FINDING
PROPOSED BOORMAN PEAK
TIMBER SALE

An interdisciplinary team (ID Team) has completed the Environmental Analysis (EA) for the proposed Department of Natural Resources and Conservation (DNRC) Boorman Peak Timber Sale. After a thorough review of the EA, project file, public correspondence, DNRC policies, standards and guidelines, and the State Forest Land Management Plan (SFLMP), the following decisions have been made:

I. Alternative Selected

Two alternatives are presented and were fully analyzed in the EA:

No Action Alternative

Under the No Action Alternative, no timber harvesting as proposed would occur, and no revenue would be generated for the beneficiary from the sale of the timber. No new roads would be built, traditional recreational uses would continue. Forest and plant succession would also continue, influenced mainly by the forces of nature such as insects and disease outbreaks, windthrow, and/or wildfire.

Action Alternative

The Action Alternative proposes the sale and harvest of an estimated 5-8 million board feet (MMBF) of timber from approximately 581 acres. The silvicultural treatment being prescribed is designed to maintain the old-growth characteristics of the stands while removing the more shade-tolerant species (such as sub-alpine fir, spruce, and grand fir), and creating openings to allow for the regeneration of seral species (ponderosa pine and western larch). Small clumps of trees would be left to further emulate the effects of fire disturbance and to benefit wildlife. To access harvest units and improve transportation systems, approximately 7 miles of new road would be constructed. It is estimated that the sale of timber would generate approximately $900,000 for the common schools trust.

For the following reasons, I have selected the Action Alternative as presented:

a. The Action Alternative meets the Project Objectives of 1) developing an appropriate road system 2) manage for the long-term forest productivity and biodiversity as detailed in the SFLMP and associated Rules, and 3) produce revenue for the beneficiary, in this case the common school trust.

b. The analysis of identified issues did not reveal information compelling the DNRC not to implement the timber sale.

c. The Action Alternative identifies mitigation measures to address issues raised by the public which include effects on vegetation, soil productivity, air and water quality, wildlife habitat, and aesthetics.

II. Significance of Impacts

a. Vegetation

The prescribed silvicultural treatments would promote long-term productivity and biodiversity by means of regeneration harvest and thinning. The specific goals of the treatments are to promote the retention and regeneration of seral species such as western larch and ponderosa pine, improve the overall health and vigor of the trees, and maintain the old-growth characteristics of the stand. These treatments would likely result in the stands within the project area maintaining old-growth characteristics longer because of the presumed increase in health and vigor. Old-growth maintenance treatments would also encourage a seral species cohort as replacement in the upper canopy.

Mitigation measures to control the potential increased risk of weed establishment, such as washing equipment prior to use, grass seeding disturbed areas, and herbicide treatment of existing or introduced weed populations will be required as part of the sale.

b. Soils

The harvesting of 581 acres of timber, building 7 miles of new road would have no impact on slope stability and detrimental impact on 15% or less of the soils in the project area. New road will be built and logging activities will be conducted to Best Management Practices (BMP) standards, such as using proven methods timed with soil conditions that reduce soil compaction and displacement.

c. Air and Water Quality

Some dust and smoke may be created from the log hauling and slash burning associated with the sale. The sale is outside the impact zone and steps will be taken to ensure the amount and duration is minimized (dust abatement if

necessary and appropriate, and burning during periods of approved open burning)

There are no stream channels in the project area so would be minimal risk if any for road surface drainage into any stream or water body. The Hydrologist input also predicts little or no increase in water yield due to harvesting activities beyond what is existing now.

a. Wildlife

Impacts to wildlife essentially revolve around connectivity of security cover, snags and course woody debris for cavity nesters, and big game winter range (thermal cover), and the effects of these on Lynx, Gray Wolf, Fisher Flammulated Owl, Pileated Woodpecker, and Elk

The potential negative effects due to loss of connectivity and cavity nester habitat will be mitigated by the retention of more trees in draws and ridgelines and retention of at least 2 snags per acre and an additional 2 snag recruits per acre. Minor adverse effects are anticipated for species that rely on closed canopy mature stands as documented in the Environmental Effects sections of the Wildlife Chapter 3.6.4 of the EA. Within the Timber Sale area, approximately 133 acres will continue to provide thermal cover and snow intercept to elk and white-tailed deer.

