects on threatened and endangered species were analyzed and are documented in this environmental assessment (Section 3.6.4., Part B). A Biological Assessment has been completed for all relevant Threatened and Endangered species.

c. Current direction for management of threatened and endangered species will be amended or revised to ensure conformance with Species Recovery Plans.

Current management direction for Threatened and Endangered species, including recovery plans, conservation assessments and strategies, have been incorporated into the analysis and the Biological Assessment.

Bald Eagle

a. Nesting, feeding and roost areas will be protected in accordance with the Pacific States Bald Eagle Recovery Plan (Appendix W, Idaho Panhandle National Forests Forest Plan).

The analysis considered the potential effects on nesting, feeding and roost areas and determined that the alternatives are consistent with current management direction for bald eagles.

b. Develop site specific bald eagle nest management plan for each located eagle nest on National Forest land as outlined in the Montana Bald Eagle Management Plan (Appendix II, Idaho Panhandle National Forests Forest Plan) and adopted for use on the Idaho Panhandle National Forests.

There are no known nest sites on National Forest System lands on the Coeur d'Alene River Ranger District that would require development of a site-specific bald eagle nest management plan.

c. Cooperate in research and surveys involving bald eagles on the Forest.

District biologists participate in annual mid-winter surveys for bald eagles in cooperation with Idaho Department of Fish and Game and other resource agencies.

Gray Wolf

a. In areas of reported occurrence, consider maintenance of a high number of prey species (deer, elk) and maintenance of security through road management.

The analysis of potential effects on the gray wolf considered maintenance of prey and security.

b. Forward information on reported sightings to the Wolf Recovery Team.

All information regarding possible wolf sightings are forwarded immediately to the Idaho Department of Fish and Game which is now the agency responsible for wolf management on the Coeur d'Alene River Ranger District.

c. Cooperate in research and data collection involving wolf and wolf habitat.

District biologists cooperate with all wolf management efforts when requested by Idaho Department of Fish and Game, and report all possible sightings to Idaho Department of Fish and Game.

Other Wildlife

a. Maintain at least minimum viable populations of management indicator species distributed throughout the Forest (Appendix L for indicator species selection process, Idaho Panhandle National Forests Forest Plan.

An analysis of potential effects has been completed for management indicator species (MIS). The analysis documents that the project would maintain habitat for MIS at or above current levels.

b. Maintain habitat for cavity nesting species and foraging substrates by implementation of the IPNF Snag and Woody Down Timber Guidelines (Appendix X, Idaho Panhandle National Forests Forest Plan).

The potential effects on snags and snag-associated species were analyzed and documented in this environmental assessment. This is analyzed further in the sensitive species section of this document.

Sensitive Species

a. 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.

The analysis of potential effects addressed relevant species from the Region 1 Sensitive Species List. The analysis is consistent with Region 1 direction, and the determinations of effects are documented in this environmental assessment. No alternative would result in effects that could lead to federal listing of any Sensitive species. The biological evaluation determined this project would have the same effect on all sensitive species: "May Impact Individuals or Habitat, But Not Likely to Trend Toward Federal Listing or Loss of Viability."

B. Consistency with the Endangered Species Act - 1973

Section 7 of the ESA includes direction that Federal agencies, in consultation with the U. S. Fish and Wildlife Service, will not authorize, fund, or conduct actions that are likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat.

Consultation with the U.S. Fish and Wildlife Service regarding Threatened and Endangered Species is not required for this project. Counterpart regulations (PF Doc. WL-68) have been prepared pursuant to the Joint Counterpart Endangered Species Act Section 7 Consultation Regulations issued on December 8, 2003 (Federal Register, pages 68254-68265), to support implementation of the Endangered Species Act. The counterpart regulations complement the general consultation regulations at 50 CFR 402 by providing an alternative process for completing Section 7 consultations for federal agency actions that authorize, fund, or carry out projects that support the National Fire Plan.

C. Consistency with the National Forest Management Act

NFMA provides for balanced consideration of all resources. It requires the Forest Service to plan for diversity of plant and animal communities based on the suitability and capability of the specific land area and within multiple use objectives of a Land Management Plan.

The analysis documents the effects on threatened and endangered species, sensitive species, management indicator species, and other species of potential concern. The Proposed-Action Alternative provides for a diversity of relevant wildlife species and their habitat.

D. Consistency with the Migratory Bird Treaty Act

An Executive Order directs agencies to ensure that environmental analyses evaluate the effects of federal actions on migratory birds, with emphasis on species of concern.

The analysis documents the effects on migratory birds with an emphasis on species of concern. Migratory birds are included in the analysis for threatened and endangered species, sensitive species, management indicator species, forest land birds, and other species of potential concern.

3.6.6. References Cited in the Wildlife Analysis

Allen, A.W. 1983. Habitat suitability index models: Fisher. USDI Fish and Wildlife Service. FWS/OBS-82/10.45. in Washington Department of Wildlife Management Recommendations for Priority Species: Fisher.

Aney, W.C. and B.R. McClelland. 1985. Habitat suitability index model for Northern Rocky Mountain pileated woodpeckers. Unpubl. Report, U.S. Department of Agriculture, Forest Service, Missoula, Montana.

Banci, V. 1994. Wolverine. Pgs 99-127 In: The Sientific Basis for Conserving Forest Carnivores in the Western United States: American Marten, Fisher, Lynx and Wolverine. L. F. Ruggiero, K.B. Aubry, S. W. Buskirk, L.J. Lyon, and W.J. Zielinski (eds). USDA Forest Service General Technical Report. RM-254

Bergman, C.A. 1983. Flaming Owl of the Ponderosa. Audubon 85(6): 66-71. in Dobkin, D. S. 1992. Neotropical Migrant Landbirds in the Northern Rockies and Great Plains. U.S.D.A. Forest Service Northern Region. Publication No. R1-93-34. Missoula, MT.

Bonn, J., B. Dixon, E. Kennedy, D. Pengeroth. 2007. Black-backed Woodpecker Northern Region Overview. Key Findings and Project Considerations.

Bull, E.L. 1975. Habitat Utilization of the Pileated Woodpecker, Blue Mountains, Oregon. Page 16.

Bull, E.L and R.G. Anderson. 1978. Notes on Flammulated Owls in northeastern Oregon. Murrelet 59:26-28. in Montana Bird Conservation Plan: Flammulated Owl.

Bull, E.L. 1986. Resource partitioning among woodpeckers in northeastern Oregon. PhD. Diss., Univ. Idaho, Moscow. 109 page. In Aney, W.C. and B. McClelland. 1985. Habiat Suitability Index Model For Northern Rocky Mountain Pileated Woodpeckers. University of Montana.

Bull, E.L., A.L. Wright, and M.G. Henjum. 1990. in Nesting habitat of Flammulated Owls in Oregon. Journal of Raptor Research 24:52-55. in Montana Bird Conservation Plan: Flammulated Owl

Bull, E., S.R. Peterson, J.W. Thome. 1986. Resource Partitioning Among Woodpeckers in Northeastern OR. Thesis. USFS PNW-444.

Bush, Renate and Renee Lundberg. 2006. Estimates of Old Growth Percentages and Snag Density on the Idaho Panhandle National Forest. KIPZ Draft Comprehensive Report. RI USFS. 12pp

Butts. 1992. *in* Witmer, Gary W., Sandra K. Martin and Rodney D. Saylor. 1998. Forest Carnivore Conservation and Management in the Interior Columbia River Basin: Issues and Environmental Correlates. USDA Forest Service, UDSI, BLM. Gen. Tech. Rpt. PNW-GTR-420

Callopy, M.W. and J.P. Smith. 1995. in USDA Forest Service, USDI, BLM. 1997. Upper Columbia River Basin Draft EIS.

Cassirer, E. F. & C. R. Groves. August 1994. Coeur d'Alene Salamander Conservation Assessment, USDA Forest Service, R1. Idaho Fish and Game. Boise, Idaho. 54 pp.

Chapman, J. and G.H. Feldhamer (editors). 1982. Wild Mammals of North America: Biology, Management, Economics. John Hopkins University Press. 1147 page.

Cherry, M. 1997. The Black-backed and Three-Toed Woodpeckers: Life History, Habitat Use and Monitoring Plan. Gallatin National Forest. Bozeman, MT.

Copeland, J. and H. Hudak. 1995. Conservation Assessment for wolverines (Gulo gulo) in Idaho. Idaho Fish & Game, Nez Perce Tribe & Sawtooth National Forest. Idaho State Conservation Effort. Saving All the Pieces Draft. Forest Carnivores in Idaho. pp. 114.

Coulter, M. W. 1966. Ecology and management of fishers in Maine. Syracuse, NY: Syracuse University, University College of Forestry. Ph.D. thesis. In The Sientific Basis for Conserving Forest Carnivores in the Western United States: American Marten, Fisher, Lynx and Wolverine. L. F. Ruggiero, K.B. Aubry, S. W. Buskirk, L.J. Lyon, and W.J. Zielinski (eds). USDA Forest Service General Technical Report. RM-254

Davis. 1939.The Recent Mammals of Idaho. Caxton Printers. Caldwell Idaho. in Groves, C. 1987. Distribution of the Wolverine in Idho 1960-1987. IDF&G. 20pp.

Dixin, Rita D. and Victoria Saab. 2000. Black Backed Woodpecker in the Birds of North America, No. 509. A Poole and F. Gill, eds.

Gibilisco, C., K.S. Heinemeyer, J.Jones, C. Mack. 1995. Idaho Fish and Game et. at. Habitat Conservation Assessment and Strategy for Forest Carnivores in Idaho.

Ghanlambor, 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, Custer, South Dakota. 55 pp.

Goggans, R. 1986. Habitat use by Flammulated Owls in northeastern Oregon. M.S. thesis, Oregon State Univ., Corvallis. 54 p. in Montana Bird Conservation Plan: Flammulated Owl

Greenwald, D.N., D.C. Crocker-Bedford, L. Broberg, K.F. Suckling, T. Tibbitts 2005. A review of northern goshawk habitat selection in the home range and implications for forest management in the western United States. Wildlife Society Bulletin 2005, 33(1):120-129. pp.120-129.

Groves, C. 1987. Distribution of the wolverine in Idaho. Idaho Natural Heritage Program. Nongame program. Idaho Dept. of Fish and Game.

Groves, C. 1989. Status and Distribution of the Plethodon vandykei idahoensis in Idaho. Part II. Idaho Department of Fish and Game 20pp.

Hagemeier, E.M. 1956. Distribution of marten and fisher in North America. Canadian Field-Naturalist. 70: 149-168. in The Sientific Basis for Conserving Forest Carnivores in the Western United States: American Marten, Fisher, Lynx and Wolverine. L. F. Ruggiero, K.B. Aubry, S. W. Buskirk, L.J. Lyon, and W.J. Zielinski (eds). USDA Forest Service General Technical Report. RM-254

Hansen, J. 1986. Wolves of Northern Idaho and Northeastern Washington. Montana Coop. Wildlife Research Unit. U.S. Fish and Wildlife Service. 96pp.

Hayward, Greg. 1990. Goshawk Habitat Relationships *in* Old Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. Nancy Warren ed. Northern Region Wildlife Habitat Relationships Program

Hayward, G.D. 1986. Activity Pattern of a Pair of Nesting Flammulated Owls (Otus flammeolus) in Idaho. Northwest Science. Vol. 60 No. 3.

Hayward, G.D. & T. Holland & R. Escano. 1983. Habitat Suitability Index Model- Goshawk. Northern Region. USDA-Forest Service. Missoula MT.

HCA/CS Development Team for the State of Idaho. 1995. Habitat Conservation Assessment and Strategy for the Northern Goshawk (*Accipiter gentillis*). IDF&G, Dept. of Parks and Rec., R1 & R4 USFS, USFWS.

Howie, R.R. and R. Ritcey. 1987. Distribution, habitat selection, and densities of flammulated owls in British Columbia. P. 249-254 *in* Biology and conservation of northern forest owls. USDA For. Serv. GTR-RM-142. Fort Collins, CO. in Montana Bird Conservation Plan: Flammulated Owl

Hornocker, M.G., and H.S. Hash. 1981. Ecology of the wolverine in northwestern Montana. Canadian Journal of Zoology 59: 1286-1301. in Austin, M. 1998. Wolverine Winter Travel Routes and Response to Transportation Corridors in Kicking Horse Pass Between Yoho and Banff National Parks. MS Project. U of Calgary. 40pp.

Idaho Fish and Game. 1984. Guidelines for evaluating and Managing Summer Elk Habitat in Northern Idaho.

Jewett, et al. 1953. Birds of Washington State. University of Washington Press.

Johnsgard, P.A. 1988. North American Owls. Biology and Natural History. Smithsonian Institution Press. Washington D.C. in Atkinson, E.C. and M.L. Atkinson. 1990. Distribution and Status of Flammulated Owls on the Salmon National Forest. Idaho Dept. of Fish and Game. Boise.

Jones, J.L. 1991. Habitat use of fishers in northcentral Idaho. M.S. thesis, University of Idaho. Moscow, ID. 147pp. in Idaho Fish & Game. 1995. Nez Perce Tribe & Sawtooth National Forest. Idaho State Conservation Effort. Saving All the Pieces Draft. Forest Carnivores in Idaho. pp. 114.

Jones, J. USFS Eastside Assessment Team. P29. In Idaho Fish & Game. 1995. Nez Perce Tribe & Sawtooth National Forest. Idaho State Conservation Effort. Saving All the Pieces Draft. Forest Carnivores in Idaho. pp. 114

Krott, P. 1960. Ways of the Wolverine. Natural History 69:16-29. in Austin, M. 1998. Wolverine Winter Travel Routes and Response to Transportation Corridors in Kicking Horse Pass Between Yoho and Banff National Parks. MS Project. U of Calgary. 40pp.

Maj, M. & Garton. 1994 p.29 in Idaho Fish & Game. 1995. Nez Perce Tribe & Sawtooth National Forest. Idaho State Conservation Effort. Saving All the Pieces Draft. Forest Carnivores in Idaho. pp. 114.

Maxell, B. 2000. Management of Montana's Amphibians. Order Number 43-0343-0-0224. Northern Regional Office. Missoula, MT.

McClelland, B.R. 1977. Relationships between hole-nesting birds, forest snags, and decay in western larch-fir forests of the Northern Rocky Mountains. Pages 283-299 in Role of Insectivorous Birds in Forest Ecolsystems. Academic Press in USDA Forest Service. 2000. Northern Region Snag Management Protocol.

McClelland, B.R. 1979a. The pileated woodpecker in forests of the Northern Rocky Mountains. pages 283-299 in Role of insectivorous Birds in Forest Ecosystems. Academic Press in Warren, N., tech. editor. 1990. Old growth habitats and associated wildlife species in the northern Rocky Mountains. Northern Region R1-90-42; U.S. Department of Agriculture, Forest Service. Missoula, Mt.

Migratory Bird Treaty Act. Section 3. 6pp.

Montana Animal Field Guide. Fringed Myotis. http://fwp.state.mt.us/fieldguide/detail_AMACC01090.aspx

Nowak, R.M. 1973. Return of the wolverine. National Parks Conservation

O'Connor, Tricia and Mike Hillis. 2001. Conservation of Post-Fire Habitats, Black-backed Woodpeckers and Other Woodpecker Species on the Lolo National Forest.

Paige, C., B. Madden, B. Ruediger. 1991. Habitat Management Guide for Bald Eagles in Northwestern Montana. Montana Bald Eagle Working Group. 29pp.

Patton, T and R. Escano. Revised by N. Warren. Old-Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains: Marten habitat Relationships. USDA Forest Service. Northern Region

Pengelley. 1951. Recent records of Wolverines in Idaho. Journal of Mammalogy. 32: 224-225. in Groves, C. 1987. Distribution of the Wolverine in Idho 1960-1987. IDF&G. 20pp.

Powell, R.A. 1982. in Arthur, S.M.; Drohn, W.B.; Gilbert, J.R. 1989a. Home range characteristics of adult fisher. Journal of Wildlife Management. 53: 674-679.

Powell, Roger A. and Willian J. Zielinski. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx and Wolverine in the Western United States. Gen. Tech. Rpt. RM-254. Ft. Collins, Colorado: USDA Forest Service Rocky Mtn. Forest and Range Experiment Station.

Quigley, T.M. Haynes, R.W. and R.T. Grahm. 1996. Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia River Basin. USDA Forest Service. Pacific Northwest Research Station. Portland, Oregon.

Reynolds, R.T. , R.A. Ryder, B.D. Linkhart. 1987. Small Forest Owls. Western Raptor Management Symposium and Workshop. Boise, Idaho. National Wildlife Federation Scientific & Technical Series. No. 12. pp 134-143.

Reynolds, R.T.,R.T. Graham, M.H. Reiser, R.L. Bassett, P.L.. Kennedy, D.A. Boyce, G.Goodwin, R. Smith, E.L. Fisher. 1992. Management Recommendations for the Northern Goshawk in the Southwestern United States. USDA Forest Service. Gen. Tech. Rpt. RM-217. Rocky Mtn. Forest and Range Experiment Station.

Reynolds, R.T., R.T. Graham, D.A. Boyce. 2005. Habitat Conservation of the Northern Goshawk in the Southwestern United States: Response to Greenwald et al. 2005. Rocky Mountain Research Station USDA. 19 pp.

Ruggerio, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, W.J. Zielinski. 1994. American Marten Fisher Lynx and Wolverine in the Western United States. USDA Forest Service. Gen. Tech. Rep. RM 254.

Saab, V., L. Bate, J. Lehmkuhl, B. Dickson, S.Story, S. Jentsch, W. Block. 2006. Changes in Downed Wood and Forest Structure After Prescribed Fire in Ponderosa Pine Forests. US Forest Service Proceedings RMRS-P-41.

Samson, F. B. 2005 (amended March 6, 2006). A Conservation assessment of the northern goshawk, blacked-backed woodpecker, flammulated owl, and pileated woodpecker in the Northern Region, USDA Forest Service. Unpublished report on file, Northern Region, Missoula, Montana, USA.

Schmidt, C.A. 2003. Conservation Assessment for the Fringed Bat in the Black Hills National Forest South Dakota and Wyoming. USDA Forest Service Rocky Mountain Region. Black Hills NF. Custer, S.D.

Simon, T. 1980. An ecological study of the marten in the Tahoe National Forest, California. M.S. Thesis, Calif. State Univ., Sacramento, Calif. 187 page. in US Forest Service. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States. General Technical Report RM-254.

Spencer, W.S. , R.H. Barrett & W.J. Zielinski. 1983. Marten Habitat Preferences in the Northern Sierra Nevada. J. Wildl. Manage. 47(4): 19831181-1186

Sydeman, M. G. & R. P. Balda. 1988. Annual Reproductive Yield in the Cooperative Pygmy Nuthatch (*Sitta pygmaea*). Department of Biological Sciences, Northern Arizona University, Flagstaff, AZ. in The Auk 105:70-77 January 1988.

Tomson, S.D., K.R. Foresman, P.E. Zager. Multiple Scale Habitat Selection of American Marten (Martes Americana) in Northern Idaho.

Tucker, P.A., D.L. Davis, R.R. Ream. 1990. Wolves Identification, Documentation, Population Monitoring and Conservation Considerations. 26pp.

U.S.D.I. 2007. Biannual species list for the Idaho Panhandle National Forests. FWS Reference No. 1-9-07-SP-0163 (105.0100).

USDA Forest Service, USDI, BLM. 1997. Appendix K of An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and great Basins. Trees and Logs Important to Wildlife in the Interior Columbia Baisn. PNW-GTR-390. USDA Forest Service.

USDA Forest Service. 1987. Idaho Panhandle National Forest Plan, Northern Region. Missoula, Montana.

USDA Forest Service 2000. Northern Region Snag Management Protocol. Northern Region. Missoula, Montana.

USDA Forest Service. 2004 & 2005. R1 Letter updating Sensitive Species List and amending it in 2005.

USDA Forest Service, USDI, BLM. 1997. Upper Columbia River Basin Draft Environmental Impact Statement.

USDA Forest Service. 1989. Reel, Susan, Lisa Schassberger and William Ruediger. Caring for Our Natural Community: Region 1 - Threatened, Endangered, & Sensitive Species Program. Northern Region. Missoula, Montana.

USDA National Fire Plan Cohesive Strategy Team in Region 1. 2002. Regional Study

USDA. Region 1. November 5, 2003. DRAFT Assessment-Black-backed Woodpecker Picoides arcticus. 3pp.

USDI. U.S. Fish and Wildlife Service. 1987. Northern Rocky Mountain Wolf Recovery Plan. U.S. Fish and Wildlife Service, Denver, Colorado. 119pp.

USFS. Idaho Panhandle National Forests. 1998. Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin. Ecosystem Paper #4. USDA Forest Service.

Van Zyll de Jong, C. G. 1975. The distribution and abundance of wolverine (*Gulo gulo*) in Canada. Canadian Field-Naturalist 89:431-437. in Austin, M. 1998. Wolverine Winter Travel Routes and Response to Transportation Corridors in Kicking Horse Pass Between Yoho and Banff National Parks. MS Project. U of Calgary. 40pp.

Warren, N., tech editor. 1990. Old growth habitats and associated wildlife species in the northern Rocky Mountains. Northern Region Report R1-90-42: U.S. Department of Agriculture, Forest Service. Missoula, Mt. 47 pages.

Warren, N. 1989 editor. Aney, W.C. and B.R. McClelland. Pileated Woodpecker Habitat Relationships. Old Growth Habitats.

Washington Dept. of Wildlife. 1991. Management recommendations for Washington's priority species habitats and species. E. Rodnick and R. Milner, eds. Washington Dept. of Wildlife. 120 page

Whitman, J.S., W.B. Ballard, and C.L. Gardner. 1986. Home range and habitat use by wolverines in southcentral Alaska. Journal of Wildlife Management 50:460-463. in Austin, M. 1998. Wolverine Winter Travel Routes and Response to Transportation Corridors in Kicking Horse Pass Between Yoho and Banff National Parks. MS Project. U of Calgary. 40pp.

Witmer, Gary W., Sandra K. Martin and Rodney D. Saylor. 1998. Forest Carnivore Conservation and Management in the Interior Columbia River Basin: Issues and Environmental Correlates. USDA Forest Service, UDSI, BLM. Gen. Tech. Rpt. PNW-GTR-420.

Witmer, G.W., S.K. Martin, R.D. Sayler. July 1998. Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates. USDA Forest Service. Pacific Northwest Research Station. Portland OR. Gen Tech. Rep. PNW-GTR-420. 43 pp.

3.7. SCENERY

3.7.1. Policy, Direction and Legal Guidance for Scenery

The regulatory framework providing direction for the management of scenic resources primarily come from the following sources:

- *Idaho Panhandle National forest Plan (USDA 1987), as amended*
- *Forest Service Manual (FSM) 2300*
- *Forest Service Handbook (FSH) 2309*

3.7.2. Methodology Used for the Scenery Analysis

Scenery management direction is provided by the Forest Plan (PF Doc. RS-1) and is described in terms of Visual Quality Objectives. The objectives are based on the area seen from sensitive viewpoints such as travel corridors, urban areas where the forest background scenery is important and other features where there may be a high visual sensitivity level. The visual management system was revised in 1995 and is now known as the Scenery Management System. The revised guidelines are provided in "Landscape Aesthetics: A Handbook for Scenery Management," (USDA Forest Service, 1995). Further guidance is provided in Agriculture Handbook Number 462, National Forest Landscape Management, Volume 2" (PF Doc. RS-2)

In this analysis we are only concerned with the landscape that can be observed from viewpoints identified in the Forest Plan. Proposed activities that are blocked by terrain are considered to be in compliance with Visual Quality Standards. Proposed management actions that have concern from a scenic resource standpoint are evaluated for how they conform to naturally occurring features that exist or could be created by natural events.