Overall I do not view these impacts as enduring or significant given the wildlife mitigation measures required as part of this project in section 2.3.2 of the EA.

b. Social/Cultural

The treatment of stands within the 581 acre project area will change the current view. The result is the old-growth treatment areas would leave a mosaic overstory. Views would be more open than current views.

Recreational use in the Boorman Peak sale area may change slightly, especially during hunting season. The entire Boorman Peak section has had no roads, so recreational use was light. With new roads it is expected that non-motorized recreational use will increase somewhat.

c. Precedent Setting and Cumulative Impacts

The project area is located on State owned lands which are “principally valuable for the timber that is on them or for growing timber or for watershed” (MCA 77-1-402). The proposed timber sale is similar to past projects that have occurred on

state trust lands in the area. Since the EA does not identify future actions that are new or unusual, the proposed timber sale is not setting precedence for a future action with significant impacts.

Taken individually and cumulatively, the identified impacts of the proposed timber sale are within threshold limits. Proposed timber sale activities are common practices and none of the project activities are being conducted on important fragile or unique sites. The proposed timber sale conforms with the management philosophy adopted by DNRC in the SFLMP and is in compliance with existing laws, policies, guidelines, and standards applicable to this type of proposed action.

Upon review of the above primary issues considered as part of this EA I find that none of the project impacts are regarded as severe, enduring, geographically widespread, or frequent. Further, I find that the quantity and quality of various resources will not be adversely affected to a significant degree. I find no precedent for future actions that would cause significant impacts, nor do I find conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that the identified adverse impacts will be avoided, controlled, or mitigated by the design of the project to an extent that they are not significant.

III. Should DNRC prepare an Environmental EIS?

Based on the following, I find that an EIS does not need to be prepared:

a. The EA adequately addressed the issues identified during project development and displayed the information needed to make the decisions.
b. Evaluation of the potential impacts of the proposed timber sale indicate that no significant impacts would occur.
c. The ID Team provided sufficient opportunities for public review and comment during project development and analysis. Public concerns were incorporated into project design and analysis of impacts.

Greg Poncin
Kalispell Unit Manager
MT DNRC

Boorman Peak TIMBER SALE

Final Environmental Assessment

Prepared by

Montana Department of Natural Resources & Conservation – Trust Lands Management Division
Northwestern Land Office
Kalispell Unit

November 2009

BOORMAN PEAK TIMBER SALE
FINAL ENVIRONMENTAL ASSESSMENT
Cover Sheet

Proposed Action: The Montana Department of Natural Resources and Conservation (DNRC) proposes forest management activities on forested State Trust lands. The planned activities would include the sale and harvest of approximately 5 to 8 million board feet (MMBF) of timber from up to 581 acres of state land located approximately 10 miles west of Kalispell, Montana. Project activities would focus on improving the current and future productivity of forest stands in the project area through the use of timber harvesting, establishing a road system to facilitate current and future forest management in the project area, and ensuring that the future forest stands meet the objectives of biodiversity and productivity for the benefit of the associated school trusts. Management activities would include harvest from up to 581 acres located in Section 16 of Township 28 North, Range 23 West. If selected, the proposed action would be implemented as early as the winter of 2009.

Type of Document: Final Environmental Assessment

Lead Agency: DNRC, Northwest Land Office, Kalispell Unit.

Decision Maker: Greg Poncin
Kalispell Unit
2250 Hwy 93 N
Kalispell, MT 59901-2557
406-751-2263

Project Leader: Mark Slaten
Kalispell Unit
2250 Hwy 93 N
Kalispell, MT 59901-2557
406-751-2264

How to Read this Environmental Assessment (EA)

To read this EA more effectively, carefully study this page. We have designed and written this document (1) **to provide** the Decision Maker with sufficient information to make an informed, reasoned decision concerning the proposed Boorman Peak Timber Sale and (2) **to inform** members of the affected and interested public of this project so that they may express their concerns to the Decision Maker.

The EA consists of the following chapters:

1 Purpose and Need
2 Alternatives
3 Existing Conditions & Environmental Effects
4 List of Preparers
5 List of Agencies and Persons Consulted
Appendices A, B, and C

Chapters 1 and 2 together serve as a summary overview of the Boorman Peak Timber Sale project. These two chapters have been written so that non-technical readers can understand the potential environmental, technical, economic, and social consequences of taking and not taking action.