3.7.3. Existing Scenic Conditions

The Deerfoot Resource Area forms a background to the moderately urbanized areas in the Hayden Lake vicinity. The foreground views when looking up into the Area are highly effected by human development and landscaping. The view is pleasing but not pristine. Most lands within the resource area that can be observed are background views, and reveal no detail due to the distance from viewpoints. Very large openings in forest cover are visible as are hints of road cuts and some old harvest units from the past. A great deal of the terrain in the area is screened from view by interdicting landform. Much of the geography of the area is dominated by three drainages; Yellowbanks Creek, Mokins Creek and the East Fork of Hayden Creek. The east to west orientation of the drainages in relation to Hayden viewpoints masks much of the visible terrain.

The Forest Plan standards for visual quality in the Deerfoot Resource Area are:

- *<u>Partial retention</u>: ground seen from the key points identified in the description below*
- *<u>Modification</u>: standards are applied to land adjacent to grounds classified as partial retention and as lands observed as background.*

The Idaho Panhandle National Forest Plan has designated U.S. Highway 95 as a corridor of scenic concern and the general area of Hayden Lake and the City of Hayden as areas of high visual sensitivity. Portions of the Deerfoot Resource Area are visible as background scenery to the locations generally described above. The lands of the Resource area that are visible from the points of visual sensitivity are to be retained in a *partial retention* Forest Plan visual condition or in a *modification* condition. In the case of partial retention the main concern is for visible lands that form a foreground view from the sensitive viewpoints.

Both the partial retention and modification visual quality objectives allow for land management activities such as those proposed. The key to analysis of the effects to scenery is how proposed land management activities will appear when viewed from points of scenic sensitivity.

3.7.4. Effects to Scenic Conditions

A. Effects under the No-Action Alternative

With no harvest or burning activities there would be no short-term effects to the scenic condition of the area. Old harvest units would continue recover tree growth slowly muting the visual effects of tree lines and unnaturally shaped openings. Small changes such as insect and disease outbreaks would be barely noticeable from the key viewing points. Such changes occur over time and are usually not usually noticed.

Long term, the increasing vulnerability to wildfire of the area may bring change to the scenic conditions. A major (large) wildfire could have drastic effects on the scenery in the Deerfoot Resource Area.

B. Effects under the Proposed-Action Alternative

All of the Deerfoot Resource Area would fall into the modification Visual Quality Objective as all proposed activities fall into the scenic background. Many of the proposed management features proposed have short-term visual effects. Prescribed burning to reduce fuel build-up is an example of management action that rarely has a long term effect on scenic resources.

In the Yellowbanks Creek drainage the proposed action is for a fairly extensive amount of lands to be subject to fuels management by prescribed burning. Burning of this sort is not considered generally as an impact that would have major or long term effects on the scenic integrity of the landscape. Also these units cannot be viewed from the points of visual concern described above. Timber harvest units in the Yellowbanks Creek drainage are not visible from key viewpoints. Units located in an unnamed steam, tributary to O'Rourke Bay, are not visible from key viewpoints. Just north of Yellowbanks Creek, in the Jim Creek drainage, Unit number 57, a 205 acre burn, would also not be visible with the temporary exception of smoke raised during the burn.

North, within the Mokins, Nilsen and Stump Creek drainages are the greatest concentration of harvest units. All or portions of proposed shelterwood units can be seen from the analysis viewpoints. As background shelterwood units will appear as openings in the vegetative cover, individual trees remaining in the units are not usually noticeable at long distance. These units appear as background views for some of the points of visual concern mainly along the south shore of Hayden lake and some residences located on the higher terrain west of the Lake. The Visual Quality standard established for the viewed area is *modification*. Modification standard allows for visual effects of management to visually dominate the landscape features. However, vegetation manipulation must borrow from naturally established lines, form and color at such a scale that the managed lands mimic the surrounding landscape character.

In the case of these units there are surrounding openings on the slopes where the units would be located. Further visual absorption of the created openings is provided by numerous natural and human created openings on privately owned and National Forest lands in the foreground views. Development of the privately owned lands in the middle and foreground viewed areas dominate the landscape to such an extent that the Deerfoot Resource Area created openings appear as natural occurrences in contrast. These units thus conform to the modification visual quality standard. Prescribed burning units will meet visual quality standards by virtue of the fact that they are temporary in effect and are of a scale that blends naturally into the landscape. Burning also mimics natural occurring events.

High up in the Mokins Creek drainage are some shelterwood cutting units that are blocked by terrain from the view points with the exception of about half of Unit 12. This unit is seen at a very long distance from the viewpoints and thus easily blends into the landscape.

C. Cumulative Effects to Scenery

Cumulatively, the collective scenic effects of the past activities and the Proposed-Action Alternative are negligible and will meet the Forest Plan standards established for this area. The reasonably foreseeable activities that will occur in the Deerfoot Resource Area are limited in scope and include bumper tree removal along three open roads, 154 acres of jackpot burning, 16 acres of underburning, and 16 acres of planting. The nature of jackpot burning means that concentrations of fuels on the forest floor are burned, with little fire going into the canopy. It is not expected that this activity would be noticed from background viewing, and will not

add to the cumulative effects of the project. The limited amount of underburning will not contribute to the cumulative effects when viewed from the background.

3.7.5. Consistency with Policies, Laws and Regulations for Scenery

1. Meet adopted visual quality objectives (VQO). Exceptions may occur in unusual situations: these will be identified through the project planning process involving an interdisciplinary team…mitigation measures should be developed for areas when VQO s' are not met.

Both alternatives would be consistent with this standard. The *no action* alternative has no immediate effects on the scenic condition of the area. The proposed action has management that will be noticed from a visual perspective but the effects blend well with the present scenic condition of the area and conform to standards established by the Forest Plan.

2. The area visual resource has been evaluated based on sensitivity levels assigned to travel routes, use areas, and water bodies in and adjacent to the IPNF. Adjustments in VQO boundaries based on project level analysis will conform to principles in FSM 2380 (PF Doc. 3).

The scenery effects analysis for the Deerfoot Resource Area was performed from key viewpoints that include the surface and west shoreline of Hayden Lake; U.S. Highway 95 and home sites to the south and west of Hayden Lake with a view of the area. The proposed project will not require that a visual mitigation plan be prepared. Visual quality remapping of the area will not be required because of the proposal.

3.7.6. References Cited for the Scenery Analysis

PF Doc. RS-1 Idaho Panhandle Forest Plan, August 1988.

PF Doc. RS-2 Agriculture Handbook 462, National Forest Visual Quality Management, Vol. 2

PF Doc. RS-3 Forest Service Manual 2380

3.8. RECREATION

3.8.1. Regulatory Framework and Methodology for Recreation

The regulatory framework providing direction for recreation is provided for in the following sources.

- *Idaho Panhandle National Forest Plan (USDA 1987 as amended).*
- *USDA Forest Service Manual 2300*
- *USDA Forest Service Handbook 2309*

Recreation goals and objectives identified in the Forest Plan (Forest Plan, Chapter II) are to provide for the projected use of developed recreation areas with development of new sites as budget becomes available, to provide for a variety of dispersed recreation opportunities (both motorized and non-motorized), to pursue opportunities to increase and improve the recreation trail system, and to continue to increase cooperative trail programs with organizations, clubs and other public agencies.

Determination of the existing conditions for recreation activities, facilities and opportunities is derived from facility inventories, facility maintenance work, observation by recreation specialists and technical personnel, and contact with recreation user groups and individuals.

Forest Service Planners also make us of the Recreation Opportunity Spectrum (ROS) as a framework for understanding recreation facilities, opportunities and settings to meet visitor needs for a desired set of outdoor recreation experiences.

3.8.2. Existing Recreation Conditions

This area provides a scenic backdrop for Hayden Lake. Little public land lies adjacent to the lake. Mokins Bay Campground occupies a small parcel of National forest lad on the east shore of the lake. It is a 15-unit campground that realizes approximately 4000 visitors per season (May to September). Most use occurs from mid-June to Labor day. The Deerfoot Area lies close to communities, but is affected by lack of public access to it. The entire western boundary lies adjacent to privately owned lands through which there is no public right of way. To the north, Forest road number 206 provides public access to a portion of the area. Forest road 1535 crosses the east side of the area. These are the only public roads in the area. Forest Service Trail number 28 skirts the southern boundary of the area along its route between Nettleton Gulch and Huckleberry Mountain.

Lack of deeded public access at the mouth of Yellowbanks Creek, Jim Creek, and Mokins Creek and roads that do not go to quality recreation settings has limited recreation development in the Deerfoot Area.

While there is only one established recreational trail in the Deerfoot Resource Area, illegal ATV use is becoming more frequent on old closed logging roads, and in some cases creating new routes, causing erosion, stream bank collapse and effects on wildlife habitation.

3.8.3. Effects to Recreation

Effects under the No-Action Alternative: No immediate changes to recreation in the Deerfoot Resource Area would occur with the selection of the No Action Alternative. The public would continue to use roads and trails in the area for recreation as well as the developed campground in Mokins Bay. Unregulated (illegal access) would also continue. A large fire in the area might have short-term effects on trail access and maintenance due to falling timber, with possible erosion of bared soil. The primary long-term effect would be on the scenic qualities of trails.

Effects under the Proposed-Action Alternative: Effects of the proposed action would be to reduce hazardous fuels in the resource area so that in the event of a wildfire, there would be a great chance of it being less severe and intense across the landscape. The proposed action would also construct barriers or reinforce existing barriers to inhibit ATV access on old closed roads or user created trails.

Cumulative Effects: The proposed action of placing effective barriers to illegal off highway vehicles would be to influence these people to use roads and trails designated for such uses. In the vicinity of the Deerfoot area there is an ATV trail, (Trail 28) that could satisfy the desire of people to use all terrain vehicles on National Forest lands. Forest Roads 206 and 1535 within the area are open to such uses in either alternative.

With either alternative there would be no net loss of recreation trail or road miles as there are no approved routes within the area. No other reasonably foreseeable activities would have an influence on recreation in the Resource Area.

3.8.4. Consistency with Policies, Laws and Regulations for Recreation

Forest Plan Standard 1: The Forest will continue to provide a share of recreation opportunities and diversity in relation to other public and private entities: recreation planning will be coordinated with other federal, state local and private managers.

The alternatives for this area have little effect on recreation on the Coeur d'Alene River Ranger District. There are better areas within the District to develop recreation facilities and opportunities. This is supported by the geographical limitations of the area and public user patterns elsewhere in the District.

Forest Plan Standard 7: Provide a broad spectrum of dispersed and developed recreation opportunities in accord with identified needs and demands. Enhance user experience by on and off site interpretation.

It is recognized by public land managers that it is not possible to develop recreation facilities in every resource area. In the case of Deerfoot public demands and needs for outdoor recreation opportunities in a diversity of setting can be better met elsewhere.

3.9. ECONOMIC ANALYSIS

3.9.1. Plans, Policy and Legal Guidance Related to Finances

The management of the Idaho Panhandle National Forest (IPNF) has the potential to affect local economies. People are an important part of the ecosystem. Use of resources and recreational visitation to the Forest generate employment and income in the surrounding communities and counties and generate revenues that are returned to the federal treasury.

This section presents concepts used to delineate an affected area and methods used to analyze the economic effects of the project, including the project feasibility, financial efficiency, and economic impacts.

NEPA requires that consequences to the human environment be analyzed and disclosed, based on issues. NEPA does not require a monetary benefit-cost analysis. If an agency prepares an economic efficiency analysis, then one must be prepared and displayed for all alternatives [40 CFR 1502.23]. The preparation of NEPA documents is also guided by CEQ regulations for implementing NEPA [40 CFR 1500-1508].

The development of timber sale programs and individual timber sales is guided by agency direction found in Forest Service Manual (FSM) 2430. Forest Service Handbook (FSH) 2409.18 (PF Doc. FIN-12) guides the financial and, if applicable, economic efficiency analysis for timber sale. The level of timber harvest is important not only in providing jobs in the timber industry, but also through indirect and induced impacts on other business sectors as well (Forest Plan, page IV-47). One of the seven major issues for the Forest Plan was community stability (Forest Plan, pages 1-8).

3.9.2. Methodology Used in the Financial Analysis

Project salability is dependent on the different revenues and costs associated with timber sale activities under the proposed action alternative. To arrive at the expected values of the timber sale, a computer program was used to determine the potential stumpage (i.e. gross bid values) of timber harvested. The program runs a regression equation called the Transactions Evidence (TE) appraisal model (PF Doc. FIN-R1), used for appraising actual timber sales. The TE appraisal method predicts the value of timber (referred to as stumpage) through the use of several independent variables developed from recent similar sales within Region 1 of the Forest Service. (The sale information comes from similar sale conditions found in 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.

The TE appraisal model equation is updated every six months with the latest information from sales that have been sold in the northern Idaho and western Montana area. In a stable market, the equation is a reliable predictor of whether the timber sale is economically viable. In a changing market, the equation is six months behind, and may reflect lower or higher stumpage than is likely. The model is also limited to those activities associated with the timber sale, and does not consider costs associated with other activities such as ecosystem burning.

Three-year average District costs were used for costs associated with fuel reduction, site preparation, planting, road construction, maintenance and erosion control. (See project file, Finances, PF Doc. FIN-1 through Fin-6 for all unit information, logging systems and costs.) These direct costs are deducted from the expected stumpage value to arrive at the minimum bid necessary for the timber sale.

Financial efficiency considers anticipated costs and revenues that are part of Forest Service monetary transactions. The financial efficiency of a timber sale is considered separate from other costs associated with NEPA analysis, sale preparation, sale administration and activities outside of the timber sale.

An economic efficiency analysis is not required (FSH 2409.18, 30 PF Doc, Fin-12), and would only be included in this analysis if it was a public issue and there are predicted changes to quantifiable non-market benefits or costs from the project. Many of the costs and benefits associated with a project are not quantifiable. For example, the benefit to wildlife from habitat improvement or the cost associated with the degradation of visual quality from a project is not quantifiable. These costs and benefits may be described qualitatively, in the individual resource sections of this document. NEPA regulations 40 CFR 1502.23

indicates "For 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." Management of the forest is expected to yield positive benefits, but not necessarily financial benefits.

3.9.3. Affected Environment

The combination of small towns and rural settings, larger towns such as Coeur d'Alene, Idaho, and the urban area of Spokane, Washington create a diverse social environment for the geographical region around the Idaho Panhandle National Forest. Local residents pursue a wide variety of life-styles, but many share a common theme, an orientation to the outdoors and natural resources, especially within the smaller communities. This is evident in both vocational and recreational pursuits including employment in logging and milling operations, outfitter and guide businesses, hiking, hunting, fishing, camping and many other recreational activities.

Timber, tourism and agricultural industries are important to the economy of local areas. Despite the common concern for, and dependence on, natural resources within the local communities, social attitudes vary widely with respect to their management. Local residents hold a broad spectrum of perspectives and preferences ranging from complete preservation to maximum development and utilization of natural resources.

A comprehensive socio-economic analysis and social assessment was completed during the revision of the forest plan. See the social and economics section of Chapter 2 of the Analysis of the Management Situation for the revised Forest Plan (PF Doc. FIN-R3) and the Social Assessment for the Idaho Panhandle National Forests (Parker et al, 2002, PF Doc. FIN-R4) for a description of the employment, income and social composition of the counties comprising the analysis area and the impact on each county from management of the IPNF. These assessments indicate the counties within the analysis area are affected by timber management on the forest.

No disproportionate impacts to minority or low-income populations were identified during scoping or during any other portion of public involvement over the course of this analysis.

3.9.4. Financial Consequences

A. Direct and Indirect Effects to Finances

No Action Alternative Under the No-Action Alternative, there would be no timber harvest, road construction, site preparation or planting, blocking of unauthorized ORV trails, or natural fuels underburned. There would be no monetary costs or revenues associated with this alternative outside of preparation of the NEPA document. There would be no benefit to the local economy from logging and timber flow into local mills.

As stated in Chapter 3 Fire/Fuels, a lack of fuel-reduction activities under the No Action Alternative would heighten fire hazards to forest homes as people continue to develop and settle lands along the urban-wildland interface. The loss of homes and human life can escalate as the surrounding forest advances in succession because of the buildup of canopy and surface fuels. Moreover, multi-layered canopies and dense crowns will increase the chance of crown fires that are difficult to control. This would increase the cost of fighting to control the fires, as well as the cost to homeowners if property is lost.

The No-Action alternative also allows a greater possibility that severe wildfire would threaten environmental values such as forest cover, wildlife habitat, soil productivity, water quality, and visual quality.

Proposed Action Alternative: Table 3-FIN-1 provides a summary of the financial appraisal based on the Proposed-Action Alternative. The predicted high bid uses the stumpage value of timber removed (based on size, species and volume, planned yarding methods such as helicopter, skyline, tractor, and hauling distance), then deducts the contractual costs (fuel treatment, road costs, erosion control) from the value of the timber. The minimum bid is then determined by adding the cost of stand regeneration as well as the roll-back factor used to adjust the TE equation to better reflect current bid prices. As shown in Table 3-FIN-1, under the

current indices the minimum bid must be raised to cover the costs of regeneration and the roll-back factor. (The roll-back factor lowers the predicted bid by the standard error calculated by the regression equation.)

Table 3-FIN-1. Predicted high bids, value and timber volume.

	No Action	Proposed Action
Total estimated CCF	$0	7,121
Predicted High Bid ($/CCF)	$0	$7.85
Advertised rate after roll back	$0	$-22.36
Minimum Bid	$0	$76.06
Minimum advertised value	$0	$541,620

Table 3-FIN-2. Projects Funded by Other than a Timber Sale

Projects	No Action	Proposed Action
Ecosystem burning	$0	$188,550
Blocking unauthorized ORV trails	$0	$21,792
Culvert upgrade and relief culvert	$0	$5,500

Costs associated with the ecosystem burning is estimated at $150/acre (helicopter). These dollars may not be tied to the timber sale, but would use appropriated hazardous fuels reduction dollars that are available to the District every year.

The funding for blocking the unauthorized ORV trails would come from appropriated dollars that are prioritized at the District level as they become available (Table 3-FIN-2). The culvert upgrade and relief culvert placement would be completed with watershed dollars that are available to the district every year.

B. Cumulative Effects to Finances

Many factors influence and affect the local economies, including changes to industry technologies, economic growth, international trade, and the economic diversity and dependency of the counties. Past, ongoing and reasonably foreseeable activities on National Forest System and other lands within the project area (EA, Appendix C) would have a limited effect on the economics issues under either alternative.

The cumulative effects of the No Action Alternative would mean a continued decline in federal timber being offered to local mill. This would contribute to the continued reduction in infrastructure of the timber industry at the local level. The Secure Rural Schools and Self Determination Act ("Craig-Wyden Act") that contributed money to the counties for roads and schools has ended, meaning the counties will now rely on the 25 percent return of gross receipts from Forest Service revenues. No Action means there are no revenues coming in and therefore no support to the counties.

The jobs and income associated with the Proposed-Action Alternative may bring the local economy some increased relative stability during the life of the project. It would contribute to the gross receipts to the counties as well.

3.9.5. Consistency with Policy, Direct and Legal Guidance for Finances

Forest-wide goals, objectives and standards for finances are not specifically addressed in the 1987 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 Proposed Action Alternative would meet this direction.

ACRONYMS/GLOSSARY

Acronyms

ATV	All-terrain vehicle
BA	Basal Area
BACT	Best Available Control Technology
BEHAVE	Fire Behavior Model
BF	Board foot*
BLM	Bureau of Land Management
BMP	Best Management Practices*
C	Cedar
CCF	Cunit (hundred cubic feet)*
CDA	Coeur d'Alene
CFR	Code of Federal Regulations*
CNF	Colville National Forest
cfsm	Cubic feet per second per square mile (referring to water flow)
COR	Contractor's Officer Representative
dbh	Diameter at breast height
DEIS	Draft Environmental Impact Statement
DEQ	Department of Environmental Quality
DF	Douglas-fir
EAWS	Environmental Assessment at the Watershed Scale
ECA	Equivalent Clearcut Acres
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FACTS	Forest Service Activity Tracking System*
FAR	Functioning at risk (referring to watersheds)
FEIS	Final Environmental Impact Statement
FFE	Fire and Fuels Extension
FIA	Forest Inventory and Analysis
FOFEM	First Order Fire Effects Model
FPA	Forest Practices Act
FSH	Forest Service Handbook
FSM	Forest Service Manual
FSVeg	Field Sampled Vegetation Database*
FVS	Forest Vegetation Simulator
GA	Geographic Assessment
GAO	Government Accounting Office
GF	Grand fir
ICBEMP	Interior Columbia Basin Ecosystem Management Project
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
IDT	Interdisciplinary Team*
IFPA	Idaho Forest Practices Act
IFTNP	Intermountain Forest Tree Nutrition Cooperative
INFS	Inland Native Fish Strategy
IPNF	Idaho Panhandle National Forests
KV	Knutson-Vandenburg Act of 1924
LP	Lodgepole pine
MA	Management Area*
MBF	Thousand Board Foot
MMBF	Million Board Foot
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act*
NFMA	National Forest Management Act
NFS	National Forest System
NPFC	Not properly functioning (watershed) condition
PFC	Properly functioning (watershed) condition
PM	Particulate Matter
PP	Ponderosa pine
PWC	Public works contract
Q2	level of instantaneous discharge expected to occur on average of every 2 years (referring to watershed conditions)
Q50	level of instantaneous discharge expected to occur on average of every 50 years (referring to watershed conditions)
Q100	level of instantaneous discharge expected to occur on average of every 100 years (referring to watershed conditions)
R1	Region 1--the Northern Region of the Forest Service
R6	Region 6--the Pacific Northwest Region of the Forest Service
RD	Ranger District
RHCA	Riparian Habitat Conservation Area*
RMO	Riparian Management Objective
ROD	Record of Decision
RPA	(Forest and Rangeland) Renewable Resources Planning Act
SAF	Subalpine fir
SAM	Sale area map
SCA	Stream Channel Alteration (Act)
SMU	Streamside Management Unit
SMZ	Streamside management Zone*
SPCC	Spill Prevention Control and Countermeasure
SPS	Special project specifications
SWCP	Soil and Water Conservation Practices
TES	Threatened, Endangered and Sensitive
TMDL	Total Maximum Daily Load
TML	Timber Marginal Lands
TSA	Timber Sale Administrator
TSC	Timber Sale Contract
TSI	Timber Stand Inventory
TSMRS	Timber Stand Management Record System*
TSP	Total Suspended Particulate
USFWL	U.S. Fish & Wildlife Service
WBP	White-bark pine
WDNR	Washington State Department of Natural Resources
WH	Western hemlock
WL	Western larch
WP	White pine
WQLS	Water Quality Limited Stream
WRC	Western redcedar
WSDFW	Washington State Department of Fish and Wildlife
WSDOE	Washington State Department of Ecology

**** These terms are defined in the Glossary below.***

Glossary

A

Activity. A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives.

Activity Fuels. The residue left on the ground after human-caused disturbances.

Adfluvial – Pertaining to fishes where adults from lake environments (i.e. Coeur d'Alene Lake) migrate up rivers and/or streams to spawn. When fry emerge they may reside in these nursery rivers or streams for a period of 1-6 years until migrating downstream to rear in the connected lake environment until capable of spawning as an adult.

Aesthetics. Generally, the study, science, or philosophy dealing with beauty and with judgments concerning beauty. In scenery management, it describes landscapes that give visual and sensory pleasure.

Affected Environment. The natural, physical, and human-related environment that exists at the time of the analysis.

Age Class (Scenery/Visual definition). An age grouping of trees according to an interval of years, usually 20 years. A single age class would have trees that are within 20 years of the same age, such as 1 - 20 years or 21 - 40 years.

Air Quality. Refers to standards for various classes of land as designated by the Clean Air Act, P.L. 88-206: Jan. 1978

Airshed. A geographical area that, because of topography, meteorology, and climate, shares the same air.

Alluvial. Materials transported and deposited by water.

Anthropogenic – Caused or produced by humans.

Aquatic – Pertaining to water.

Area Transportation Plan. A plan that identifies the transportation facilities needed to manage the lands and resources for a given area.

Armoring. Protective coverings or structures used to displace the erosive force of water. Rip-rapping is a type of armoring.

Aspect. The direction a slope faces. For example, a hillside facing east has an eastern aspect.

B

Background (Visual Distance Zone). That part of a scene, landscape, etc., which is furthest from the viewer; The distant part of a landscape. The IPNF defines background as the landscape area located from three miles to infinity from the observer. The Newport Ranger District defines background as the landscape area located from 4 miles to infinity from the viewer.

Basal Area. In forests, the cross-sectional area of a tree trunk measured at breast height (4.5 feet), usually expressed in square feet per acre.

Baseline Data. Data representative of a particular base period or concurrent control sample. Normally representative of the undisturbed, undeveloped state.

Basin (river) –In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems.

Bedload – Sediment moving in or near a streambed.

Beneficial Uses – The many various uses that may be made of water including, but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics. The beneficial use depends on actual use, the ability of the water to support a non-existing use either now or in the future, and its likelihood of being used in a given manner. The use of water for the purpose of wastewater dilution or as a receiving water for a waste treatment facility effluent is not considered a beneficial use.

Best Management Practices (BMPs) – Practices determined by the State of Idaho to be the most effective and practicable means of preventing or reducing erosion, and water pollution to meet water quality goals.

Big Game. Those species of large mammals normally managed as a sport-hunting resource.

Biological Diversity (biodiversity) – The variety and variability among living organisms and the ecological complexes in which they occur.

Biomass. Total weight or quantity of organic material on a given area over a defined period.

Biophysical Setting. Areas with similar vegetation characteristics, fire frequencies, moisture regimes and geological and topographical characterizes.

Board Foot (BF). A unit of measurement equal to an unfinished board one foot square by one inch thick.

Broadcast Burn. Allowing a controlled fire to burn over a designated area within well-defined boundaries for reduction of fuel hazard, as a silvicultural treatment, or both.

C

Canopy. In a forest, the branches from the uppermost layer of trees; on rangeland, the vertical projection downward of the aerial portion of vegetation.

Canopy Closure. The amount of ground surface shaded by tree canopies, as seen from above. Used to describe how open or dense a stand of trees is, often expressed in percent.

Canopy Cover. The amount of ground surface shaded by tree canopies as seen from above. Used to describe how open or dense a stand of trees is, often expressed in ten percent increments.

Capability. The potential of an area of land and/or water to produce resources, supply goods and services, and allow resource uses under a specified set of management practices and at a given level of management intensity. Capability depends on current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices, such as silviculture or protection from fires, insects, and disease.

Capable Habitat. Wildlife habitat that has the fixed attributes that enable it to produce the habitat requirements for a given species currently or in the future. These fixed attributes are usually soils (or parent material, or landtype), slope, aspect, elevation, and habitat type. The vegetation on the site may not be currently suitable for a given species because of variable stand attributes such as inappropriate seral stage, cover type or stand density. See also Suitable Habitat.

Cavity Habitat. Snags, broken-topped live trees and down logs used by wildlife species that excavate and/or occupy cavities in these trees.

Channel (stream) – A stream or riverbed through which the main current of water flows.

Characteristic. When used in terms of scenery or visuals, this refers to the qualities that constitute a character, that characterize a landscape; a distinguishing trait, feature, or quality; uniqueness; or attribute.

Classified Road – A road wholly or partially within or next to National Forest lands determined to be needed for long-term motor vehicle access.

Clearcut Harvest. An even aged regeneration harvest method that removes all merchantable trees in a single cutting except for wildlife trees or snags.

Climate – The composite or generally prevailing weather conditions of a region throughout the year, averaged over a series of years.

Climax Vegetation. The culminating stage in plant succession for a given habitat, that develops and perpetuates itself in the absence of disturbance, natural or otherwise (in temperate ecosystems this rarely occupies large portions of the natural landscape because of the frequency of natural disturbances).

Coarse Woody Debris (CWD). Pieces of woody material having a diameter of at least three inches and a length greater than three feet (also referred to as Large Woody Debris, or LWD).

Code of Federal Regulations (CFR). The listing of various regulations pertaining to management and administration of the National Forests.

Color. The property of reflecting light of a particular wavelength that enables the eye to differentiate otherwise indistinguishable objects. A hue (red, green, blue, yellow, and so on), as contrasted with a value (black, white, or gray).

Commodity. Commercial item that can be bought, sold, and transported, such as mineral, agricultural, timber or other forest products.

Compaction. Making soil hard and dense, decreasing its ability to support vegetation because the soil can hold less water and air and because roots have trouble penetrating the soil.

Competition – An interaction that occurs when two or more individuals make demands on the same resources that are in short supply.

Component. A part of a system.

Composition (species). The mix of difference species that make up a plant or animal community, and their relative abundance.

Conifer. Any of a group of needle and cone-bearing evergreen trees.

Connectivity. The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. The opposite of fragmentation.

Contract Provisions. Controls constraints, and/or general direction included in Contracts offered by the Forest Service.

Contrast. A term used in regard to scenery or visuals, referring to the diversity or distinction of adjacent parts, or the effect of striking differences in form, line, color, or texture of a landscape.

Contour map feature. A term used in regard to scenery or visuals, referring to a line drawn on a map that connects points of the same elevation.

Corridor (landscape). Landscape elements that connect similar patches of habitat through an area with different characteristics. For example, streamside vegetation may create a corridor of willows and hardwoods between meadows or through a forest.

Council on Environmental Quality (CEQ). An advisory council to the President, established by NEPA. It reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Cover – (1) Trees, shrubs, rocks, or other landscape features that allow an animal to partly or fully conceal itself. (2) The area of ground covered by plants of one or more species.

Cover/Forage Ratio. The ratio, in percent, of the amount of area in cover conditions to that in forage conditions.

Cover Type – A vegetation classification depicting a genus, species, group of species, or life form of tree, shrub, grass, or sedge. The present vegetation of an area.

Created Opening. A term used in regard to scenery or visuals, referring to an opening in the forest cover created by the application of even-aged silvicultural practices.

Cross Drain/Ditch. A man made ditch or channel constructed to intercept surface water runoff and divert it before the runoff concentrates to erosive volumes and velocities.

Crown. The part of a tree containing live foliage; treetops.

Crown Fire. A forest fire that burns in the crowns of trees.

Crowning. Forming a convex road surface that allows runoff to drain from the running surface to both sides of the road prism.

Cultural or Heritage Resources. The physical remains of human activity (artifacts, ruins, burial mounds, pertroglyphs, etc.) having scientific, prehistoric, or social values.

Cultural Landscape. A term used in regard to scenery or visuals, referring to human-altered landscapes, especially those slowly evolving landscapes with scenic vegetation patterns or scenic structures. Addition of these elements creates a visually pleasing complement to the natural character of a landscape.

Cumulative Effect. The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or nonFederal) or person undertakes such other actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time. ***In this EA, potential cumulative effects include those that were assessed for all ownerships, including lands administered by other federal entities and non-federal lands, especially regarding terrestrial and aquatic species.***

Cunit (CCF). One hundred cubic feet. A measurement for timber volume.

D

Data – Facts used in analysis.

Debris (organic) – Logs, trees, limbs, branches, leaves, bark, etc., that accumulate, often in streams or riparian areas.

Decay (decomposition) – The breakdown of organic matter, usually as a result of bacterial or fungal actions.

Decommission (roads) – Activities that result in the stabilization and restoration of unneeded roads to a more natural state. May include removal of all stream crossings and full recontour of the entire road prism, introduction of woody debris, and revegetation as needed. Fully decommissioned roads would be removed from the transportation system.

Degradation – (1) General lowering of the earth's surface by erosion or moving of materials from one place to another. (2) Reduction in value or quality.

Degrade (habitats) – Measurably change a feature at a defined scale in a way that: further reduces habitat quality, where existing conditions meet or are worse than the objective; reduces habitat quality, where existing conditions are better than the objective.

Density (fish) – The number of fish inhabiting a given area, usually expressed in terms of numbers per one hundred meters squared (i.e. #/100m^2).

Density (stand). The number of trees growing in a given area, usually expressed in terms of trees per acre.

Desired Landscape Character. A term used in regard to scenery or visuals, referring to the appearance of the landscape to be retained or created over time, recognizing that a landscape is a dynamic and constantly changing community of plants and animals. Combination of landscape design attributes and opportunities, as well as biological opportunities and constraints.

Developed Recreation. Recreation dependent on facilities provided to enhance recreation opportunities in concentrated use areas. Examples are ski areas, resorts and campgrounds.

Direct Effects – Impacts on the environment that are caused by the action and occur at the same time and place.

Dispersed Recreation. Recreation that occurs outside of developed recreation sites; requiring few, if any, facilities or other improvements. Includes such activities as hunting, hiking, viewing scenery and cross-country skiing.

Distance Zones. Landscape areas denoted by specified distances from the observer. Used as a frame of reference in which to discuss landscape attributes or the scenic effect of human activities in a landscape (Immediate Foreground, Foreground, Middleground, and Background).

Distinctive. Refers to extraordinary and special landscapes. These landscapes are attractive, and they stand out from common landscapes.

Disturbance – Refers to events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, and insects and diseases. Human-caused disturbances include, among others, actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species.

Diurnal – Daily.

Dominance Elements. In scenery management, the dominance elements are form, line, color, and texture. They are the attributes that make up the landscape character.

Dominant. A group of plants that by their collective size, mass, or number exert a primary influence on other ecosystem components.

Dominant Human Alterations. In scenery management, dominant human alterations override the natural character of the landscape and are very noticeable.

Down or Downed Wood. A tree or part of a tree that is dead or dying and is laying on the ground.

E

Ecological integrity. In general, ecological integrity refers to the degree to which the elements of biodiversity and the functions that link them together and sustain the entire system are complete and capable of performing desired functions; the quality of being complete; a sense of wholeness. Absolute measures of integrity do not exist. Proxies provide useful measures to estimate the integrity of major ecosystem components (forestland, rangeland, aquatic, and hydrologic). Estimating these integrity components in a relative sense across the project area helps to explain current conditions and to prioritize future management. Thus, areas of high integrity would represent areas where ecological functions and processes are better represented and functioning than areas rated as low integrity.

Ecological Processes. The flow and cycling of energy, materials, and organisms in an ecosystem.

Ecology. The science of the interrelationships between organisms and their environment; from the Greek *Oikos* meaning "house" or "place to live."

Ecosystem. A complete, interacting system of organisms and the land and water that make up their environment; the home places of all living things, including humans.

Ecosystem Health. A condition where the parts and functions of an ecosystem are sustained over time and where the system's capacity for self-repair is maintained, such that goals for uses, values, and services of the ecosystem are met.

Ecosystem/Wildlife Burning. This is the application of prescribed fire to fire-dependent ecosystems in order to meet multi-resource objectives (for example, to improve forage habitat for wildlife).

Edge. The line where an object or area begins or ends. Edge serves to define borders, limits or boundaries. In this analysis, edge often refers to where plant communities meet or where successional stage or vegetation conditions within the plant community come together.

Effects (or impacts). Environmental consequences (the scientific and analytical basis for comparison of alternatives) as a result of a proposed action. Effects may be either direct, which are caused by the action and occur at the same time and place; indirect, which are caused by the action and are later in time or farther removed in distance; but are still reasonably foreseeable, or cumulative.

Endangered Species. Any plant or animal species which is in danger of extinction throughout all or a significant portion of its range. (Endangered Species Act of 1973).

Endemic. The population of plants, animals, or diseases that are at their normal, balanced level, in contrast to epidemic.

Endemic Species. Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality. "Endemism" is the occurrence of endemic species in an area.

Environment – The combination of external physical, biological, social, and cultural conditions affecting the growth and development of organisms and the nature of an individual or community.

Ephemeral Streams. Streams that flow only as a direct response to rainfall or snowmelt events. They have no baseflow.

Epidemic. The rapid spread, growth, or development of pathogen or insect populations that affect large numbers of a host population throughout an area at the same time.

Erosion – The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities; can be accelerated or intensified by human activities that reduce the stability of slopes or soils.

Even-aged System. A silvicultural system that produces stands in which all trees are about the same age; that is, the difference in age between trees forming the main canopy level will usually not exceed 20 percent of the rotation.

Even-aged Stands. Stands of trees of approximately the same age. Silvicultural methods that generate even-aged stands include clearcutting, shelterwood, and seed tree.

Evident. That which is noticeable, apparent, conspicuous, or obvious.

Existing Scenic Integrity. Current state of the landscape, considering previous human alterations; existing visual condition.

Exotic. A plant or animal species introduced from a distant place; not native to the area (e.g. eastern brook trout).

Expected Image. A term used in regard to scenery or visuals, referring to a mental picture of what a person expects to see in a national forest.

F

FACTS (Forest Service Activity Tracking System). An activity tracking system for all levels of the Forest Service. It supports timber sales in conjunction with contracts and permits, tracks and monitors NEPA decisions; tracks KV trust-fund plans at the timber sale level; and generates National, Regional, Forest and/or District reports. The tracking functions of the Timber Stand Management Record System (see TSMRS in this glossary) have been incorporated into FACTS.

Feature. A visually distinct or outstanding part, quality, or characteristic of a landscape.

Fines (sediment). Sediment particles smaller than 0.2 inch. Excessive fines can trap newly hatched fish and decrease the amount of water percolating through spawning gravels.

Fire Regime. The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire.

Floodplain – The portion of river valley or level lowland next to streams that is covered with water when the river or stream overflows its banks.

Fluvial – Pertaining to fishes where adults from large river environments (i.e. Kootenai River) migrate upstream to smaller river tributaries to spawn. When fry emerge they may reside in these nursery streams for a period of 1-6 years until they migrate downstream to spend adulthood in the connected large river environment until capable of spawning as an adult.

Forage. Vegetation used for food by wildlife, particularly big game wildlife and domestic livestock.

Forage Areas. Vegetated areas with less than 60 percent combined canopy closure of tree and tall shrubs (greater than seven feet in height).

Foreground (Visual Distance Zone). That part of a scene, landscape, etc., which is nearest to the viewer, and in which detail is evident. The IPNF defines foreground as the landscape area located from one-quarter to one-half mile from the observer. The Newport Ranger District defines foreground as the landscape area located from the observer to one-half mile away.

Forest Cover Type. A category of forest described by the dominant tree species present in a stand (either by basal area dominance in stands older than seedlings or by trees per acre in seedling stands).

Forest Health – The condition in which forest ecosystems sustain their complexity, diversity, resiliency, and productivity to provide for specified human needs and values. It is a useful way to communicate about the current condition of the forest especially with regard to resiliency, a part of forest health that describes the ability of the ecosystem to respond to disturbances. Forest health and resiliency can be described, in part, by species composition, density, and structure.

Form. Structure, mass, or shape of a landscape or of an object. Landscape form is often defined by edges or outlines of landforms, rockforms, vegetation patterns, or waterforms, or the enclosed spaces created by these attributes.

Fragmentation (habitat) – The break-up of a large land area (such as a forest) into smaller patches isolated by a different land type and lacking corridors of appropriate vegetation to allow organisms and ecological processes to move across the landscape. The opposite of connectivity.

Fry – A recently hatched fish, after the yolk sac has been absorbed.

Frame of Reference. An area or framework against which various parts can be judged or measured.

FSVEG (Field Sampled Vegetation). A computerized database used to store detailed stand examination data, including plants, land cover, soils, and fuels information, and create comprehensive reports based on that data. This database replaced R1Edit database system (see R1Edit in this glossary).

Fuel (fire). Combustible materials present in the forest (dry dead parts of trees, shrubs and other vegetation) which contribute to the intensity of a fire.

Fuel ladder. Vegetative structures or conditions such as low-growing tree branches, shrubs, and other vegetation that can burn readily.

Fuel load. The dry weight of combustible materials per unit area; usually expressed as tons per acre.

Fuelbreak. A strategically-located strip or block of land where the fuel is modified to reduce fire intensity potential. Fuelbreaks are designed to interrupt the continuity of heavy, hazardous fuel so fires burning to them can be readily controlled. They are pre-attack installations that provide safer, easier, and faster control efforts for fighting fire. Generally, this treatment provides holding area and accessibility for fire-suppression forces and reduces potential fire damage to adjacent resources.

Fuels Management. Manipulation or reduction of fuels to meet Forest protection and management objectives while preserving and enhancing environmental quality.

G

Game Species – Wild animals that people hunt or fish for food or recreation according to prescribed seasons and limits.

Geographic Information System (GIS). An information processing technology to input, store, analyze and display data; a system of computer maps with corresponding site-specific information that can be combined electronically to provide reports and maps.

Gradient. A rate of vertical elevation change per unit of horizontal distance; also called slope.

Group Selection Cutting. An uneven-aged cutting method in which small groups of trees, usually no more that 2 acres in size, are removed to meet a predetermined goal of size distribution and species in the remaining stands.

H

Habitat – A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community or population of plants or animals.

Habitat Guild – An artificial assemblage of rare plants that have similar habitat requirements. Rare plant habitat guilds occurring in the IPNF include aquatic, peatland, deciduous riparian, wet forest, moist forest, dry forest, subalpine and cold forest.

Habitat Type – A group of plant communities having similar habitat relationships.

Hardwoods. A conventional term for broadleaf trees.

Harvest. (1) Felling and removal of trees from the forest. (2) Removal of game animals or fish from a population, typically by hunting or fishing.

Hazardous Substance. Materials which by their nature are toxic or dangerous to handle or dispose of, such as radioactive materials, petroleum products, pesticides, chemicals and biological wastes.

Headwaters – Beginning of a watershed; unbranched tributaries of a stream.

Healthy Landscape Systems. Those landscapes whose processes are in balance. The balance is dynamic; humans have the opportunity to work with changing landscape conditions to receive a predictable and reliable flow of both commodities and amenities. Healthy landscape systems show resiliency and have predictable responses to disturbance while providing human values. Key ecological systems that interact in dynamic balance include: human, hydrologic-land, carbon-nutrient, food web, and evolutionary systems.

Heterogeneous – Irregular, dissimilar; not uniform throughout.

Hiding Cover. Vegetation capable of hiding 90 percent of a standing adult deer or elk at 200 feet or less. Includes some shrub stands and all forested stand conditions with adequate tree stem density or shrub layer to hide animals. In some cases, topographic features also can provide hiding cover.

High Integrity Area. Those areas within the drainage which are functioning the best in terms of providing security, late successional forests, current carnivore sightings, and key habitats. See also Secondary Integrity Area.

High Scenic Integrity Level. A scenic integrity level meaning human activities are not visually evident. In high scenic integrity areas, activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.

Historical Range of Variability (HRV) – The natural fluctuation of ecological and physical processes and functions that would have occurred during a specified period of time. In this EA, refers to the range of conditions that are likely to have occurred prior to settlement of the project area by Euro Americans (approximately the mid-1800s), which would have varied within certain limits over time. HRV is discussed in this document only as a reference point, to establish a baseline set of conditions for which sufficient scientific or historical information is available to enable a comparison to current conditions.

Homogeneous – Regular, similar; uniform throughout.

Human Impact or Influence. A term used in regard to scenery or visuals, referring to a disturbance or change in ecosystem composition, structure, or function caused by humans.

Hydrologic – Refers to the properties, distribution, and effects of water. "Hydrology" refers to the broad science of the waters of the earth-their occurrence, circulation, distribution, and physical properties, and their reaction with the environment.

Hydrologic Unit Code (HUC) – A hierarchical coding system developed by the U.S. Geological Survey to identify geographic boundaries of watersheds of various sizes.

I

Immediate Foreground (Visual Distance Zone). That part of the foreground which is extremely critical for visual detail. The IPNF defines immediate foreground as the landscape area located usually within 400 feet of the observer. The Newport Ranger District defines immediate foreground as the landscape area within the first few hundred feet of the observer, usually within 300 feet of the observer. Distance zones are normally used in project-level planning rather than broad-scale planning.

Implement – To carry out; put into action.

Improvement Cutting. The removal of less desirable trees of any species in a stand of poles or larger trees, primarily to improve composition and quality.

In-Service. Pertains to activities, actions or personnel within the USDA Forest Service.

Indicator Species – A species that is presumed to be sensitive to habitat changes; population changes of indicator species are believed to best indicate the effects of land management activities.

Indirect Effects – Impacts on the environment that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable.

Individual Tree Selection Harvest. A cutting method to develop and maintain uneven-aged stands by the removal of selected trees from specified age classes over the entire stand area in order to meet a predetermined goal of age distribution and species in the remaining stand.

INFS – Inland Native Fish Strategy for the Intermountain, Northern and Pacific Northwest Regions (1995; Forest Service).

Instream (flow). Flow of water in its natural setting (as opposed to waters diverted for "offstream" uses such as industry or agriculture. Instream flow levels provided for environmental reasons enhance or maintain the habitat for riparian and aquatic life, with timing and quantities of flow characteristic of the natural setting.

Intactness. A term used in regard to scenery or visuals, referring to something untouched or unaltered, especially by anything that harms or diminishes its character.

Interdisciplinary Approach. Use of one or more individuals representing areas of knowledge and skills focusing on the same task, problem, or subject. Team member interaction provides needed insight to all stages of the process.

Interdisciplinary Team (IDT). A group of two or more individuals, with different training or skills, assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. The members of the team proceed to solution with frequent interaction, so that each discipline may provide insights to any stage of the problem and disciplines may combine to provide new solutions. This is different form a multidisciplinary team, where each specialist is assigned a portion of the problem and their partial solutions are linked together at the end to provide the final solution. The forming of the team, the data collection and analysis, team discussions, interactive evaluation, and joint resolution of the problem in the Interdisciplinary Process.

Intermediate Harvest. Any removal of trees from a stand between the time of its formation and the regeneration cut. Most commonly applied intermediate cuttings are release, thinning, improvement, and salvage.

Intermittent Stream. A stream that flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow.

Irretrievable. Applies to losses of production, harvest, or a commitment of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports (recreation) site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible. Applies primarily to the use of nonrenewable resources, such as minerals, or cultural resources, or to those factors that are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.

Issue. A point, matter, or question of public discussion or interest, to be addressed or resolved through the planning process.

Issue Indicator. A specific, measurable element that expresses some feature or attribute relative to an issue.

J

Jackpot Burning. A modified method of broadcast burning used primarily to burn concentrations of fuels where the fuelbed is not continuous.

L

Land Allocation. The assignment of a management emphasis to particular land areas with the purpose of achieving goals and objectives. Land allocation decisions are documented in environmental analysis documents, such as the Forest Plan for the Idaho Panhandle National Forests.

Landform. One of the attributes or features that make up the Earth's surface, such as a plain, mountain, or valley.

Landscape. All the natural features such as grasslands, hills, forest, and water, which distinguish one part of the earth's surface from another part; usually that portion of land which the eye can comprehend in a single view, including all its natural characteristics.

Landscape Character. Particular attributes, qualities, and traits of a landscape that make it identifiable or unique.

Landscape Character Goal. A management prescription designed to maintain or modify the existing landscape character to a desired future state. (See Desired Landscape Character.)

Landscape Composition. The types of stands or patches present across a given area of land.

Landscape Ecology. The study of the ecological effects of spatial patterns in ecosystems.

Landscape Setting. The context and environment in which a landscape is set; a landscape backdrop.

Landscape Structure. The mix and distribution of stand or patch sizes across a given area of land. Patch sizes, shapes, and distributions are a reflection of the major disturbance regimes operating on the landscape.

Landscape Visibility. Accessibility of the landscape to viewers, referring to one's ability to see and perceive landscapes.

Landtype. A unit of land with similar designated soil, vegetation, geology, topography, climate and drainage. The basis for mapping units in the land systems inventory.

Large Woody Debris – Pieces of wood that are of a large enough size to affect stream channel morphology.

Lethal fires. Fires that kill 90% or more of the dominant tree canopy. These are often called "stand-replacing" fires. They are commonly crown fires, burning with high severity. In general, lethal fires have long return intervals (140 to 250 years or more apart), but affect large areas when they occur. Local examples of these types of fires would be the Sundance and Trapper Peak Fires of 1967 that burned over 80,000 acres in a relatively short time period during late summer drought conditions. Refer to mixed severity fires and nonlethal fires.

Liberation Cutting. A form of release cutting that removes older, larger trees that overtop a more desirable younger stand.

Line. An intersection of two planes; a point that has been extended; a silhouette of form. In terms of landscapes, features such as ridges, skylines, structures, changes in vegetation, or individual trees and branches may be perceived as line.

Line Officer. Management personnel within the Forest Service Organization consisting of: Secretary of Agriculture, Chief of Forest Service, Regional Foresters, Forest Supervisors, and District Rangers. Refers to the line of authority and responsibility.

Log Landing. An area where logs are skidded or yarded prior to loading and transportation to a mill.

Lop and Scatter. Branches are cut from felled trees to a predetermined height then scattered to reduce fuel concentrations. The objective is to re-arrange the fuel so as to eliminate concentrations and break up vertical and horizontal continuity. Generally, this treatment hastens natural decomposition and improves esthetic qualities of the treated area.

Low Scenic Integrity. A scenic integrity level meaning human activities must remain visually subordinate to the attributes of the existing landscape character. Activities may repeat form, line, color, or texture common to these landscape characters, but changes in quality of size, number, intensity, direction, pattern, and so on, must remain visually subordinate to these landscape characters.

M

Maintain – For this document, the term is intended to convey the idea of keeping ecosystem functions, processes, and/or components (such as soil, air water, vegetation) in such a condition that the ecosystem's ability to accomplish current and future management objectives is not weakened. Management activities may be compatible with ecosystem maintenance if actions are designed to maintain or improve current ecosystem condition.

Maintenance. See Road Maintenance.

Management Area (MA). Geographic areas, not necessarily contiguous, which have common management direction, consistent with the Forest Plan allocations.

Management Direction. A statement of multiple use and other goals and objectives, along with the associated management prescriptions and standards and guidelines to direct resource management.

Management Prescription. A set of land and resource management policies that, as expressed through Standards and Guidelines, trends toward a Desired Future Condition over time.

Management Activity. An activity humans impose on a landscape for the purpose of managing natural resources.

Mass Failure (erosion) – A large land slump, in which a mass of rock or soil slips in one unit down from a cliff or slope.

Mature Timber. Individual trees or stands of trees that in general are at their maximum rate in terms of the physiological processes expressed as height, diameter, and volume growth.

Mean Annual Increment. The total volume increase in a tree or stand of trees up to a given age, divided by that age.

Merchantable timber. Timber that can be bought or sold.

Metapopulation. Clustered, non-contiguous populations that interact at times through geneflow and dispersal.

Middleground. (Visual Distance Zone). The IPNF defines middleground as that part of a scene or landscape which hits between the foreground and background zones. The Newport Ranger District defines middleground as the zone between the foreground and the background in a landscape, usually located from one-half mile to four miles from the observer.

Mitigate/mitigation measures. To offset or lessen real or potential impacts of effects through the application of additional controls or actions. Counter measures are employed to reduce or eliminate undesirable or unwanted results.

Mixed Conifer. See Timber Types.

Mixed severity fires. Fires that kill more than 10% but less than 90% of the dominant tree canopy. These fires are commonly patchy, irregular burns, producing a mosaic of different burn severities. Return intervals on mixed severity fires may be quite variable. Refer to nonlethal and lethal fires.

Monitoring – A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring allows detection of undesirable and desirable changes so that management actions can be modified or designed to achieve desired goals and objectives while avoiding adverse effects to ecosystems.

Morphology – Form and structure.

Mosaic. A pattern of vegetation in which two or more kinds of communities are interspersed in patches, such as clumps of shrubs with grassland between.

Multiple-use Management. The management of public lands and their various resource values so they are used in the combination that best meets the present and future needs of the American people.

N

National Environmental Policy Act (NEPA) – An act of Congress passed in 1969 declaring a national policy to encourage productive and enjoyable harmony between people and the environment, to promote efforts that will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of people, and to enrich the understanding of the ecological systems and natural resources important to the nation, among other purposes.

National Forest Management Act (NFMA). Law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring preparation of Regional Guides and Forest Plans, and the preparation of regulations to guide that development.

Native – (1) one born or reared in a particular place. (2) an entity original or indigenous to a particular locality.

Native Species – Species that normally live and thrive in a particular ecosystem or region (e.g. In fishes – westslope cutthroat trout).

Natural Disturbance. Periodic impact or natural events such as fire, severe drought, insect or disease attack or wind.

Natural Landscape Character. Landscape character that originated from natural disturbances such as wildfires, glaciation, succession of plants from pioneer to climax species, or indirect activities of humans, such as inadvertent plant succession through fire prevention.

Natural-Appearing Landscape Character. Landscape character that has resulted from human activities, yet appear natural, such as historic conversion of native forests into farmlands, pastures, and hedgerows that have reverted back to forests through reforestation activities or natural regeneration.

Natural Regeneration. Renewal of a tree crop by natural means using natural seed fall.

Natural Resources – Water, soil, wild plants and animals, air, minerals, nutrients, and other resources produced by the earth's natural processes.

No-Action Alternative. The No-Action Alternative is required by regulations of the National Environmental Policy Act (NEPA) (40 CFR 1502.14). The No-Action Alternative provides a baseline for estimating the effects of other alternatives. Where a project activity is being evaluated, the No-Action Alternative is defined as one where current management direction would continue unchanged.

Nongame Species. All wild animals not subject to sport-hunting and fishing regulations.

Nonlethal fires. Fires that kill 10% or less of the dominant tree canopy. A much larger percentage of small understory trees, shrubs and forbs may be burned back to the ground line. These are commonly low-severity surface and understory fires, often with short-return intervals (a few decades). Refer to mixed severity and lethal fires.

Non-point Source Pollution – Pollution whose source is not specific in location; the sources of the pollutant discharge are dispersed, not well defined or constant. Examples include sediments from logging activities and runoff from agricultural chemicals.

Nonstocked. A stand of trees or aggregation of stands that have a stocking level below the minimum specified for meeting the prescribed management objectives.

Normal Operating Season. A portions of a year when normal timber harvesting operations are expected to take place uninterrupted by adverse weather conditions.

Noxious Weeds. Rapidly spreading plants which can cause a variety of major ecological impacts to both agriculture and wild lands.

O

Objective. A concise, time specific statement of measurable planned results that respond to predetermined goals. An objective forms the basis for further planning, to define the precise steps to be taken and the resources to be used in achieving identified goals.

Obliteration – By definition designation under the mandated Roads Analysis Process (RAP) this term has been replaced by the use of the word "***Decommission***" (see definition previous). Hence, it no longer applies in subscribing it to roads related work.

Observer Position. Specific geographic position in the landscape where the viewer is located. Also known as viewer platform.

Old-growth Forest. Old-growth forests are considered ecosystems that are distinguished by old trees and related structural attributes. They encompass the later stages of stand development that typically differ from earlier stages in characteristics such as tree age, tree size, number of large trees per acre and basal area. Attributes such as decadence, dead trees, the number of canopy layers and canopy gaps are also important, but are more difficult to describe because of high variability. (See also Potential or Recruitment Old Growth.)

Older Capable Habitat. Stands that are nearing the age at which they would provide "suitable" wildlife habitat. Canopy closures in older capable habitat may not currently meet the needs of flammulated owls.

Open Park-Like Stand. A single stratum of large trees is present. Large trees are common. Young trees are absent or few in the understory. Park-like conditions may exist. (Applies to Newport Ranger District Only)

Open Road Density. A measure of the roads accessible to motorized use which affects wildlife, expressed as miles of road per square mile of area.

Outputs. The goods and services produced from and offered on National Forest lands.

Outsloping. Shaping a road to cause drainage to flow toward the outside shoulder (generally the fill slope), as opposed to insloping which encourages drainage to flow to the inside shoulder (generally the cut slope). Emphasis is on avoiding concentrated water flow.

Overstory. The portion of trees in a forest which forms the uppermost layer of foliage.

P

Park-like Structure. Stands with large scattered trees and open growing conditions, usually maintained by ground fires.

Partial Retention. A visual quality objective which, in general, means man's activities may be evident but must remain subordinate to the characteristic landscape.

Patch. An area of uniform vegetation that differs from what surrounds it in structure and composition. Examples might include a forest surrounded by a cut over area or a patch of dense young forest surrounded by a patch of open old growth.

Pathogen. An agent such as a fungus, virus, or bacterium that causes disease.

Pattern. The spatial arrangement of landscape elements (patches, corridors, matrix) that determines the function of a landscape as an ecological system.

Payments to Counties. The portion of receipts derived from Forest Service resource management that is distributed to State and county governments, such as the Forest Service's 25 percent fund payments.

Perennial Stream – A stream that flows water year-round.

Permitted Grazing. Use of a National Forest range allotment under the terms of a grazing permit.

Permittee. Individual or entity that has received a grazing or Special Use Permit from the Forest Service.

Pesticide. A general term applied to a variety of chemical materials including insecticides, herbicides, fungicides and rodenticides.

Pile Burning. Employing top-attached yarding methods, woody debris is removed from a site to a roadside landing or hand-piled on site, where the woody debris can be burned safely and inexpensively. Pile burning is conducted in late fall.

Point Source. Originating from a discrete identifiable source or conveyance.

Pool. Portion of a stream where the current is slow, often with deeper water than surrounding areas and with a smooth surface texture. Often occurs above and below riffles and generally is formed around stream bends or obstructions such as logs, root wads, or boulders. Pools provide important feeding and resting areas for fish.

Population. Spatially-discreet groups of individuals that can freely interbreed.

Potential Vegetation. Vegetation that would likely develop if all successional sequences were completed without human interference under present site conditions.

Precommercial Thinning. The selective felling, deadening, or removal of trees in a young stand primarily to accelerate diameter increment on the remaining stems, maintain a specific stocking or stand density range, and improve the vigor and quality of the trees that remain.

Preferred Alternative. The alternative recommended for implementation in an EIS (40 CFR 1502.14).

Preparatory Cut. Removal of trees near the end of a rotation so as to permanently open the canopy and enlarge the crowns of seed bearers, with a view to improving conditions for seed production and natural generation, as typically in shelterwood systems.

Prescribed Burning. The intentional application of fire to wildland fuels in either their natural or modified state under such conditions as to allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (i.e., silviculture, wildlife management, reduction of fuel hazard, etc.).

Prescribed Fire. Any fire ignited by management actions to meet specific objectives. Prescribed fire can rejuvenate forage for livestock and wildlife or prepare sites for natural regeneration of trees.

Prescription. Management practices selected and scheduled for application on a designated area to attain specific land and resource management goals and objectives.

Productivity. (1) *Soil productivity:* the capacity of a soil to produce plant growth, due to the soil's chemical, physical, and biological properties (such as depth, temperature, water holding capacity, and mineral, nutrient and organic matter content). (2) *Vegetative productivity:* the rate of production of vegetation within a given period. (3) *General:* the innate capacity of an environment to support plant and animal life over time.

Programmatic Document. An environmental document that establishes a broad management direction for an area by establishing a goal, objective, standard, management prescription and monitoring and evaluation requirements for different types of activities which are permitted. It also can establish what activities are not permitted within the specific area(s). This type of document does not mandate or authorize the permitted activities to proceed.

Proper Functioning Condition (PFC) – Riparian and wetland areas achieve Proper Functioning Condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. Attainment of Proper Functioning Condition reduces erosion and improves water quality; filters sediment, captures bedload, and aids floodplain development; improves floodwater retention and groundwater recharge; develops root masses that stabilize streambanks against cutting action; develops diverse ponding and channel characteristics to provide habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and supports greater biodiversity. The functioning condition of riparian and wetland areas is a result of the interaction of geology, soil, water, and vegetation.

Purchaser. The entity which is awarded a USDA Forest Service contract after bidding, usually with competition. As used in timber, the entity which has purchased timber as identified in a timber sale contract.

Q

Qualitative – Traits or characteristics that relate to quality and can't be measured with numbers.

Quantitative – Traits or characteristics that can be measured with numbers.

R

R1Edit. A computerized database that was used to store detailed stand examination data and create comprehensive reports based on that data. R1Edit has been replaced by the more recent FSVeg database (see FSVeg in this glossary) and is no longer in use.

Rain-on-Snow Event. A winter storm that is characterized by precipitation falling as rain, rather than snow, and melting of existing snowpack.

Range of Alternatives. An alternative is one way of managing the National Forest, expressed as management emphasis leading to a unique set of goods and services being available to the public. A range of alternatives is several different ways of managing the Forest, offering many different levels of goods and services.

Range of Variability. The spectrum of conditions possible in ecosystem composition, structure, and function considering both temporal and spatial factors.

Reconstruction. See Road Reconstruction.

Recovery – (1) Return of an ecosystem to a specified condition after a disturbance; (2) return of a previously threatened or endangered species to a condition of population viability.

Redd – Spawning nest made by salmonid fish species in the gravel bed of a river.

Reforestation. The renewal of forest cover by seeding, planting, and natural means.

Regeneration. The process of establishing a new crop of trees on previously harvested land; also refers to the new crop of trees that have become established.

Rehabilitate. To repair and protect certain aspects of a system so that essential structures and functions are recovered, even though the overall system may not be exactly as it was before.

Release Treatment. An intermediate treatment or cutting designed to free a young stand of desirable trees, not past the sapling stage, from the competition of undesirable trees that threaten to suppress them. Cleaning and liberation cutting are types of release.

Resident – Pertaining to fishes where fish within a streams spend there entire life-cycle within the watershed.

Residual Stand. Trees remaining standing after some disturbance event, such as fire or logging.

Resilient, Resilience, Resiliency – (1) The ability of a system to respond to disturbances. Resiliency is one of the properties that enable the system to persist in many different states or successional stages. (2) In human communities, refers to the ability of a community to respond to externally induced changes such as larger economic or social forces.

Resource Area – In this EA, refers to National Forest lands to which decisions in the Decision Notice will apply.

Restoration – Holistic actions taken to modify an ecosystem to achieve desired, healthy and functioning conditions and processes. Generally refers to the process of enabling the system to resume acting or continue acting following disturbance as if the disturbance were absent. Restoration management activities can be either active (such as control of noxious weeds, thinning of over-dense stands of trees, or redistributing roads) or more passive (more restrictive, hands-off management direction that is primarily conservation-oriented).

Restricted Road. A National Forest road or segment which is restricted from a certain type of use or all uses during certain seasons of the year or yearlong. The use being restricted and the time period must be specified. The closure is legal when the Forest Supervisor has issued and posted an order in accordance with 36 CFR 261.

Revegetation. Establishing or reestablishing desirable plants on areas where desirable plants are absent or of inadequate density, by management alone (natural revegetation) or by seeding or transplanting (artificial revegetation).

Riffle. Relatively shallow section of a stream or river with rapid current and a surface broken by gravel, rubble, or boulders.

Riparian Area – Area with distinctive soil and vegetation characteristics between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

Riparian Habitat Conservation Areas (RHCAs). Portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems.

Rip Rapping. The use of a large rock, boulders, concrete chunks or similar non-erosive, heavy objects as an armoring device.

Road Work/Maintenance - Includes, as needed, installation of rolling dips, installation of relief culverts, rolling the road grade for increased drainage, armoring of culvert catch basins and outlets, and adding gravel surfacing, replacing existing stream crossings, cut and fill slope stabilization, and removal of encroaching road fills.

Road Maintenance Plan. A document schedule and program for upkeep of roads to provide a level of service for the user and protection of resources. There are five levels of maintenance; Level I being the least intense and Level V being the most intensive.

Road Obliteration. There are varying degrees of road obliteration. **Level 1 Obliteration** includes removal and recontour of all stream crossings and, as needed, recontour of unstable fill slopes, cutslope stabilization, ripping the road tread, installation of no-maintenance cross ditches, and revegetation. Obliteration also includes some kind of road closure method such as with a guard rail barrier, gate, an earthen berm, or a short section of full recontour, called "front end" obliteration. Front End Obliteration includes recontouring of the first site distance, or about 250 feet of the road, to stop motorized traffic from entering onto the road. Culverts that pose a high risk of failure because of lack of maintenance would be removed and recontoured concurrently with the closure of the road. **Level 2 Obliteration** includes removal of all stream crossings and full recontour of the entire road prism, introduction of woody debris, and revegetation as needed.

Road Reconstruction. There are varying degrees of road reconstruction. **Light Road Reconstruction** includes, as needed, installation of rolling dips, installation of relief culverts, rolling the road grade for increased drainage, armoring of culvert catch basins and outlets, and adding gravel surfacing. **Heavy Road Reconstruction** includes, as needed, changing the road design, replacing existing stream crossings, cut and fill slope stabilization using gabions or other means, subgrade reinforcements, road prism realignment, and removal of encroaching road fills.

Road Stabilization. Stabilization includes the use of vegetation and geotextiles to control or reduce surface erosion.

Rocking. The application of aggregate to a roadbed to provide strength and a more stable erosion resistant surface.

Runoff. Fresh water from precipitation and melting ice that flows on the earth's surface into nearby streams, lakes, wetlands and reservoirs.

S

Sale Area Map. A map of suitable scale and detail to be legible which part of a timber sale contract. The map identifies sale area boundaries and contract requirements specific to the sale.

Salmonid – One of a number of fishes of the genus *Onchorhynchus* of the North Pacific, which ascend freshwater streams to spawn.

Salvage Harvest. The removal of dead trees or trees damaged or dying because of injurious agents other than competition, for the purpose of recovering economic value that would otherwise be lost.

Sanitation Harvest. An intermediate harvest that removes dead, damaged, or susceptible trees, essentially to prevent the spread of pests or pathogens and so promote forest hygiene.

Sawtimber. Trees containing at least one twelve foot sawlog or two noncontiguous eight foot logs, and meeting regional specifications for freedom from defect. Softwood trees must be nine inches in diameter and hardwood trees eleven inches in diameter at breast height.

Scale. (1) The level of resolution under consideration, such as broad scale or fine scale. (2) The ratio of length on a map to true length.

Scenery. General appearance of a place, general appearance of a landscape, or features of a landscape.

Scenery Management. The art and science of arranging, planning, and designing landscape attributes relative to the appearance of places and expanses in outdoor settings.

Scenic. Of or relating to landscape scenery; pertaining to natural or natural appearing scenery; constituting or affording pleasant views of natural landscape attributes or positive cultural elements.

Scenic Attractiveness. The scenic importance of a landscape based on human perceptions of the intrinsic beauty of land form, rockform, waterform, and vegetation pattern. Reflects varying visual perception attributes of variety, unity, vividness, intactness, coherence, mystery, uniqueness, harmony, balance, and pattern. It is classified as a), distinctive; b) typical or common; or c) undistinguished.

Scenic Class. A system of classification describing the importance or value of a particular landscape or portions of that landscape.

Scenic Integrity. State of naturalness or, conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from the existing landscape character in a national forest. "**Very High**" (unaltered) refers to landscapes where the valued landscape character is intact with only minute, if any, deviations. The existing landscape character and sense of place is at the highest possible level. "**High**" (appears unaltered) refers to landscapes where the valued landscape character appears intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident. "**Moderate**" (slightly altered) refers to landscapes where the valued landscape character "appears slightly

altered". Noticeable deviations must remain visually subordinate to the landscape character being viewed. "**Low**" (moderately altered) refers to landscapes where the valued landscape character "appears moderately altered". Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles outside the landscape being viewed. "**Very Low**" (heavily altered) refers to landscapes where the valued landscape character "appears heavily altered". Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles within or outside the landscape being viewed. "**Unacceptably Low**" (extremely altered) refers to landscapes where the valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern or scale from the landscape character.

Scenic Quality. The essential attributes of landscape that when viewed by people, elicit psychological and physiological benefits to individuals and therefore, to society in general.

Scenic Resource. Attributes, characteristics, and features of landscapes that provide varying responses from, and varying degrees of benefits to humans.

Scoping. The procedures by which the Forest Service determines the extent of analysis necessary for a proposed action, i.e., the range of actions, alternatives, and impacts to be addressed, identification of significant issues related to a proposed action, and establishing the depth of environmental analysis, data, and task assignments needed.

Secondary Integrity Area. Those areas which contain slightly higher amounts of mature or old forest when compared to other areas in the drainage, yet are highly fragmented and typically have high total road and open road and/or motorized trail densities.

Security. The inherent protection that provides minimal human disturbance and minimal threat of mortality for species that either avoid human disturbance or are directly threatened by trapping, hunting, and/or other forms of mortality.

Sediment – Solid materials, both mineral and organic, in suspension or transported by water, gravity, ice, or air; they may be moved and deposited away from their original position and eventually will settle to the bottom of the stream.

Seed Trees. Mature trees left standing after timber harvest to provide seeds to regenerate the new stand; a harvest prescription.

Seed Tree Harvest. An even-aged cutting method in which most of the mature timber from an area is removed in one cut except for a small number of desirable trees retained to provide seed or shelter for regeneration.

Seed Trees With Reserves. Harvest where some or all of the shelter trees are retained after regeneration has become established to attain goals other than regeneration.

Seedling/Sapling. A size category for forest stands in which trees less than five inches in diameter are the predominant vegetation.

Seen Area. The total landscape area observed based upon land-form screening. Seen areas may be divided into zones of immediate foreground, foreground, middleground, and background. Some landscapes are seldom seen by the public.
Selective Harvest. Cutting of intermediate aged, mature, or diseased trees in an uneven aged forest stand, either singly or in small groups. This encourages growth of younger trees and maintains an uneven aged stand.

Sense of Place. A concept that focuses on the subjective and often shared experience or attachment to the landscape emotionally or symbolically. It refers to the perception people have for a physical area with which they interact, whether for a few minutes or a lifetime that gives that area special meaning to them, to their community, or to their culture.

Sensitivity Level. Measure of people's concerns for the scenic quality of the National Forest. Sensitivity levels are determined for land areas viewed by people who are: traveling through the forest on developed roads and trails; using areas such as campgrounds and visitor centers; or recreating at lakes, streams and other water bodies. There are three sensitivity levels for identifying the different levels of concern a visitor/user has for the visual scenic quality they experience. They are classified as: Level I - Highest Sensitivity, Level II - Average/Moderate Sensitivity, and Level III - Lowest Sensitivity.

Sensitive Species – Species identified by a Forest Service Regional Forester for which population viability is a concern either (a) because of significant current or predicted downward trends in population numbers or density, or (b) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. For example, torrent sculpin and westslope cutthroat trout.

Seral. Refers to the sequence of transitional plant communities during succession. Early seral refers to the plants that are present soon after a disturbance or at the beginning of a new successional process, such as seedling or sapling growth stages within a forest; midseral in a forest would refer to pole or medium sawtimber growth stages; late seral refers to plants present during a later stage of plant community succession, such as mature and old growth forest stages.

Seral Stage. The developmental phase of a forest stand or rangeland with characteristic structure and plant species composition.

Shade Intolerant. Tree species which grow best in direct sunlight.

Shade Tolerant. Tree species which can tolerate a shaded environment.

Shape. Contour, spatial form, or configuration of a figure. Shape is similar to form, but shape is usually considered to be two-dimensional.

Shelterwood Harvest. An even-aged cutting method in which a stand of trees is removed through a series of cuttings designed to establish a new crop with seed and protection provided by a portion of the stand.

Shelterwood with Reserves. Harvest unit where some or all of the shelter trees in a shelterwood harvest unit are retained after regeneration has become established to attain goals other than regeneration.

Significant Disturbance. Disturbance of surface resources, including soil, water and vegetation, which has the potential to degrade water quality to a level requiring corrective action.

Silviculture. The practice of manipulating the establishment, composition, structure, growth, and rate of succession of forests to accomplish specific objectives.

Silvicultural Examination. The process used to gather the detailed onsite field data needed to determine management opportunities and direction for the timber resource within a small subdivision of a forest area, such as a stand. Also called stand exam or common stand exam.

Silvicultural System. The entire process by which forest stands are tended, harvested, and replaced. It includes all cultural practices performed during the life of the stand, such as regeneration cutting, fertilization, thinning, improvement cutting, and use of genetically improved sources of tree seeds and seedlings.

Site – A specific location of an activity or project, such as a campground, a lake, or a stand of trees to be harvested.

Site Potential. A measure of resource availability based on interactions among soils, climate, hydrology, and vegetation.

Site Preparation. A general term for a variety of activities that remove or treat competing vegetation, slash, and other debris that may inhibit the establishment of regeneration.

Site Specific. Pertains to a discernible, definable area of point on the ground where a project or activity would (or is proposed) to occur.

Slash. The residue left on the ground after felling and other silvicultural operations and/or accumulating there as a result of storm, fire, girdling, or poisoning of trees.

Snag. A standing dead tree, usually greater than five feet tall and six inches in diameter at breast height. Snags are important as habitat for a variety of wildlife species.

Soil and Water Conservation Practice (SWCP). The set of practices which, when applied during implementation of a project, ensures that soil productivity is maintained, soil loss and water quality impacts are minimized, and water related beneficial uses are protected. These practices can take several forms. Some are defined by state regulation or Memoranda of Understanding between the Forest Service and the States and thus are recognized as Best Management Practices (BMPs). Others are defined by the Forest Service interdisciplinary teams or described in Forest Service Handbooks for application Forest-wide. Both kinds of SWCP are included in the Forest Plan as Forest-wide standards or are referenced in the plans. A third kind of SWCP is identified by the interdisciplinary team for application to specific management areas; these are included as Management Area Standards in the appropriate management areas in the Forest Plan. A fourth kind, project level SWCPs, are based on site specific evaluations and represent the most effective and practical means of accomplishing the soil and water resource goals of the specific area involved in the project. These project level conservation practices can either supplement or replace the Forest Plan for specific projects. This handbook would aid in the development of the fourth kind of SWCP.

Soil Productivity. The capacity of the soil to produce a specific crop such as fiber and forage, under defined levels of management. It is generally dependent on available soil moisture and nutrients and length of growing season.

Spatial – Related to or having the nature of space.

Spawning Habitat – Areas used by adult fish for laying and fertilizing eggs.

Special Use Permit. A permit issued under established laws and regulations to an individual, organization, or company for occupancy or use of National Forest land for some special purpose.

Species – A population or series of populations of organisms that can interbreed freely with each other but not with members of other species.

Specified Road – A road with specific features designed by Forest Service engineers and included in the timber sale contract.

Stability. Ability of a living system to withstand or recover from externally imposed changes and stresses.

Stand. A group of trees in a specific area that are sufficiently alike in composition, age, arrangement and condition so as to be distinguishable from the forest in adjoining areas.

Stand Composition. The vegetative species that make up a stand.

Stand Conversions. Application of silvicultural practices that change the species composition of trees in a stand, including planting a variety of species, discrimination against undesirable species during thinning, and other practices that naturally discriminate against undesirable species, such as specific site preparation and harvest methods.

Stand Density. Refers to the number of trees growing in a given area, usually expressed in trees per acre.

Stand Structure. The mix and distribution of tree sizes, layers, and ages in a forest. Some stands are all one size (single story), some are two story, and some are a max of trees of different sizes and ages (multistory).

Stocking. The degree to which trees occupy the land, measured by basal area and/or number of trees by size and spacing, compared with a stocking standard; that is, the basal area and/or number of trees required to fully utilize the land's growth potential.

Storage (roads) - Includes removal and recontouring of all stream crossings and, as needed, recontour of unstable fill slopes, cutslope stabilization, ripping the road tread, installation of no-maintenance cross ditches, and revegetation. Storage also includes some kind of road closure method such as with a guardrail barrier, gate, an earthen berm, or a short section of full recontouring. These roads would remain as classified roads on the transportation system.

Stream order. It is often convenient to classify streams within a drainage basin by systematically defining the network of branches. Each nonbranching channel segment (smallest size) is designated a first-order stream. A stream which receives only first-order segments is termed a second-order stream, and so on. The order of a particular drainage basin is determined by the order of the principle or largest segment.

Stream morphology. The study of the form and structure of streams.

Streamside Management Zone (SMZ). A designated zone that consists of the steam and an adjacent area of varying width where management practices that might affect water quality, fish, or other aquatic resources are modified. The SMZ is not a zone of exclusion, but a zone of closely managed activity. It is a zone which acts as an effective filter and absorptive sone for sediment, maintains shade, projects aquatic and terrestrial riparian habitats, protects channel and streambanks, and promotes floodplain stability. The SMZ may be wider than the riparian area.

Structural Stages. Category of successional stage based on stand age and tree size class. Three structural stages are used in this analysis. The shrub/seedling/sapling stage includes forest stands that are less than 35 years old; the pole/small to medium stage stands are 36 to 100 years old and the mature/large timber stage stands are over 100 years old.

Structure. How the parts of ecosystems are arranged, both horizontally and vertically. Structure might reveal a pattern, or mosaic, or total randomness of vegetation.

Subordinate. A term used in regard to scenery or visuals, referring to landscape features that are inferior to, or placed below, another in size, importance, brightness and so on. Features that are secondary in visual impact or importance.

Subbasin – A drainage area of approximately 800,000 to 1,000,000 acres, equivalent to a 4th-field hydrologic unit code (HUC). Hierarchically, subwatersheds (6th-field HUC), which in turn are contained within a watershed (5th-field HUC), which in turn are contained within a subbasin (4th-field HUC). This concept is shown graphically in Figure 2-1.

Substrate – The soil or underlying rock on which an organism is growing or to which it is attached.

Subwatershed – A drainage area of approximately 20,000 acres, equivalent to a 6th-field Hydrologic Unit Code (HUC). Hierarchically, subwatersheds (6th-field HUC) are contained within watershed (5th-field HUC), which in turn contained within a subbasin (4th-field HUC). This concept is shown graphically in Chapter 2.

Succession – A predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages in succession are often referred to as seral stages.

Successional Stage. A phase in the gradual supplanting of one community of plants by another.

Suitable forest/timber land. Forest land (as defined in CFR 219.3, 219.14) for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions; for which there is reasonable assurance that such lands can be adequately restocked (as provided in CFR 219.4); and for which there is management direction that indicates that timber production is an appropriate use of that area.

Suitable Habitat. Wildlife habitat that currently has both the fixed and variable stand attributes that enable it to produce the habitat requirements for a given species. Fixed attributes of a stand do not change over time, and may include elevation, aspect, landtype, slope, and habitat type. Variable attributes change over time and may include seral stage, cover type, stand density, tree size, stand age, or stand condition. See also Capable Habitat.

Sustainability. (1) Meeting the needs of the present without compromising the abilities of future generations to meet their needs; emphasizing and maintaining the underlying ecological processes that ensure long term productivity of goods, services, and values without impairing productivity of the land. (2) In commodity production, refers to the yield of a natural resource that can be produced continually at any given intensity of management.

Sustainability – Meeting the needs of the present without compromising the abilities of future generations to meet their needs; emphasizing and maintaining the underlying ecological processes that ensure long-term productivity of goods, services, and values without impairing productivity of the land.

T

Temporary Roads - Those roads not intended to be retained for long-term management.

Terrestrial. Pertaining to the land.

Texture. Visual interplay of light and shadow created by variations in the surface of an object. Grain or nap of a landscape or a repetitive pattern of tiny forms. Visual texture can range from smooth to coarse.

Thermal Cover. Vegetation used by animals to modify the adverse effects of weather. A forest stand that is at least 40 feet in height with tree canopy cover of at least 70 percent provides thermal cover. These stand conditions are achieved in closed sapling-pole stands and by all older stands unless the canopy cover is reduced below 70 percent. Deciduous stands may serve as thermal cover in summer, but not in winter.

Thinning. An intermediate cutting made to stimulate the growth of the trees that remain, change species composition, and/or to increase the total yield of useful material from the stand.

Threatened Species – Species listed under the Endangered Species Act (1973; i.e. bull trout) that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Three-step Shelterwood. An even aged silvicultural system in which the old crop (the shelterwood) is removed in three successive cuttings in order to provide a source of seed and/or protection for regeneration.

Tiering. Refers to the coverage of general matters in broader Environmental Impact Statements or Environmental Assessments with subsequent other related statements in Environmental Assessments incorporated, by reference, the discussions contained in the previous document, solely on the issues specific to the statement subsequently prepared.

Timber Types. A descriptive classification of forestland based on present occupancy of an area by tree species (i.e., lodgepole, mixed conifer). More appropriately called forest cover types, this category is further defined by the composition of its vegetation and/or environmental factors that influence its locality.

Tractor. Any logging system which uses ground-based machines.

Trampling. Fuel is treated by crushing it. Trampling is utilized in areas where fuels are relatively light and the area is limited by slope (usually areas that are harvested with a machine). The objective is to mix fuel with soil to hasten decomposition and provide for nutrient cycling.

Typical or Common Landscape. A term used in regard to scenery or visuals, referring to prevalent, usual, or widespread landscapes within a landscape province. It also refers to landscapes with ordinary and routine scenic attractiveness.

Travel Corridor. The habitat pathway that allows an animal to move from one place to another.

TSMRS (Timber Stand Management Record System). A three-part system comprised of an index map of physical stand locations, a computerized database to maintain searchable records and create reports, and a folder system to maintain information not supported or suitable for entry into the computerized database. The purposes of TSMRS are to provide information for silvicultural prescriptions, plan for and schedule treatments, and maintain a historical record of past activities within forest stands.

U

Unclassified Road – A road on National Forest land that is not managed in the forest transportation system.

Underburning. A prescribed fire method designed to meet various resource objectives where a tree canopy is present and is to be preserved. The treatment reduces woody debris, provides site-preparation for natural or artificially-planted regeneration and eliminates unwanted vegetation. Underburning can also improve wildlife habitat.

Understory. Plants that grow beneath the canopy of other plants. Usually refers to grasses, forbs, and low shrubs under a tree or shrub canopy.

Uneven-age Management. The application of a combination of actions needed to simultaneously maintain continuous high-forest cover. Cutting methods that develop and maintain uneven-aged stands are individual-tree and group selection.

Uneven-aged Stand. Stand of trees in which there are considerable difference in the age classes of individual trees.

Uneven-age System. A silvicultural system involving manipulation of a forest to simultaneously maintaining: continuous high forest cover; recurring regeneration of desirable species and orderly growth; and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Individual tree selection and group selection cutting are examples of uneven-aged management methods.

Unique. Unequalled, very rare, or uncommon.

Unplanned Ignition. A fire started at random by either natural or human causes or a deliberate incendiary fire.

Unroaded. Area characterized by its lack of existing roads, but not designated as a Roadless Area or Wilderness.

Unsuitable Forest Land. The IPNF defines unsuitable forest land as lands not selected for timber production in Step II and III of the suitability analysis during the development of the Forest Plan due to: (1) the multiple-use objectives for the alternative precludes *scheduled* timber production; (2) other management objectives for the alternative limit timber production activities to the point where management requirements set forth in 36 CFR 219.27 cannot be met; and (3) the lands are not cost-efficient over the planning horizon in meeting forest objectives that include timber production. Land not appropriate for timber production shall be designated as unsuitable in the Forest Plan.

V

Variety. An intermixture, diversity, or succession of different things, forms, or qualities in the landscape.

Variety Class. A term from the Visual Management System. See "Scenic Attractiveness."

Very High Scenic Integrity Level. A scenic integrity level that generally provides for ecological change only.

Very Low Scenic Integrity Level. A scenic integrity level meaning human activities of vegetative and landform alterations may dominate the original, natural landscape character but should appear as natural occurrences when viewed at background distances.

Viability. In general, the ability of a population of plant or animal species to persist for some specific time into the future. For planning purposes, a viable population is one that has the estimated numbers and distribution of reproductive individuals to ensure that its continued existence will be well distributed in the planning area.

Viable Population – A population that is regarded as having the estimated numbers and distribution of reproductive individuals to ensure that its continued existence is well distributed in the project area.

Viewshed. Subunits of the landscape where the visitor's view is contained by topography similar to a watershed.

Visual. A mental image attained by sight.

Visual Absorption Capability. A classification system used to denote relative ability of a landscape to accept human alterations without loss of character of scenic quality.

Visual Quality Objective (VQO). The IPNF defines Visual Quality Objective as a system of indicating the potential expectations of the visual resource by considering the frequency an area is viewed and the type of landscape. The Newport Ranger District defines Visual Quality Objective as a desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area, referring to the degree of acceptable alterations of the characteristic landscape. Under the Newport definition, all VQO's except "Preservation" imply that there will be management activities: "**Preservation**": In general, human activities are not detectable to the visitor; usually provides for ecological change only. "**Retention**:" Human activities are not evident to the casual Forest visitor. "**Partial Retention**": Human activities may be evident, but must remain subordinate to the characteristic landscape. "**Modification**": Human activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground. "**Maximum Modification**": Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background. "**Rehabilitation**": A short-term management alternative used to return existing visual impacts that are undesirable or do not meet adopted VQO's to a desired visual quality. "**Enhancement**": A short-term management alternative that is done with the express purpose of increasing positive visual variety where little variety now exists.

Visual Resource. The IPNF defines visual resource as the composite of landforms, water features, vegetative patterns and cultural features which create the visual environment. The Newport Ranger District defines visual resource as the composite of basic terrain, geologic features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

W

Water Quality Limited Segment (WQLS) – A Clean Water Act classification for waters where application of best management practices or technology-based controls are not sufficient to achieve designated water quality standards.

Watershed – (1) The region draining into a river, river system, or body of water. (2) In this EA, a watershed also refers specifically to a drainage area of approximately 50,000 to 100,000 acres, which is equivalent to a 5th-field Hydrologic Unit Code (HUC). Hierarchically, subwatersheds (6th-field HUC) are contained within a watershed (5th-field HUC), which in turn is contained within a subbasin (4th-field HUC). This concept is shown graphically in Figure 2-1.

Wetland – In general, an area soaked by surface or groundwater frequently enough to support vegetation that requires saturated soil conditions for growth and reproduction; generally includes swamps, marshes, springs, seeps, bogs, wet meadows, mudflats, natural ponds, and other similar areas.

Wildfire. A human or naturally caused fire that does not meet the land management objectives.

Windrowing. To pile slash or debris is a row along the contour of the slope.

Wildland Fire. Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Wildlife Burning. See Ecosystem/Wildlife Burning.

Wildlife Diversity. The relative degree of abundance of wildlife species, plant species, communities, habitats or habitat features per unit area.

Windthrow. Trees blown over by the wind.

Y

Yarding. A method of bringing logs in to a roadside area or landing, for truck transport. Methods may include forms of skyline cable logging systems, ground-based skidding, balloon, helicopter, etc.

Yield. Measured output; for example, timber yield or water yield.

APPENDIX A
Best Management Practices

INTRODUCTION

The Forest Service is required by law to comply with water quality standards developed under authority of the Clean Water Act. The Environmental Protection Agency and the State of Idaho are responsible for enforcement of these standards. The Idaho Panhandle National Forest Plan states (Chapter II, p. 27) that the Forest will "maintain high quality water to protect fisheries habitat, water based recreation, public water supplies and be within state water quality standards". The use of BMP's is also required in the Memorandum of Understanding between the Forest Service and the State of Idaho as part of our responsibility as the Designated Water Quality Management Agency on National Forest System lands. The State's water quality standards regulate nonpoint source pollution from timber management and road construction activities through application of Best Management Practices (BMPs). The BMPs were developed under authority of the Clean Water Act to ensure that Idaho's waters do not contain pollutants in concentrations, which adversely affect water quality or impair a designated use. State recognized BMPs that will be used during project design and implementation are contained in these documents:

a. Rules and Regulations Pertaining to the Idaho Forest Practices Act, (IFPA), as adopted by the Idaho Land Board; and

b. Rules and Regulations and Minimum Standards for Stream Channel Alterations, as adopted by the Idaho Water Resources Board under authority of the Idaho Stream Channel Protection Act (ISCPA).

Many of the rules and regulations for stream channel alterations are contained, in slightly different forms, in two Memorandum of Understandings (MOU) between the USFS and the State of Idaho. These MOUs are incorporated into the Forest Manual and R-1 Supplement 31, contains provisions which are not currently state recognized BMPs.

The practices described herein are tiered to the practices in FSH 2509.22. They were developed as part of the NEPA process, with interdisciplinary involvement, and meet state and Forest water quality objectives. The purpose of this appendix is to: 1) establish the connection between the Soil and Water Conservation Practice (SWCP) employed by the Forest Service and BMP's identified in Idaho Water Quality Standards (IDAPA 16.01.2300.05) and 2) identify how the SWCP Standard Specifications for the Construction of Roads, and the Timber Sale Contract provisions meet or exceed the Rules and Regulations pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code. The relevant portions of the Rules and Regulations developed under the Idaho Stream Protection Act are also covered.

The objective of this appendix is to provide conservation practices for use on National Forest Lands to minimize the effects of management activities on soil and water resources. The conservation practices were compiled from Forest Service manuals, handbooks, and contract and permit provisions, to directly or indirectly improve water quality, reduce losses in soil productivity and erosion, and abate or mitigate management effects, while meeting other resource goals and objectives. They are of three basic forms: administrative, preventive and corrective. These practices are neither detailed prescriptions nor solutions for specific problems. They are purposely broad. These practices are action initiating process mechanisms, which call for the development of requirements and considerations to be addressed prior to and during the formulation of alternatives for land management actions. They serve as checkpoints, which are considered in formulating a plan, a program and/or a project.

Although some environmental impacts may be characteristic of a management activity, the actual effects on soil and water resources will vary considerably. The extent of these management effects on soil and water resources is a function of:

1. The physical, meteorological and hydrologic environment where the activity takes place (topography, physiography, precipitation, channel density, geology, soil type, vegetative cover, etc.);
2. The type of activity imposed on a given environment (recreation, mineral exploration, timber management, etc.) and its extent and magnitude;
3. The method of application and the duration of the activity (grazing system used, types of silvicultural practice used, constant vs. seasonal use, recurrent application or onetime application, etc.);
4. The season of the year that the activity occurs or is applied.

These factors vary within the National Forests in the Northern Region and from site to site. It follows then that the extent and kind of impacts are variable, as are the abatement and mitigation measures. No solution prescription, method, or technique is best for all circumstances. Thus the management practices presented in the following include such phrases as "according to the design", "as prescribed," "suitable for," "within acceptable limits," and similar qualifiers. The actual prescriptions, specifications, and designs are the result of evaluation and development by professional personnel through interdisciplinary involvement in the NEPA process. This results in specific conservation practices that are tailored to meet site specific resource requirements and needs.

BMP IMPLEMENTATION PROCESS

In cooperation with the States, the USDA Forest Service's primary strategy for the control of nonpoint sources is based on the implementation of BMP's determined necessary for the protection of the identified beneficial uses. The Forest Service Nonpoint Source Management System consists of:

1. BMP selection and design based on site-specific conditions; technical, economic and institutional feasibility; and the designated beneficial uses of the streams;
2. BMP Application;
3. BMP monitoring to ensure that they are being implemented and are effective in protecting designated beneficial uses;
4. Evaluation of BMP monitoring results;
5. Feeding back the results into current/future activities and BMP design.

The District Ranger is responsible for insuring that this BMP feedback loop is implemented on all projects. The Practices described herein are tiered to the practices in the R1/R4 FSH 2509.22. They were developed as part of the NEPA process, with interdisciplinary involvement, and meet State and Forest water quality objectives. The purpose of this appendix document is to: 1) establish the connection between the SWCP employed by the Forest Service and BMP's identified in Idaho Water Quality Standards (IDAHO APT 16.01.2300.05) and 2) identify how the SWCP, Standard Specifications for the Construction of Roads, and the Timber Sale Contract provisions meet or exceed the Rules and Regulations Pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code (BMP's). The relevant portions of the Rules and Regulations developed under the Idaho Stream Protection Act are also included.

FORMAT OF THE BMPS

Each Soil and Water Conservation Practice (SWCP) is described as follows:

Title: Includes the sequential number of the SWCP and a brief title.

OBJECTIVE: Describes the SWCP objective(s) and the desired results for protecting water quality.

EFFECTIVENESS: Provides a qualitative assessment of expected effectiveness that the implemented BMP will have on preventing or reducing impacts on water quality. The SWCP effectiveness rating is based on: 1) literature and research (must be applicable to area 2) administrative studies (local or within similar ecosystem); and 3) professional experience (judgment of an expert by education and/or experience). The expected effectiveness of the SWCP is rated either High, Moderate or Low.

High: Practice is highly effective (>90%) and one or more of the following types of documentation are available:

a) Literature/Research - must be applicable to area;

b) Administrative studies - local or within similar ecosystem;

c) Experience - judgment of an expert by education and/or experience;

d) Fact - obvious by reasoned (logical response).

Moderate: Documentation shows that the practice is effective less than 90% of the time, but at least 75% of the time, **or**

Logic indicates that this practice is highly effective, but there is little or no documentation to back it up; **or**

Implementation and effectiveness of this practice will be monitored and the practice will be modified if necessary to achieve the objective of the BMP.

Low: Effectiveness unknown or unverified, and there is little to no documentation; **or**

Applied logic is uncertain in this case, or the practice is estimated to be less than 75% effective; **or**

This practice is speculative and needs both effectiveness and validation monitoring.

The effectiveness estimates given here are general, given the range of conditions throughout the Forest. More specific estimates are made at the project level when the BMPs are actually prescribed.

COMPLIANCE: Provides a qualitative assessment of how the implementation of the specific measures will meet the Forest Practice Act Roles and Regulations pertaining to water quality.

IMPLEMENTATION: This section identifies: (1) the site-specific water quality protection measures to be implemented and (2) how the practices are expected to be applied and incorporated into the Timber Sale Contract.

ITEMS COMMON TO ALL SOIL & WATER CONSERVATION PRACTICES

Responsibility For Implementation: The District Ranger (through the Presale Forester) is responsible for insuring the factors identified in the following SWCP's are incorporated into: Timber Sale Contracts through the inclusion of proper B and/or C provisions; or Public Works Contracts through the inclusion of specific contract clauses.

The Contracting Officer, through his/her official representative (Sale Administrator and/or Engineering Representatives for timber sale contracts; and Contracting Officers Representative for public works contracts) is responsible for insuring that the provisions are properly administered on the ground.

Monitoring: Implementation and effectiveness of water quality mitigation measures are also monitored annually. This includes routine monitoring by timber sale administrators, road construction inspectors, and resource specialists which is documented in diaries and project files. Basically, water quality monitoring is a review of BMP implementation and a visual evaluation BMP effectiveness. Any necessary corrective action is taken immediately. Such action may include modification of the BMP, modification of the project, termination of the project, or modification of the state water quality standards.

Table 1.1: Key to abbreviations.	
TSC = Timber Sale Contract	**SAM** = Sale Area Map
TSA = Timber Sale Administrator	**COR** = Contracting Officer Representative
PWC = Public Works Contract	**IFPA** = Idaho Forest Practices Act
SCA = Stream Channel Alteration Act	**SWCP**= Soil and Water Conservation Practices
BMP = Best Management Practices	**SMZ** = Streamside Management Zone
SPS = Special Project Specifications	**EPA** = Environmental Protection Zone
CFR = Code of Federal Regulations	

KEY SOIL & WATER CONSERVATION PRACTICES

Class * Soil and Water Conservation Practice (FSH 2509.22)

11 WATERSHED MANAGEMENT

W 11.05 - Wetlands Analysis and Evaluation
W 11.07 Oil and Hazardous Substance Spill Contingency Planning
W 11.09 Management by Closure to Use
W 11.11 Petroleum Storage & Delivery Facilities & Mgt

13 VEGETATION MANIPULATION

G 13.02 Slope Limitations for Tractor Operation
G 13.03 Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows
E 13.04 Revegetation of Surface Disturbed Areas
E 13.05 Soil Protection During and After Slash Windrowing
E 13.06 Soil Moisture Limitations for Tractor Operation

14 TIMBER

A 14.02 Timber Harvest Unit Design
A 14.03 Use of Sale Area Maps for Designating Soil and Water Protection Needs
A 14.04 Limiting the Operating Period of Timber Sale Activities
E 14.05 Protection of Unstable Areas
A 14.06 Riparian Area Designation
G 14.07 Determining Tractor Loggable Ground
E 14.08 Tractor Skidding Design
E 14.09 Suspended Log Yarding in Timber Harvesting
A 14.10 Log Landing Location and Design
E 14.11 Log Landing Erosion Prevention and Control
E 14.12 Erosion Prevention and Control Measures During Timber Sale Operations
E 14.13 Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities
E 14.14 Revegetation of Areas Disturbed by Harvest Activities
E 14.15 Erosion Control on Skid Trails
E 14.16 Meadow Protection During Timber Harvesting
S 14.17 Streamcourse Protection (Implementation and Enforcement
E 14.18 Erosion Control Structure Maintenance
A 14.19 Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
E 14.20 Slash Treatment in Sensitive Areas
A 14.22 Modification of the Timber Sale Contract

15 ROADS AND TRAILS

A 15.02 General Guidelines for Road Location/Design
E 15.03 Road and Trail Erosion Control Plan
E 15.04 Timing of Construction Activities
E 15.05 Slope Stabilization and Prevention of Mass Failures
E 15.06 Mitigation of Surface Erosion and Stabilization of Slopes
E 15.07 Control of Permanent Road Drainage
E 15.08 Pioneer Road Construction
E 15.09 Timely Erosion Control Measures on Incomplete Road and Streamcrossing Projects
E 15.10 Control of Road Construction Excavation & Sidecast Material
S 15.11 Servicing and Refueling of Equipment
S 15.12 Control of Construction In Riparian Areas
S 15.13 Controlling In-Channel Excavation
S 15.14 Diversion of Flows Around construction Sites
S 15.15 Stream crossings on Temporary Roads
S 15.16 Bridge & Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)
E 15.17 Regulation of Borrow Pits, Gravel Sources, and Quarries
E 15.18 Disposal of Right-of-Way and Roadside Debris
S 15.19 Streambank Protection
E 15.21 Maintenance of Roads
E 15.22 Road Surface Treatment to Prevent Loss of Materials
E 15.23 Traffic Control During Wet Periods
G 15.24 Snow Removal Controls
E 15.25 Obliteration of Temporary Roads
E 15.27 Trail Maintenance and Rehabilitation

18 FUELS MANAGEMENT

E 18.02 Formulation of Fire Prescriptions
E 18.03 Protection of Soil and Water from Prescribed Burning Effects

Table 1.2: Classes of SWCP (BMP)	
A = Administrative	**G** = Ground Disturbance Reduction
E = Erosion Reduction	**W** = Water Quality Protection
S = Stream Channel Protection/Stream Sediment Reduction	

SITE-SPECIFIC BEST MANAGEMENT PRACTICES

PRACTICE 11.05 - Wetlands Analysis and Evaluation;

OBJECTIVE: To delineate wetlands within sale areas in order do o facilities or degradation of soil and water resources.

EFFECTIVENESS: High

COMPLIANCE: FPA Rule 4.d.v(c) - Meets

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

OBJECTIVE: To prevent contamination of waters from accidental spills of fuels, lubricants, bitumen's, raw sewage, wash water, and other harmful materials by prior planning and development of Spill Prevention Control and Countermeasure Plans.

EFFECTIVENESS: Although SPCC Plans cannot eliminate the risk of materials being spilled and escaping into waters, they can if followed be effective at reducing adverse effects to tolerable levels. Depending on the location and quantity of a spill, a properly implemented Plan can provide for up to 100 percent containment of a spill.

COMPLIANCE: FPA Rule 2.j.i,ii - Meets

IMPLEMENTATION: TSC provision C6.341 holds the purchaser responsible for taking appropriate preventive measures to insure that any spill of oil or oil products does not enter any stream or other waters of the United States. If the total oil or oil products storage exceeds 1320 gallons or if any single container exceeds a capacity of 660 gallons, the purchaser will prepare a Spill Prevention Control and Countermeasures Plan. The plan shall meet EPA requirements including certification by a registered professional engineer. If necessary, specific requirements for transporting oil to be used in conjunction with the contract will be specified in TSC provision C6.53.

The Contracting Officer Representative will designate the location, size and allowable uses of service and refueling areas. The criteria below will be followed at a minimum:

1. Petroleum product storage containers with capacities of more than 200 gallons, stationary or mobile, will be located no closer than 100 feet from stream, water course, or area of open water. Dikes, berms, or embankments will be constructed to contain the volume of petroleum products stored within the tanks. Diked areas will be sufficiently impervious and of adequate capacity to contain spilled petroleum products. [FPA RULE 2(j)]

2. Transferring petroleum products: During fueling operations or petroleum product transfer to other containers, there shall be a person attending such operations at all times [FPA Rule 2(j)(i)].

3. Equipment used for transportation or storage of petroleum products shall be maintained in a leakproof condition. If the Forest Service Representative determines there is evidence of petroleum product leakage or spillage he/she shall have the authority to suspend the further use of such equipment until the deficiency has been corrected. [FPA Rule 2(j)(ii)]

4. For longer-term storage, a sump pond lined with plastic will be constructed equal to the volume of fuel stored on the site.

In the event any leakage or spillage enters any stream, water course or area of open water, the operator will immediately notify the COR who will be required to follow the actions to be taken in case of hazardous spill, as outlined in the Forest Hazardous Substance Spill Contingency Plan.

PRACTICE 11.09 - Management by Closure to Use
PRACTICE 15.23 - Traffic Control During Wet Periods

OBJECTIVE: To reduce the potential for road surface disturbance during wet weather and to reduce sedimentation probability by excluding activities that could result in damages to facilities or degradation of soil and water resources.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA Rule 4.d.v(c) - Meets

IMPLEMENTATION: Specific guidelines for closure of roads during the period of the contract and at the end of the purchasers operations will be spelled out in the TSC provision C5.51# (Closure to Use by Others):

Roads that must be used during wet periods should have a stable surface and sufficient drainage to allow such use with a minimum of resource impact. Rocking, paving and armoring are measures that may be necessary to protect the road surface and reduce erosion potential. Roads not constructed for all weather use should be closed during the wet season. Where winter field operations are planned, roads may need to be upgraded and maintenance intensified to handle the traffic without creating excessive erosion and damage to the road surfaces.

PRACTICE 13.02 - Slope Limitations for Tractor Operation
PRACTICE 14.07 - Determining Tractor Loggable Ground

OBJECTIVE: To reduce gully & sheet erosion and associated sediment production by restricting tractor operation to slopes where corrective measures for proper drainage are easily installed and effective.

EFFECTIVENESS: In general, the less the slope percentage, the less are the chances of rilling, gullying, and soil displacement as a consequence of tracked or wheeled skidding.

COMPLIANCE: FPA Rules 3.c.i. & c.ii - **VARIES FROM FPA RULE - FPA Rules 3.c.i**

IMPLEMENTATION:

Example 1:

1) Tractor or wheel skidding shall not be conducted on geologically unstable, saturated, or easily compacted soils. On slopes exceeding 35 percent gradient, tractor or wheel skidding shall be conducted during the winter with a minimum of 18 inches of snow cover or with a softtrack skidding machine. On slopes exceeding 45 percent gradient and which are immediately adjacent to a class I or II stream, tractor or wheel skidding shall not be conducted unless the operation can be done without causing accelerated erosion. Where slopes in the area to be logged exceed 45 percent gradient, skidding shall be done in the winter with a minimum of 18 inches of snow cover and a softtrack skidding machine shall be used. [FPA Rule 3.c.i.]

    a). This provision does not apply to any units.

2) Constructed skid trails on geologically unstable, saturated, or highly erodible or easily compacted soils on slopes over 20 percent will be prohibited [FPA Rule 3.c.ii and TSC Provision B6.42 and C6.6].

    a). This provision does not apply to any units.

Example 2:

1) Tracked or wheel skidding shall not be conducted on geologically unstable, saturated, or easily compacted soils or on slopes exceeding 30 percent. Constructed skid trails on geologically unstable, saturated, or highly erodible or easily compacted soils on slopes over 20 percent will be prohibited [FPA Rules 3.c.i and ii and TSC Provision B6.42 and C6.6].

    a). This provision does not apply to any units.

Mandatory: When tractor skid trails are required on geologically unstable, saturated, or highly erodible or easily compacted soils, the maximum grade of the trail shall be limited to 30 percent. The Forest Service shall document any differences from the FPA Rule requirements in a variance and so note the variance in the Decision Document.

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 65 feet from the wetlands, bogs, and wet meadows or as directed by INFS (1995) Standards and Guidelines under category 4 definitions.

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). This provision applies to units 1, 24 and 29.

b). This provision applies to landings outside of units on roads 1562-B and 206.

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 13.05 - Soil Protection During and After Slash Windrowing

OBJECTIVE: To reduce erosion and sedimentation from road surfaces and fill slopes, slash is windrowed below the fill slope.

EFFECTIVENESS: Slash filter windrows are logging slash placed at the base of fill slopes and below culverts where fish passage is not required has been shown to reduce sediment leaving fill slopes by 75 to 85 percent (Cook and King, "Construction Cost and Erosion Control Effectiveness of Filter Windrows on Fill Slopes," Research Paper INT-335, Intermountain Research Station, 1983; Burroughs, *et al.*, "Relative Effectiveness of Fillslope Treatment in Reducing Surface Erosion, Horse Creek Road, Nez Perce National Forest" Intermountain Research Station, 1985.) Slash filter windrows are effective immediately and during the first few years thereafter; they may later be near capacity and in some cases would have begun to decompose. By that time, though, revegetation would have become more effective.

COMPLIANCE: No directly related FPA Rule.

IMPLEMENTATION: Slash windrows will be installed 100 feet on both sides of all new stream crossings where sediment delivery from the fill slope can be expected. Slash filter windrows will also be used on fill slopes where there is a possibility of erosion or sedimentation into a nearby stream or channel (STD FS Spec 201).

a). This provision does not apply to any units.

PRACTICE 13.06 - Soil Moisture Limitations for Tractor Operation

OBJECTIVE: To minimize soil compaction, puddling, rutting, and gulling with resultant sediment production and loss of soil productivity by ensuring that activities are done when ground conditions are such that erosion and sedimentation can be controlled.

EFFECTIVENESS: Responsible implementation and enforcement are required for high effectiveness.

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION:

1. Tractor operations will be limited to periods when the soil moisture content is 18% or less, the ground is frozen, or there is at least 18 inches of snow depth. Tractor operations will only be allowed outside of these specifications through the use of designated skid trails. These requirements will be incorporated into TSC provisions C6.315# and C6.4#.

PRACTICE 14.02 - Timber Harvest Unit Design;
PRACTICE 14.08 - Tractor Skidding Design;
PRACTICE 14.10 - Log Landing Location and Design

OBJECTIVE: To insure that timber harvest unit design will maintain water quality and soil productivity by locating/designing landings and skidding patterns to best fit the terrain and avoid soil erosion.

EFFECTIVENESS: Restricting tractor skidding to designated skid trails can reduce the areal extent of soil disturbance from the typical 18-36 percent to 10 percent or less. Properly located landings and skid trails produce similar results. Effectiveness is expected to be moderate.

COMPLIANCE: FPA Rules 3.c.iii; 3.d.i & ii - Meets

IMPLEMENTATION: TSC provision B6.422 (Landings and Skid Trails) requires that the location of all skid trails and landings must be agreed upon before construction. Specific criteria that will be addressed during sale-layout and pre-work with the operator will include:

General: All new or reconstructed landings, skid trails, and fire trails shall be located on stable areas outside riparian areas. Side casting will be held to a minimum [FPA Rule 3.d.i].

Skid Trails:

a. Skid trails shall be kept to the minimum feasible width and number [FPA Rules 3.c.iii];

b. Located skid trails to avoid concentrating runoff and provide breaks in grade and waterbars;

c. Use existing skid trails wherever possible as long as the existing trails meet INFISH requirements.

a). This provision applies to units 6, 11, 15, 23 and 28.

Landings:

1. Landing sizes will be the minimum necessary for safe, economical operation [FPA Rule 3.d.ii];

   a). This provision applies to unit 1.

2. Landings and log decks will not be located within Riparian Areas;

   a). This provision does not apply to any units.

Landings, log decks, and/or burn piles will be located a minimum of 100 feet from streams, far enough away that direct (unfiltered) entry of sediment, bark, or ash and burning products, will not occur.

a). This provision applies to all units.

PRACTICE 14.03 - Use of Sale Area Maps for Designating Soil & Water Protection Needs

OBJECTIVE: To delineate the location of protection areas and special treatment areas, to insure their recognition, proper consideration, and protection on the ground.

EFFECTIVENESS: High

COMPLIANCE: No related FPA rule.

IMPLEMENTATION: The following features will be designated on the SAM:

1. The stream courses (Category 1, 2, and 4) listed below will be designated as Stream Course Protection areas to be protected under the TSC. During layout of the units these areas will be excluded where possible. Where these areas cannot be easily excluded from the unit, these areas will be excluded by designating the timber as leave trees. INFS (1995) standards and and guidelines using buffer categories will be applied(See Chapter 2-Section 2.5: Features Deesignedof the Proposed Action.

2. Wetlands (meadows, lakes, potholes, etc.) to be protected per the timber sale contract clauses are those designated on the Fish and Wildlife Service 1:24000 scale wetland maps;

3. Ephemeral channels will be protected through unit layout, marking plans, and/or designation on sale area maps;

The Purchaser and the Sale Administrator prior to harvesting will review these features on the ground.

a). These provisions apply to all units.

MONITORING: A Watershed Specialist (Forest or District) will insure that the above features have been designated on the Sale Area Map during contract development.

PRACTICE 14.04 - Limiting the Operating Period of Timber Sale Activities;
PRACTICE 15.04 - Timing of Construction Activities

OBJECTIVE: To minimize soil erosion, sedimentation and soil productivity loss by insuring activities, including erosion control work, road maintenance, etc., are done: (1) within the time period specified in the TSC; or (2) when ground conditions are such that erosion and sedimentation can be prevented.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA 4.c.ix - Meets

IMPLEMENTATION: Within the sale area, the following specifications relating to operating periods have been identified and recommended by the IDT:

1. Earthwork shall be postponed during wet periods if, as a result, erodible material would enter streams (FPA 4(c)(ix));

TSC provision B6.31 allows operations to occur outside Normal Operating Season subject to requirements in B6.6, B6.65, and C5.23.

G. The following requirements apply to operations outside the Normal Operating Season (see H-1, 2 for specific winter operations):

1. Drain dips will be built into skidtrails and temporary roads at the time of construction, where feasible. Where draindips are not feasible, or are not functioning, trails and temporary roads will be waterbarred and maintained as necessary and/or prior to any prolonged shutdown;
2. Pioneering on specified road construction will be limited to 1,000 feet after October 31;
3. Temporary Roads will be seeded immediately following construction;
4. All surface erosion and stabilization activities will be placed prior to November 1 of each year.

H. The following requirements apply to winter operations:

1. Skid trails will be constructed with waterbars and/or draindips, and allowed to freeze prior to skidding operations;
2. Prior to spring shutdown, slash and/or cull logs will be placed into skidtrails to approximate waterbars;
3. Breaks will be provided in the snow berm during snowplowing activities;

Winter operations will also require the following language in the referenced TSC provisions:

a. All streams and channels within harvest units will be flagged or otherwise identified. (Predesignated under C6.50#);
b. During all snowplowing activities, breaks will be maintained in the snow berm along the outside of roads, particularly in the areas where needed for road drainage (C5.46).

Operations will be discontinued if conditions change and activities are no longer operating on frozen or snow covered ground, the intent of winter logging.

a). These provisions apply to all units.

PRACTICE 14.05 - Protection of Unstable Areas
PRACTICE 15.05 - Slope Stabilization and Prevention of Mass Failures

OBJECTIVE: To identify and protect unstable areas and to avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.

EFFECTIVENESS: Avoidance is the most effective measure on high-risk landforms. Risk assessment based on experience is essential. Effectiveness is expected to be moderate

COMPLIANCE: FPA Rule 3.d.iii - Meets

IMPLEMENTATION: Unstable areas will be avoided by project design within the sale area. The following are guidelines that will be followed:

1. Avoid road locations or timber harvesting on or adjacent to active landslides, slump blocks and other mass wasting processes;
2. To prevent landslides, fill material used in landing construction shall be free of loose stumps and excessive accumulations of slash. On slopes where sidecasting is necessary, landings shall be stabilized by use of seeding, compaction, riprapping, benching, mulching, or other suitable means [FPA Rule 3.d.iii];
3. If road construction is necessitated in an area of moderate instability, the embankment should be layer placed or as recommended by a geotechnical engineer;

Identify any opportunities to stabilize existing unstable areas or minimize the adverse impacts associated with the unstable areas.

a). These provisions apply to all units.

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 Class I 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 300 feet slope distance from the edge of perennial fish bearing streams, 150 feet from perennial non-fish bearing streams, and 65 feet form all intermittent streams (see Deerfoot project files, Map of Stream Classification for INFS (1995) Buffers). 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].

a). These provisions apply to all units.

PRACTICE 14.09 - Suspended Log Yarding in Timber Harvesting

OBJECTIVE: To protect the soil from excessive disturbance and accelerated erosion and to maintain the integrity of the Riparian Area and other sensitive watershed areas.

EFFECTIVENESS: The more suspended log yarding can be used, the less soil disturbance will result. Effectiveness is expected to be moderate

COMPLIANCE: FPA Rule 3.g.ii - Meets

IMPLEMENTATION: The TSC provision B1.1, item (n), requires that areas requiring special yarding, as identified in TSC provision B6.42 (Skidding and Yarding), be identified on the SAM. Cable yarding (partial or full suspension) will be used on all areas identified for such logging on the SAM. Uphill cable yarding is preferred. Where downhill yarding is used, reasonable care shall be taken to lift the leading end of the log to minimize downhill movement of slash and soils [FPA Rule 3.c.iv].

The following requirement will be included in TSC C6.4# (Conduct of Logging):

All skyline units as prescribed (See Proposed Action Map) will be uphill yarded with at least one end of the logs suspended.

a). These provisions apply to units 1, 3, 5, 10, 12-14,16, 24, 29 and 30.

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:

4. Deposit waste material from construction or maintenance of landings and skid and fire trails in geologically stable locations outside of Riparian Habitat Conservation Areas.
5. Skid trails and landings, seeding will be done with a seed/fertilizer mix specified in the contract.

   a). This provision applies to units 1, 24 and 29.

   b). This provision applies to landings outside of units on roads 1562-B and 206.

   c). This provision applies to all units with fireline construction.

Landings:

1. During period of use, landings will be maintained in such a manner that debris and sediment are not delivered to any streams. Landings will not be located in ephemeral draws or swales that were created by or are prone to landslides.
2. Landings shall be reshaped as needed to facilitate drainage prior to fall and spring runoff. Landings shall be stabilized by establishing ground cover or by some other means within one year after harvesting is completed [FPA Rule 3.e.ii].
3. Landings will drain in a direction and manner that will minimize erosion and will preclude sediment delivery to any stream.

4. After landings have served the Purchaser's purpose, the Purchaser shall ditch or slope them to permit the water to drain or spread [Provision BT6.63 (Landings)].

   a). This provision applies to unit 1.

   b). This provision applies to landings outside of units on roads 1562-B and 206.

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].
3. Unit design and location will facilitate logging with a minimum amount of excavated skid trails. Where excavated trails are constructed they will be kept to a minimum and must be decommissioned by the purchaser following completion of the logging activities. The decommissioning will include restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding where needed.
4. Skid trails and fire trails shall be stabilized whenever they are subject to erosion, by waterbarring, cross draining, outsloping, scarifying, seeding, or other suitable means. This work shall be kept current to prevent erosion prior to fall and spring runoff.
5. Spacing of water bars on skid trails will be based on guides for controlling sediment from secondary logging roads (no date). If necessary, additional water bars will be prescribed by the sale administrator and/or watershed specialist.
6. Ground skidding will be restricted to winter operating seasons on frozen ground or a minimum of 18 inches of snow. This will minimize ground disturbance and compaction, which could lead to, increased sediment production and delivery within the watershed. ***Not applicable to project, conditions in the project area do not allow for this type of ground based operation***.
7. All skid trail and landing locations will be approved by the Forest Service prior to harvesting and will be rehabilitated as necessary to assure that normal drainage patterns are maintained, and that exposed soil surfaces are seeded or covered with slash. This will minimize the potential for sediment production and delivery.
8. Only existing skid trails will be used or the units will be winter logged to prevent new soil compaction above existing levels. ***Not applicable to project, conditions in the project area do not allow for this type of ground based operation***.
9. Skid trail distance will average 100 feet or greater on ground skidded units, except where the trails converge to landings and as terrain dictates otherwise. This measure will help assure that no more than 15 percent of the activity area will be detrimentally disturbed per Region 1 soil standards;
10. Mechanical fellers will only be allowed off skidtrails if they travel on 18 inches of snow, frozen ground, or a slash mat (to avoid soil compaction levels that exceed Region 1 standards).

    a). These provisions apply to units 6, 11, 15, 23 and 28.

Corridors:

1. Corridors that have become entrenched below the litter layer into the top soil and could channel water will be water-barred and/or covered with debris.

   a). This provision applies to units 1, 3, 5, 10, 12-14,16, 24, 29 and 30.

PRACTICE 14.13 - Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities
PRACTICE 14.14 - Revegetation of Areas Disturbed by Harvest Activities

OBJECTIVE: To establish a vegetative cover on disturbed sites in order to reduce erosion and sedimentation on disturbed areas where **normal revegetation methods where other contract provisions will not apply**.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA Rules 3.e.i and 3.d.iii - Meets

IMPLEMENTATION: Revegetation by seeding and fertilization to control erosion is planned for all temporary roads, skid trails, and landings. If erosion problems still occur on these areas, or other problem areas are discovered or are brought to the attention of the Sale Administrator, KV Plans will be revised to reseed and/or fertilize, or provide for other control measures. If KV Funds are not available, Appropriated Funds will be used.

PRACTICE 14.16 - Meadow Protection During Timber Harvesting

OBJECTIVE: To avoid damage to the ground cover, soil and water in meadows.

EFFECTIVENESS: High

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: Vehicular or skidding equipment shall not be used on meadows except where roads, landings, and tractor roads are approved. In all cases, soil and vegetation will be protected from disturbance which would cause adverse affects on water quality, quantity and aquatic habitat. The TSC Provision B6.61 (Meadow Protection) is a standard provision in all contracts.

Unless otherwise agreed, trees felled into meadows shall be removed by end lining, and resulting logging slash shall also be removed. Damage to meadows, stream courses, and riparian areas caused by unauthorized Purchaser's operations shall be repaired by the Purchaser in a timely manner to restore and prevent further damage.

PRACTICE 14.17 - Stream Channel Protection (Implementation and Enforcement).
PRACTICE 15.19 - Streambank Protection

OBJECTIVE: To protect stream beds and streamside vegetation, during and after forest practice operations and road construction, by (1) maintaining unobstructed passage of stormflows; and (2) reducing sediment and other pollutants from entering streams.

EFFECTIVENESS: Much of this mitigation consists of avoiding the impact, minimizing the impact, or rectifying the impact [40 CFR 1508.20 (a-c)]. The Forest Service has near-complete control over construction operations. Effectiveness is expected to be high.

COMPLIANCE: FPA Rules 3.f.i, ii; 3.g.i,ii – Meets SCA Rules

IMPLEMENTATION: To reduce sediment and channel bank degradation at sites disturbed by construction of stream crossing or roadway fill, it may be necessary to incorporate "armoring" in the design of a structure to allow the water course to stabilize after construction. Riprap, gabion structures, and other measures are commonly used to armor stream banks and drainage ways from the erosive forces of flowing water. These measures must be sized and installed in such a way that they effectively resist erosive water velocities. Stone used for riprap should be free from weakly structured rock, soil, organic material and materials of insufficient size, all of which are not resistant to stream flow and would only serve as sediment sources. Outlets for drainage facilities in erodible soils commonly require rip-rapping for energy dissipation (FSH 7709.56B, and Std. FS Spec. 619).

The intent of the regulations and clauses is to protect the integrity of stream channels, and minimize adverse impacts to the channel and downstream resources and beneficial uses. To list all of the regulations that would be implemented to protect and restrict channel alterations, would require a small book. The following items however, highlight some of the principal provisions incorporated into the TSC that will govern channel protection in the sale area.

1. Care shall be taken to cause only the minimum necessary disturbance to the natural appearance of the area. Streambank vegetation shall be protected except where its removal is absolutely necessary for completion of the work [SCPA Rule 9,1(c) and TSC Provisions B6.3 and C6.50];
    a. All streambanks will be avoided by design.
2. If the channel is damaged during construction, it will be restored as nearly as possible to its original configuration without causing additional damage to the channel;
3. Purchaser shall repair all damage to a stream course if the Purchaser is negligent in their operations, including damage to banks and channel, to an acceptable condition as agreed to by the certified Sale Administrator and Purchaser's representative;
4. All project debris shall be removed from stream course, in an agreed manner that will cause the least disturbance. (B6.5 Stream course Protection). Specifically:
    a. Whenever possible trees shall be felled, bucked, and limbed in such a manner that the tree or any part thereof will fall away from any Class I streams. Slash that enters Class I streams as a result of harvesting operations shall be continuously removed, as will other debris that enters Class I streams whenever there is a potential for stream blockage or if the stream has the ability for transporting such debris. Material removed shall be placed five feet slope distance above the ordinary high water mark [FPA Rule 3.f.i];
    b. Material to be removed will be all logging debris that is less than six inches in diameter and less than six feet long;
        ii. Slash and other debris that enters Class II streams whenever there is a potential for stream blockage or if the stream has the ability for transporting the debris shall be removed immediately following skidding and placed above the ordinary high water mark [FPA Rule 3(f)(ii)].

Material to be removed will be all logging debris that is less than six inches in diameter and less than six feet long.

PRACTICE 14.18 - Erosion Control Structure Maintenance

OBJECTIVE: To insure that constructed erosion control structures are stabilized and working effectively.

EFFECTIVENESS: High

COMPLIANCE: No directly related FPA Rule

IMPLEMENTATION: TSC provision B6.66 requires that during the period of the contract, the Purchaser shall provide maintenance of soil erosion control structures constructed by the Purchaser until they become stabilized, but not for more than one year after their construction. After 1 year, any erosion control work needed is accomplished through performance bond earmarked for that use. TSC provision C6.6(F) requires the Purchaser to maintain erosion control structures concurrently with his operations under the sale and in any case not later than 15 days after completion of skidding each unit or subdivision.

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 14.22 - Modification of the Timber Sale Contract

OBJECTIVE: To modify the Timber Sale Contract if new circumstances or conditions indicate that the timber sale will cause irreversible damage to soil, water, or watershed values.

EFFECTIVENESS: High

COMPLIANCE: No directly related FPA Rule

IMPLEMENTATION: Over time, the Forest Service adopts new policies and direction that amend how we address timber harvest operations. An example is the recent change in direction to leave some large organic debris in stream channels instead of removing it all. In cases such as this, modifications to the TSC would occur under provisions B2.37 or B8.32.

If evidence indicates that unacceptable impacts would occur to soil and water resources if the sale was harvested as planned, the Forest Service Representative will request the Contracting Officer to gain Regional Forester advice and approval to proceed with a resource environmental modification, mutual cancellation, or unilateral cancellation of the Timber Sale Contract as allowed by TSC Provisions B8.3 or B8.33. If the decision is for a resource environmental modification, once the action is approved by the Regional Forester, the appropriate Line Officer will assign an interdisciplinary team to make recommendations of implementation.

A). This provision applies to all units.

PRACTICE 15.02 - General Guidelines for the Location and Design of Roads and Trails

OBJECTIVE: To locate and design roads and trails with minimal soil and water resource impact while considering all design criteria.

EFFECTIVENESS:

1. Route location ground-truths the results of transportation planning and provides site-specific information on possible problem areas (Gray and Megahan, 1981; Cline et. al., 1981; Megahan and Kidd, 1972; King and Gonsior, 1980);
2. Designed and controlled cut slopes, fill slopes, road width, and road grades effectively reduce sediment production by fitting the roads to the land (Bethalmy and Kidd, 1966; Burroughs, Watts, King, and Hanson, 1985; King, 1979; Megahan, 1978).

COMPLIANCE: FPA Rules 4.b.i,ii,iii & 4.c.i – Meets SCA Rules 9,7 - Meets

IMPLEMENTATION: The following listed items are incorporated in general road location and design guidelines for minimizing impacts on water quality:

Design:

1. Roads shall be planned no wider than necessary to safely accommodate the anticipated use and equipment needs . Cut and fill volumes shall be minimized by designing the road to fit natural terrain features as closely as possible. As much of the excavated material as possible shall be used in fill sections. Minimum cuts and fills shall be planned, particularly near stream channels [FPA Rule 4.b.ii]

Location:

1. Utilize natural benches, follow contours, avoid long, steep road grades. Balance cut/fill where possible to avoid waste areas;
2. Embankments and waste shall be designed so that excavated material may be disposed of on geologically stable sites [FPA Rule 4.b.iii];
3. Avoid slumps and slide-prone areas, and steep sidehills;
4. Road construction shall be minimized within stream protection zones. Areas of vegetation shall be left or re-established between roads and streams [FPA Rule 4.b.i and Standard Road Specifications-Special Project Specification 204.01];
5. Where possible, locate turnouts and turn-arounds at least 200 feet from water bodies or riparian zones. Where placement within 200 feet is necessary due to safety considerations, emphasize erosion control measures to protect water quality; i.e additional windrowing, seeding, etc.

Stream crossing sites:

1. Minimize the number of stream crossings, and choose stable sites. Major culverts will be sized, based on hydrologic analysis, to function effectively at 50-year peak flows, without water backing up. These culverts will be tested to withstand 100-year peak flows without failing. All other live streams will be sized, based on hydrologic analysis, for 20 year peak flows with maximum headwater depth ratios of 1.2, and withstand 50 year peak flows without failing;

Road drainage: SEE SWCP 15.07

1. Locate and design roads and trails to drain naturally by appropriate use of out-sloping, rolling dips, and grade changes, where possible. Cross drains will be installed in ditched areas to 1) carry intercepted flow across constructed areas; 2) to relieve the length of undrained ditch; and 3) to reduce disruption of normal drainage patterns. Road and trail drainage should be channeled to effective buffer areas, either natural or manmade, to maximize sediment deposition prior to entry into live water;
2. Ditch lines and road grades will be designed to minimize unfiltered flow into streams. A rolling dip, relief culvert or similar structure will be installed as close as practical to crossings to minimize direct sediment and/or water input directly into streams. Route the drainage through SMZ, buffer strips, or other sediment settling structures where possible;
3. Roads shall be planned to drain naturally by out-sloping or in-sloping with cross drainage and by grade changes where possible. Dips, water bars and/or cross drainage will be planned when necessary [FPA Rule 4(b)(iv)];

Relief culverts and roadside ditches shall be planned whenever reliance upon natural drainage would not protect the running surface, excavation, or embankment. Culvert installations shall be designed to prevent erosion of the fill. Drainage structures shall be planned to achieve minimum direct discharge of sediment into streams [FPA Rule 4.b.v].

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 15.06 - Mitigation of Surface Erosion and Stabilization of Slopes:

OBJECTIVE: To minimize soil erosion from road cutslopes, fillslopes, and travelway.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA Rule 4.c.iii & d.ii - Meets

IMPLEMENTATION: Areas requiring mitigation of surface erosion will occur during the life of the timber sale contract. When these are found, the following provisions will be implemented.

a. All disturbed areas associated with road construction and reconstruction will be seeded. The first seeding will be applied as soon as practical after cuts and fills are brought to grade within seeding seasons as established in specification 625. A second seeding in the fall or spring season following road construction will be required where original seeding did not adequately revegetate exposed soil area;

b. Where surface erosion is occurring because of inadequate vegetative cover, additional seeding and re-fertilization will occur using recommended seed and fertilizer mixes. A T108 specification covers re-seeding of cut slopes if bared by the purchaser's maintenance operation. If the purchaser has done his required seeding, or bare spots are not caused by the purchaser, revise the KV Plan to cover costs;

c. Where ditches are carrying erosion products into stream channels, straw bale and erosion cloth ditch blocks will be installed to "short-circuit" the delivery. Seeding of the eroding surfaces, and seeding of the stored sediment in the ditch will also be accomplished. If problem areas are known before contract award, add C6.602# to require cross ditching on segments of road;

d. Where either straw bale/erosion cloth structures are not felt to be effective, underdrains or other measures will be installed to drain the ditches onto suitable ground, or at least reduce erosion impacts to the stream. If problem areas are known before contract award, add C6.602# to require cross ditching on segments of road;

e. Slumping of cutslopes will require a combination of both mechanical and vegetative controls. If/when this problem is found, a solution will be determined in consultation with Engineers and resource specialists and appropriate actions taken to remedy the situation or minimize adverse impacts.;

Additional underdrains and/or french drains will be constructed where intercepted moisture is encountered on incised stream approaches. Erosion control blankets and straw bales will be used to dissipate ditch scour and stabilize fill slopes.

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)).
5. For New Construction and Reconstruction - The following criteria will be incorporated into the road:

    a. Design:

    i. The temporary road will be constructed as an outsloped road that follows the natural terrain. Following use: the purchaser will obliterate this road by restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding if needed. The purpose of this requirement is to minimize potential for increasing sediment production and delivery.

    ii. The reconstruction will include increasing pipe sizes or changing design on many of the existing stream crossings to provide fish passage (if needed) and pass 100 year flood discharges and prevent diversion of streamflow by the road.

    iii. Unstable cut and fill slopes will be stabilized.

    iv. Additional relief culverts will be installed to very frequently cross drain the road. Distances between relief pipes will generally not exceed 200 to 250 feet.

    v. The grade of outsloped and insloped roads will be varied with graded rolling dips, drivable dips, or drivable waterbars to frequently cross drain surface water and to safely return water to stream channels in the event the culvert plugs.

    vi. Gravelling will be used on native road surfaces to reduce surface erosion - especially near stream crossings. A minimum of a 4 inch lift is recommended.

    vii. During and following operations on out sloped roads, retain out slope drainage and remove berms on the outside except those intentionally constructed for protection of road grade fills.

viii. Construct cross drains and relief culverts to minimize erosion of embankments. Minimize the time between construction and installation of erosion control devices. Use riprap, vegetative matter, downspouts and similar devices to minimize erosion of the fill.

ix. Prior to fall or spring runoff, install drainage structures or cross drain uncompleted roads that are subject to erosion;

x. Install relief culverts at a minimum grade of 1 percent greater than road gradient;

xi. Energy dissipaters or downspouts will be placed below problem culvert outlets (Reconstruction item).

xii. Roads restricted after use will also have erosion control measures in place prior to final pull-out. Roads to be closed by any closure device other than a gate will be decommissioned.

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 15.13 - Controlling In-Channel Excavation

OBJECTIVE: To minimize downstream sedimentation by insuring that all in-channel excavations are carefully planned.

EFFECTICENESS: High

COMPLIANCE: SCA Rule 9,1(a) - Meets

IMPLEMENTATION: Location and method of stream crossings will be designed and agreed to prior to construction. The following items highlight some of the principal provisions incorporated into the TSC that will govern channel protection:

1. Construction equipment may cross, operate in, or operate near stream courses only where so agreed to and designated by the Forest Service prior to construction (B6.5, B6.422). Crossing of perennial stream channels will be done in compliance with the specifications in the Stream Channel Alteration Act Rules and Regulations and included in the project specifications.
2. No construction equipment shall be operated below the existing water surface except that fording the stream at one location only will be permitted, and work below the water level that is necessary for culvert bedding or footing installations will be permitted to the extent that it does not create unnecessary turbidity or stream channel disturbance [SCA Rule 9,1 (a) and Standard Road Specifications-Special Project Specification 204.04].

3. Wheeled or track laying equipment shall not be permitted to operate within 5 feet slope distance of the apparent high water mark of Class II streams and 75 feet of Class I streams. (C6.6 Erosion Prevention and Control).
4. Construction of any hydraulic structures in stream channels will be in compliance with the Rules and Regulations pertaining to the Stream Channel Protection Act, Title 42, Chapter 38, Idaho Code).

PRACTICE 15.14 - Diversion of Flows Around Construction Sites

(See also Practice 15.13)

OBJECTIVE: To restore the natural course of any stream as soon as practical if the stream is diverted as a result of timber management activities.

EFFECTIVENESS: High

COMPLIANCE: Meets SCA Rule

IMPLEMENTATION: Flow in stream courses may only be diverted if the Forest Service deems it necessary for the contractor to do the job. Such a diverted flow shall be restored to the natural stream course as soon as practicable and, in any event, within the period stated in Stream Channel Alteration Act Rules and Regulations. Stream channels impacted by construction activity will be restored to their natural grade, condition, and alignment. (Std. FS Spec. 206, 206A).

1. On perennial Class I and II streams dewatering shall be accomplished prior to excavation for culvert installation;
2. Filter cloth, erosion control blankets, plastic, straw bales, and rip-rap can be used to keep live water from contacting new fill during culvert installations;

When dewatering of stream crossings is required, a non-erodeable conduit, flex pipe or geotextile fabric will be used. Diversion dams above the crossing shall be hand constructed. Sediment traps shall be constructed below the stream crossing.

PRACTICE 15.15 - Stream Crossings on Temporary Roads

(See also Practice 15.13)

OBJECTIVE: To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.

EFFECTIVENESS: Moderate

COMPLIANCE: SCA Rules - Meets

IMPLEMENTATION: Culverts, temporary bridges, low-water crossings, or log-fords will be required on all temporary roads and crossings. Streams that will have flowing water during the life of the temporary crossing will normally use culverts or a bridge. The number of temporary crossings will kept to the minimum needed for access.

a. Temporary crossings on temporary roads will be removed when no longer needed, and any fills will be removed and the channel restored to pre-project condition (TSC B6.62, C6.62#);
b. Material from temporary road and skid trail stream crossings will be removed and streambanks restored to an acceptable condition. (B6.62 Temporary Roads);

Temporary crossings on temporary roads will only be allowed where anticipated or calculated flow is 40 CFS or less (approx. 48" CMP). Flow situations greater than this will normally not allow temporary crossings. Larger temporary crossing structures may be allowed following IDT review.

PRACTICE 15.16 - Bridge and Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)

(See also Practice 15.13)

OBJECTIVE: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

EFFECTIVENESS: High

COMPLIANCE: SCA Rule - Meets

IMPLEMENTATION: The following preventive measures will be included in contract specifications for such installations:

1. Diverting stream flow through or around project sites if needed during construction in order to minimize erosion and downstream sedimentation. Active streams will be de-watered or diverted during culvert installations;
2. Erodible material shall not be deposited into live streams;
3. Any material stockpiled on floodplains shall be removed before rising waters reach the stockpiled material;
4. During excavation in or near the stream course, it may be necessary to use suitable cofferdams, caissons, cribs or sheet piling. This will usually be the case where groundwater is contributing a significant amount of water to the immediate excavation area. If any of the aforementioned devices are used, they will be practically watertight and no excavation will be made immediately outside of them;
5. Water pumped from foundation excavation shall not be discharged directly into live streams, but shall be pumped into settling ponds or into locations where water will not re-enter water;

All fill material shall be placed and compacted in horizontal lifts. Areas to be filled shall be cleared of all vegetation, debris, and other materials that would be objectionable in the fill [SCPA Rule 9,1(d) and Standard Road Specifications-Special Project Specification 203.15].

PRACTICE 15.17 - Regulation of Borrow Pits, Gravel Sources and Quarries

OBJECTIVE: To minimize sediment production from borrow pits, gravel sources, and quarries, and limit channel disturbances in those gravel sources suitable for development in floodplains.

EFFECTIVENESS: High

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: Minimize opportunities for erosion from Borrow pits and gravel sources from entering streams.

1. Complete any crushing and/or screening of excavated bedload away from any active stream channels and minimize future opportunities for waste materials to enter area streams, even under flood conditions;
2. Identify opportunities to minimize erosion from existing borrow pits within the drainage;

If development of new rock sources are needed within the watershed, complete a pit development plan or rock source development plan which outlines all mitigation measures needed to control future erosion at the rock source.

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 15.22 - Road Surface Treatment to Prevent Loss of Materials

OBJECTIVE: To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production.

EFFECTIVENESS: Stabilization of road surface and ditch lines over 6 percent with competent rock (rock that does not rapidly disintegrate) is often over 90 percent effective (Burroughs, et.al., 1983a, 1983b, 1984, 1985; King and Burroughs, 1988). High

COMPLIANCE: No directly related FPA Rule

IMPLEMENTATION: On timber sale roads, the Purchaser shall undertake measures to prevent excessive loss of road material if the need for such action has been identified. Road surface treatments may include: watering, applying magnesium chloride, sealing, aggregate surfacing, chip-sealing, or paving.

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 - Decommissioning of Temporary Roads

OBJECTIVE: To reduce sediment generated from temporary roads by decommissioning them at the completion of their intended use.

EFFECTIVENESS: High

COMPLIANCE: FPA Rule 4.d.v. - Meets

IMPLEMENTATION: Effective decommissioning is generally achieved through a combination of the following measures: (TSC)

1. Road effectively drained and blocked;
2. Temporary culverts and bridges removed and any modified channel slopes stabilized and revegetated;
3. Road returned to resource production through revegetation (native species, or trees);

Sideslopes reshaped and stabilized.

a). This provision applies to the temporary road and skid trail construction in units 24 and 29.

PRACTICE 18.02 - Formulation of Fire Prescriptions

OBJECTIVE: To provide for soil and water resource protection while achieving the management objective through the use of prescribed fire.

EFFECTIVENESS: High

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: The prescription elements are defined by the interdisciplinary team during the environmental analysis. Field investigations are conducted to identify site-specific conditions, which may affect the prescription. Both the optimum and tolerable limits for soil and water resource needs should be established. Prescription elements will include such factors as fire weather, slope aspect, soil moisture and fuel moisture, which influence the fire intensity. These elements have a direct effect on whether or not a litter layer remains after burning and whether or not a water repellent layer is formed. The amount of remaining litter significantly affects erosion rates, water quality and runoff volumes.

PRACTICE 18.03 - Protection of Soil and Water from Prescribed Burning

OBJECTIVE: To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris form entering surface water.

EFFECTIVENESS: High

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: Forest Service and/or other crews are used to prepare the units for burning. This includes water barring firelines and reducing fuel concentrations. The interdisciplinary team identifies Riparian Areas and soils with water repellant tendencies as part of the environmental analysis. Some of the techniques used to prevent soil erosion and water quality degradation are: (1) construct water bars in fire lines; (2) reduce fuel loadings in drainage channels; (3) maintain the integrity of the Riparian Area; (4) avoid intense fires, which may promote water repellency, nutrient leaching, and erosion; (5) retain or plan for sufficient ground cover to prevent erosion of the burned sites and (6) removal of all debris added to stream channels as a result of prescribed burning, unless debris is prescribed to improve fisheries habitat.

i. Foaming agents will not be used for water control lines where any of the category INFS buffers have been applied nearer units which these channels could carry the material to intermittent or perennial streams;

ii. Machine constructed firelines will not be used on the sensitive landtypes displayed in Figures 3.5;

iii. Firelines must be frequently waterbarred (not to exceed 50 foot spacing when going up and down the hill);

iv. Maintain large organic debris appropriate to the habitat type (see "Managing Coarse Woody Debris in the Forests of the Rocky Mountains" by Graham et. al. 1994);

v. Limit prescribed burning to those times when surface soil moisture is above 25 percent to reduce the potential for damage from hot burns (Guideline developed by J. Neihoff, USFS – IPNF).

Standard Widths Defining Interim RHCAs

(USDA FS, 1995; INFS, pp. A-5, A-6; PF Doc. CR-0039)

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

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

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

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

a) The extent of landslides and landslide-prone areas;

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

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

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

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

INFS Standards and Guidelines (USDA A7-13; 1995)

Only INFS standards and guidelines that apply to the range of alternatives for the Deerfoot P-Pine 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 alternatives within RHCAs in the project area. In some units, non-commercial (i.e. ladder fuel reduction) treatments were deemed necessary in order to reduce fuel hazards and loading. This form of activity would meet the intent of silvicultural practices that would not retard RMOs and avoid adverse effects to inland native fish (see Fire/Fuels) by preventing long-term RMO damage or reduction.

***Effectiveness*:** *High. No commercial harvest is to occur within the RHCAs.*

Roads Management (A-7-8)

RF-1. Cooperate with Federal, Tribal, State, and county agencies, and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain Riparian Management Objectives.

The proposed activities are all on USFS publicly managed lands and the activities associated with the project 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:

a. Completing watershed analyses prior to construction of new roads or landings in Riparian Habitat Conservation Areas (RHCAs) within priority watersheds.

This project area is not within an INFS priority watershed nor is any activities (e.g. roads, landings, etc.) are proposed within RHCAs so no watershed analysis is required.

b. Minimizing road and landing locations in Riparian Habitat Conservation Areas.

No new roads or landings are proposed within RHCAs under any of the action alternatives.

***Effectiveness*:** *High.*

c. Initiating development and implementation of a Road Management Plan or a Transportation Management Plan. At a minimum, address the following items in the plan:
    1. Road design criteria, elements, and standards that govern construction and reconstruction.
    2. Road management objectives for each road.
    3. Criteria that govern road operation, maintenance, and management.
    4. Requirements for pre-, during-, and post-storm inspections and maintenance
    5. Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives such as protection of the road surface.
    6. Implementation and effectiveness monitoring plans for road stability, drainage, and erosion control.
    7. Mitigation plans for road failures.

The interdisciplinary team (IDT) evaluated access and road improvement needs within the project area. The project includes several opportunities to improve road surfaces and decommissioning.

The interdisciplinary team (IDTeam) evaluated access and road improvement needs within the project area (i.e. Deerfoot RAP process). Several access options were critically reviewed and selected based on the implementation of these actions having the least impact on all resources. The project includes several opportunities to improve road surfaces.

***Effectiveness*:** *Moderate. The Roads Analysis Process (RAP) will be employed to assist in making these management decisions.*

d. Avoiding sediment delivery to streams from the road surface.
    1. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe.

This standard is applied directly for the proposed temporary road(s).

***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.*

e. Avoiding disruption of natural hydrologic flow paths.

Roadwork associated with this project previously that included decommissioning and culvert crossing removal has been completed. Any road maintenance, reconstruction and construction will follow the intent of preventing or blocking natural hydrological flow paths as part of contract design.

Effectiveness: *High. Road reconstruction projects would restore the hydrologic flow paths.*

f. Avoid sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RHCAs in priority watersheds.

None of the streams in the Deerfoot Project Area are listed as priority watersheds.

Effectiveness: *High. Sidecasting of snow and/or soils would be prohibited at all stream crossings*

RF-3. Determine the influence of each road on the Riparian Management Objectives. Meet Riparian Management Objectives and avoid adverse effects on inland native fish by:

a. Reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or that retard attainment of Riparian Management Objectives, or do not protect priority watersheds from increased sedimentation.

b. Prioritizing reconstruction based on the current and potential damage to inland native fish and their priority watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of Riparian Habitat Conservation Areas.

c. Closing and stabilizing; or obliterating and stabilizing; roads not needed for future management activities. Prioritize these actions based on the current and potential damage to inland native fish in priority watersheds, and the ecological value of the riparian resources affected.

The proposed road reconstruction and maintenance described in Chapters II and III originate from the above standards. The Proposed Action would meet this standard.

Effectiveness: *High. Existing roads are proposed for reconstruction with the Timber Sale Contract, so the likelihood that the projects would be completed is high.*

RF-4. Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-year flood, including associated bed load and debris, where those improvements would/do pose a substantial risk to riparian conditions. Substantial risk improvements include those that do not meet design and operation maintenance criteria, or that have been shown to be less effective than designed for controlling erosion, or that retard attainment of Riparian Management Objectives, or that do not protect priority watersheds from increased sedimentation. Base priority for upgrading on risks in priority watersheds and the ecological value of the riparian resources affected. Construct and maintain crossings to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

The proposed road crossing improvements originate from the above standard. The proposed action would meet this standard.

Effectiveness: *High. There are no stream crossings for any of the system or temporary roads proposed. There is a culvert upgrade to meet 100-year flow events and a culvert relief pipe proposed for installation under the Proposed Action.*

RF-5. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

Through previous land management activities within the project area these types of crossings were inventoried and upgraded to provide and maintain fish passage, under the current proposed system road construction (0.6-miles) and temporary road and skid road construction (total = 1.0-miles) in the Deerfoot Project Area there were no identified locations that road crossings would be placed on fish bearing streams. Decommissioned roads and subsequent culvert have been previously removed within the project area and hence would automatically follow this standard.

***Effectiveness*:** *High. There are currently no crossings that are known fish barriers in the project area. The proposed road design would maintain fish passage.*

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 units described in Chapters 2 and the Fire/Fuels Specialist Report (Chapter 3) originate from the above standards. The action alternatives would meet this standard.

***Effectiveness*:** *High. Planting of long-lived tree species to provide for large woody debris recruitment would follow prescribed burning within the RHCAs.*

FM-5. Immediately establish an emergency team to develop a rehabilitation treatment plan to attain Riparian Management Objectives and avoid adverse effects on inland native fish whenever a wildfire or a prescribed fire burning out of prescription significantly damages Riparian Habitat Conservation Areas.

The proposed fires/fuels management direction described in the Fire/Fuels Specialist Report originates from the above standards. The action alternatives would meet this standard.

***Effectiveness*:** *Moderate to High. Prescribed fire in the project area is designed to meet these standards.*

General Riparian Area Management (A-12)

RA-1. Identify and cooperate with Federal, Tribal, State and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.

This project does not adversely affect instream flows.

RA-2. Trees may be felled in Riparian Habitat Conservation Areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.

Slashing of the understory may occur within RHCAs in order to accomplish burning and planting of long-lived species such as cedar, larch, and white pine.

RA-3. Apply herbicides, pesticides, and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on inland native fish.

By following the BMPs (Appendix A) and fisheries criteria as listed in the Coeur d'Alene River Ranger District Noxious Weed FEIS (CR-028), all alternatives would meet this standard.

***Effectiveness*:** *High. Standards would be met as required by the Coeur d'Alene River Ranger District Noxious Weed FEIS (CR-028).*

RA-4. Prohibit storage of fuels and other toxicants within Riparian Habitat Conservation Areas. Prohibit refueling with Riparian Habitat Conservation Areas unless there are no other alternatives. The Forest Service must approve refueling sites within a Riparian Habitat Conservation Area or Bureau of Land Management and have an approved spill containment plan.

Effectiveness: *High. This is a standard BMP that is part of the timber sale contract.*

RA-5. Locate water-drafting sites to avoid adverse effects to inland native fish and instream flows, and in a manner that does not retard or prevent attainment of Riparian Management Objectives.

Effectiveness: *Moderate to High. This standard would be applied in the prescribed burn plans associated with the Deerfoot P-Pine 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: *Moderate to High. The previously implemented watershed restoration projects originated from the above standard. The proposed action 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. Cooperation at the multiple levels as listed occurred within the framework for developing the proposed activities of this project and that future resource management has worked and will continue to work with the Hayden Lake Watershed Association with their developed plans for the Hayden Lake system.*

Fisheries and Wildlife Restoration (A-13)

FW-1. Design and implement fish and wildlife habitat restoration and enhancement actions in a manner that contributes to attainment of the Riparian Management Objectives.

Effectiveness: *High. Improvements to culverts (i.e. upgrades), road decommissioning, and riparian plantings are habitat enhancement actions that have been 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.*

APPENDIX C
Past Activities

Introduction

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 cataloging should provide sufficient detail to allow for analysis of the differences between prior projects and proposed projects, which could provide the information necessary to consider alternatives that might have less impact on the environment. Within the EA we have provided information of relevant past, present and reasonably foreseeable projects/activities that have occurred, are occurring, or are proposed to occur within each of the resource cumulative effects areas examined in this analysis.

The Council on Environmental Quality (CEQ), whose responsibility it is to coordinate federal environmental efforts and work closely with agencies and other White House offices in the development of environmental policies and initiatives, provided guidance to federal agencies on the consideration of past actions in cumulative effects analysis (CEQ Memorandum to the Heads of Federal Agencies regarding Guidance on the Consideration of Past Actions in Cumulative Effects Analysis, June 24, 2005; PF Doc. CR-026). CEQ stated that "the environmental analysis required under NEPA is forward looking, in that it focuses on the potential impacts of the proposed action that an agency is considering. Thus, review of past actions is required to the extent that the review informs agency decision makers regarding the proposed action," (CEQ memo, p. 1) They further state, "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 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 memo p. 2).

With respect to past actions, during the scoping process and subsequent 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 memo p. 3).

The 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 aide 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 (specifically related to roads and timber harvest) is the result of science and our ongoing monitoring actions.

Past Activities in the Deerfoot Resource Area

The analysis of existing conditions in Deerfoot Resource Area included both natural events and management-related activities. Natural events include disturbances such as floods, fire, insects, and disease. For a detailed discussion of these disturbances, please refer to the Aquatics, Fire/Fuels and Forest Vegetation sections in Chapter 3.

Past management activities on National Forest System lands in the Deerfoot Resource Area were queried from the District's Timber Stand Management Record System (TSMRS) database and checked against timber maps, aerial photographs, and ground surveys. The database contains some information about past harvest in the Deerfoot Resource Area from as early as 1924 to the present. Information regarding activities from before the mid-1970's was drawn from district timber sale records and historic references, including maps, photographs and newspapers. Information on private timber harvest is based on aerial photograph interpretation.

Past vegetation management activities are summarized in Table B-1; acres are specific to the resource area, and the same stand may have had harvest occur more than once. Some activities span decades, but were grouped into one decade for summary purposes. Unnamed activities are also included in the summary. Refer to the Project File documents for more specific detail.

Table C-1. Description of Past Vegetative Management Activities in the Deerfoot Resource Area.

Timing	Category	Project Name or Vicinity	Description
1924-1929	Timber Harvest	1924 Mokins Creek 1924 Mokins Cr. Salvage 1926 Yellowbanks Cr.	153 Acres of salvage and liberation harvesting. Associated construction of logging trails.
	Railroad Construction	Ohio Match Railroad	The Ohio Match Railroad was constructed in 1924 through the Resource Area.
1930-1939	*No Activities Recorded*		
1940-1949	Timber Harvest	1945 South Stump Creek	157 acres of salvage harvesting.
	Planting	1947 Mokins Creek	29 acres of planting in the head of Mokins Creek
1950-1959		1959 Mokins Creek	87 acres of salvage and 398 acres of shelterwood harvesting.
1960-1969	Timber Harvest	Hells Canyon Horse Ridge 1 Yellowbanks Ridge Hayden Cr. Thinning Horse Ridge Unnamed projects	1960 acres of thinning, 104 acres of liberation, 9 acres of regeneration harvesting. 82 acres of non-commercial release and weeding was also completed.
1970-1979	Timber Harvest	Hayden Creek WP Unnamed projects	85 acres of salvage followed by 82 acres of hand piling. 12 acres of commercial thinning. 424 acres of non-commercial release, weeding or other tree improvement.
1980-1989	Timber Harvest	Yellow Down Unnamed projects	7 Acres of salvage followed by lopping and burning of landing slash.
	Prescribed Burning	Unnamed	196 acres of prescribed burning to improve wildlife habitat, 5 acres of broadcast burning.
	Private Timber Harvest	N/A	281 acres of thinning, shelterwood and seed tree harvesting in Mokins, Stump and Nilson Creeks.
1990-1999	Timber Harvest	Deersham Yellow Stacel Deerforks Hayden Fuelbreak Hayden Salvage Mokins Ice Salvage Ice Hayden Heli McLeans/Nilson Ice Backdoor Ice	1043 acres of salvage, shelterwood, clearcut, thinning and special (fuelbreak) harvesting.Most harvesting was followed slashing, prescribed burning, and/or planting in subsequent years.
	Prescribed Burning	1992 Unnamed	107 Acres of wildlife burning.
	Private Timber Harvesting	N/A	1079 acres of thinning, shelterwood salvage, group selection, special cuts and seed tree harvesting in Mokins, Stump, Jim and Nilson Creeks.
2000-2007	Timber Harvest	Nilson Beetle Salvage Yellow Horse Beetle Backdoor Ice Deerforks SDA Beetle Stump Jumper	738 acres of salvage, shelterwood, thinning and seed tree harvesting. Most of the post-harvest work including slashing, leave tree protection, noxious weed treatment, prescribed burning and planting has been completed on these units, although some burning and planting is still planned.

APPENDIX D
Specific Unit Information

The following tables provide specific unit information under the Proposed-Action Alternative. No management activities are proposed under the No-Action Alternative; therefore there is no information provided here regarding that alternative. Please refer to Chapter 2 for a complete alternative description.

Table D-1. Specific Unit Information, Proposed-Action Alternative

Unit	Acres	Fuels Treatment
50	22	Prescribed Burn
51	27	Prescribed Burn
52	55	Prescribed Burn
53	6	Prescribed Burn
54	122	Prescribed Burn
55	52	Prescribed Burn
56	88	Prescribed Burn
57	309	Prescribed Burn
58	205	Prescribed Burn
59	197	Prescribed Burn
60	33	Prescribed Burn
61	44	Prescribed Burn
62	68	Prescribed Burn
63	29	Prescribed Burn
Total	**1257**	

Table D-2. Specific Harvest Unit Information, Proposed-Action Alternative.

Unit	Acres	Harvest Treatment	Yarding	Fuels Treatment
1	28	Shelterwood	Skyline	underburn
2	66	Shelterwood	Helicopter	underburn
3	8	Thin	Skyline	underburn
4	21	Shelterwood	Helicopter	underburn
5	29	Shelterwood	Skyline	underburn
6	44	Shelterwood	Tractor	underburn
10	45	Shelterwood	Skyline	underburn
11	3	Shelterwood	Tractor	underburn
12	48	Shelterwood	Skyline	underburn
13	38	Shelterwood	Skyline	underburn
14	2	Shelterwood	Skyline	underburn
15	10	Shelterwood	Tractor	underburn
16	66	Shelterwood	Skyline	underburn
17	5	Shelterwood	Helicopter	underburn
20	4	Shelterwood	Helicopter	underburn
23	7	Shelterwood	Tractor	underburn
24	53	Shelterwood	Skyline	underburn
25	38	Shelterwood	Helicopter	underburn
28	14	Shelterwood/Thin	Tractor	underburn
29	33	CC w/ reserves	Skyline/swing	underburn
30	30	Shelterwood	Skyline	underburn
31	16	Shelterwood	Helicopter	underburn
Total	**608**			

APPENDIX E
Concerns Not Addressed in Detail

A. Introduction

Some concerns are either addressed through alternative design or are outside the scope of this project. There is no detailed discussion of these concerns in Chapter 3 because they are either not relevant to the project or its resources, they are beyond the scope of the project, or they have been addressed by virtually eliminating any potential effects through alternative design (described in Chapter 2). The following concerns were briefly considered and subsequently eliminated from further study for the reasons stated below.

B. Threatened, Endangered and Sensitive Plant Species

There would be no effect to Threatened plant species under either alternative. A complete analysis of Threatened plants is included in the Biological Assessment (PF Doc. TES-39). There are no Endangered plants listed by the U.S. Fish and Wildlife Service for the Idaho Panhandle National Forests. While some Sensitive plant individuals that were not detected during field surveys may be impacted by implementation of projects on National Forest System lands, cumulatively, these effects constitute a very low level of impacts to Sensitive plant populations or suitable habitat. Refer to the Project Files for TES Plants for supporting information.

C. Noxious Weeds

While existing infestations of certain weed species may continue to increase on National Forest System lands and adjacent private lands, features of the Proposed-Action Alternatives (discussed in Chapter 2) would serve to minimize (but not totally eliminate) the risk of weed spread due to project-related activities. Features designed to reduce the spread of noxious weeds include such measures as: contract clauses requiring construction equipment washing (CT 6.351), grass seeding landings and temporary roads, and pre-treatment of timber sale roads to reduce weed infestations. Please refer to Section 2.5 (Features of the Proposed Action) and the Project Files for Noxious Weeds for supporting information.

The following table lists roads within the Resource Area that would be treated under contract clause CT 6.27 or equivalent to reduce the risk of weed spread. All weed treatments would be conducted in accordance with provisions contained in the Coeur d'Alene River Ranger District Noxious Weed Environmental Impact Statement (USDA Forest Service, 2000; PF Doc. CR-029).

Table E-1. Noxious weed treatment sites in the Deerfoot Resource Area.

Road #	Miles	Weed Species Present
206	10.7	Spotted knapweed, Common tansy, Dalmatian toadflax
406B	3.2	Spotted knapweed, St. Johns wort
406C	2.2	Spotted knapweed, St. Johns wort
406F	3.0	Spotted knapweed, St. Johns wort
406G	2.2	Spotted knapweed, St. Johns wort
406K	0.3	Spotted knapweed, St. Johns wort,
1535	2.9	Spotted knapweed, St. Johns wort, Common tansy
1562A	3.2	Spotted knapweed, St. Johns wort
1562B	0.4	Spotted knapweed, St. Johns wort
Total	**28.1**	

D. Threatened/Endangered Wildlife Species

Canada lynx: Canada lynx have a low probability of occurrence in the Deerfoot Resource Area. The Bitterroot Divide and the St. Joe Divide provide the best habitat for lynx found on the Coeur d'Alene River Ranger District. The Deerfoot Resource Area provides poor quality habitat for lynx due to low elevations, lack of spruce/fir habitats and isolation from preferred habitat by distance and by lack of connected, preferred forest types. The resource area consists primarily of low-elevation drier site habitats and is adjacent to urban

development associated with the towns of Hayden and Coeur d'Alene. It is not within, or near, an LAU or designated lynx travel corridor. Lynx are considered only an infrequent transient in the watershed.

Grizzly bear: Grizzly bears are not likely to occur on the Coeur d'Alene River Ranger District. The District is not currently within a designated recovery area (USFWS 1997; PF Doc. WL-R8). Quality grizzly bear habitat does not exist in the Coeur d'Alene Mountains and there have been no sightings of grizzly bears in the Deerfoot Resource Area. Sightings were in the eastern half of the District near the border with the Kaniksu Forest and over 10 air miles from the watershed. The project would not result in the long-term degradation of grizzly bear habitat, nor would any expansion of human settlement occur as a result of the project. The Deerfoot Resource Area is not within or near a grizzly bear recovery zone.

Woodland Caribou: Caribou have no probability of occurrence in the Deerfoot Resource Area. Although there is some evidence that Caribou once ranged as far south as the Salmon River, currently this species is not known to occur outside the Selkirk Mountains in Idaho. Although some potential habitat exists in other portions of northern Idaho the species is known to exist in only in the one area.

E. Sensitive Wildlife Species

Peregrine falcon: Peregrine falcons are seasonal migrants nesting in northern temperate regions and wintering southward. Peregrines typically nest on cliffs higher than 100 feet with overhanging ledges and a vertical surface that provides protection from predation. Foraging areas are associated with nest sites and can include wooded areas, marshes, grasslands, and open water. There are no known historic eyries (nest sites) or potential nesting habitat in the Deerfoot Resource Area. Peregrines have been observed around the Rathdrum Prairie in fall as they are migrating to winter range, and one individual was reported north of I-90 in 1993. Based on lack of suitable or potential habitat, and that there are no known occurrences of the species in the watershed, no further analysis is warranted.

Common loon: Loons are large, heavy-bodied birds with their legs and feet positioned far to the rear. This allows them to propel quickly under water but renders them unable to walk well on land or to take off without a long expanse of water. They require lakes of at least 10 acres in order to gather enough speed to take off. Lakes suitable for nesting are 10 acres or larger with emerging shoreline vegetation and secluded areas for nesting and brood rearing (USDA Forest Service, 1989). Loons have been sighted on Coeur d'Alene Lake and Fernan Lake. Since loons are located on lakes, the proposed actions would not affect habitat for loons. No further analysis and discussion is necessary for this species.

Harlequin duck: Harlequin ducks were sighted on the Coeur d'Alene River and the North Fork of the Coeur d'Alene in 1991. No harlequin ducks were found on the Coeur d'Alene River District during two years of surveys. Most recently, a pair of harlequin ducks were spotted in Fern Creek during the summer of 1999. In 1982, harlequin ducks were seen in Tepee Creek. In 1987, there was a pair seen on the east end of the district, northeast of Cathedral Peak in the Coeur d'Alene River. There are no suitable streams for harlequin ducks within or adjacent to the Deerfoot Resource Area. Therefore, no further analysis or discussion is warranted.

Black swift: The black swift is a long-distance neotropical migratory bird that breeds in western North America in close association with mountain waterfalls or sea-side cliffs (Knorr 1961, Foerster 1987, Dobkin 1994 all in Schultz et al 2001). Known breeding populations are disjunct and are associated with highly specialized habitat characteristics (Schultz 2001). There are five known black swift nests near a waterfall over 20 miles east of the Deerfoot Resource Area. This habitat is very specific and no similar habitat is found within the Deerfoot Resource Area. Based on lack of suitable or potential habitat, and that there are no known occurrences of the species in the watershed, no further analysis is warranted.

Northern bog lemming: The northern bog lemming is listed as a sensitive species on the IPNF. There are no known observations of this species on the Coeur d'Alene River Ranger District. The range of the northern bog lemming is not thought to extend south of the Kaniksu Forest on the IPNF (Reichel and Beckstrom, 1993). For these reasons activities in the Deerfoot Resource Area would have no effect on this species. Due to the absence of the species from the District and the resource area, no further analysis of this species is warranted.

Townsend's big-eared bat: Townsend's big-eared bats use caves and cave-like structures for hiberncula in winter and for summer roosts by nursery colonies. They occasionally use bridges and old buildings for roosting and in some places have been known to use building attics as nursery sites. There no adits in the Resource Area.

F. Air Quality

The Idaho Panhandle National Forests is a member of the Montana/Idaho Airshed Group, which is composed of members who conduct a "major" amount of prescribed burning and the regulatory and health agencies that regulate this burning. The intent of the Airshed Group is to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction (PF Doc. FF-42).

The monitoring unit of the Montana/Idaho Airshed Group coordinates burning and smoke emissions to minimize smoke accumulation and provides smoke dispersion forecasts and air quality monitoring support for burners in the Airshed Group. Between January 2nd and February 27th of each year, members submit to the Monitoring Unit a list of all prescribed burns planned for the current calendar year through an Internet-based reporting system for tracking and reporting prescribed fires. This burn reporting system allows members to build preseason burn lists directly into the program's master database, propose burns on a daily basis, and report accomplished burns. Daily during the burning season, burners post proposed burns before 11:00 am; the monitoring unit considers proposed burns together with expected ventilation or smoke dispersion conditions and existing air quality to determine burn recommendations for the following day (with concurrence from the Idaho Department of Environmental Quality). These procedures limit smoke accumulations to legal, acceptable limits. The District strictly complies with these procedures, and has had no air quality violations.

Historically, prescribed burning on the Coeur d'Alene River Ranger District occurs in the spring and fall seasons over a total time span of 45 to 60 days during each season. All burning complies with federal, state and local regulations. Prescribed burning during spring or fall would generate less smoke than a summertime wildfire (PF Doc. FF-42).

G. Cultural Resources

All known heritage resource sites would be protected under either alternative, as directed by the Cultural Resource Management Practices (Forest Plan, Appendix FF). Surveys to locate cultural (heritage) resources have been completed in the Deerfoot Resource Area; a single Class I (a site eligible for the National Register) was identified. The Forest Cultural Resource Specialist has made a preliminary determination that the project would have *No Adverse Effect* to known cultural resource sites in the Deerfoot Resource Area based on design features meant to resolve, minimize, reduce or mitigate adverse effects to Class I properties (see Chapter 2, Section 2.5, Part H).

Any future discovery of cultural resource sites would be inventoried and protected if found to be of cultural significance. A decision would be made to avoid, protect, or mitigate effects to these sites in accordance with the National Historic Preservation Act of 1966.

H. Environmental Justice

Environmental Justice Executive Order 12898, issued in 1994, ordered federal agencies to identify and address the issue of environmental justice; i.e. adverse human health and environmental effects that disproportionately impact minority and low-income populations. Based on the composition of the affected communities and the cultural and economic factors, neither alternative would have an adverse effect to human health and safety or environmental effects to minority, low-income, or any other segments of the population. Both alternatives would be consistent with the Environmental Justice Executive Order.