Chapter 1 introduces the Boorman Peak Timber Sale. It provides a very brief description of the proposed Boorman Peak Timber Sale and then explains three key things about the project:

(1) the environmental, social, and economic issues relevant to and within the scope of the project,
(2) the decisions that the Decision Maker must make concerning this project, and
(3) the relevant laws, regulations, and consultations with which the DNRC must comply.

Chapter 2 provides detailed descriptions of the No Action and the Action Alternative. It includes a **summary comparison** of the predicted effects of these two alternatives on the human environment, providing a clear basis for choice between the alternatives for the Decision Maker.

Chapter 3 briefly describes the past and current conditions of the relevant resources (*issues*) in the project area that would be meaningfully affected, establishing a part of the baseline used for the comparison of the predicted effects of the alternatives. Chapter 3 also presents the detailed, analytic predictions of the potential consequences of implementing the No Action Alternative and the Action Alternative. These predictions include the short and long term direct, indirect, and cumulative effects of implementing the alternatives.

Chapter 4 lists the preparers of the Environmental Assessment

Chapter 5 lists agencies and persons consulted

Appendix A lists references

Appendix B displays the initial proposal

Appendix C displays letters from interested parties and DNRC responses

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS IV

1.0 CHAPTER 1: PURPOSE & NEED 1

1.1 DESCRIPTION OF PROPOSED ACTION 1
1.2 NEED FOR ACTION 2
1.3 OBJECTIVES OF THE BOORMAN PEAK TIMBER SALE PROJECT 3
1.4 COOPERATING AGENCIES AND ENTITIES WITH JURISDICTION AND REQUIRED PERMITS 3
1.5 OTHER RELEVANT ENVIRONMENTAL REVIEWS IN THE AREA 4
1.6 DECISIONS TO BE MADE 4
1.7 SCOPE OF THE ENVIRONMENTAL ANALYSIS 4
1.7.1 HISTORY OF THE BOORMAN PEAK PLANNING PROCESS 4
1.7.2 ISSUES STUDIED IN DETAIL 5
1.7.3 ISSUES ELIMINATED FROM DETAILED STUDY 6

2.0 CHAPTER 2: ALTERNATIVES 1

2.1 INTRODUCTION 1
2.2 DEVELOPMENT OF ALTERNATIVES 1
2.3 ALTERNATIVE DESCRIPTIONS 1
2.3.1 NO ACTION ALTERNATIVE 1
2.3.2 ACTION ALTERNATIVE 1
2.4 SUMMARY COMPARISON OF ALTERNATIVES 5

3.0 CHAPTER 3: EXISTING CONDITIONS & ENVIRONMENTAL EFFECTS 1

3.1 INTRODUCTION 1
3.2 GENERAL DESCRIPTION OF THE AREA 1
3.3 VEGETATION 1
3.3.1 ANALYSIS METHODS 1
3.3.2 ANALYSIS AREA 2
3.3.3 EXISTING CONDITIONS 3
3.3.4 ENVIRONMENTAL EFFECTS 8
3.4 HYDROLOGY AND WATERSHED RESOURCES 13
3.4.1 INTRODUCTION 13
3.4.2 ANALYSIS METHODS 14
3.4.3 ANALYSIS AREA 14
3.4.4 WATER USES AND REGULATORY FRAMEWORK 15
3.4.5 EXISTING CONDITIONS 15
3.4.6 ENVIRONMENTAL EFFECTS 16
3.4.7 REFERENCES 17

3.5 GEOLOGY AND SOILS 17
3.5.1 INTRODUCTION 17
3.5.2 ANALYSIS METHODS 18
3.5.3 ANALYSIS AREA 18
3.5.4 RELEVANT PLANS, RULES, AND MITIGATIONS 18
3.5.5 EXISTING CONDITIONS 19
3.5.6 ENVIRONMENTAL EFFECTS 20
3.5.7 APPENDIX – MAPS 23
3.6 WILDLIFE ANALYSIS 25
3.6.1 INTRODUCTION 25
3.6.2 ANALYSIS AREAS 25
3.6.3 ANALYSIS METHODS 26
3.6.4 COARSE FILTER WILDLIFE ANALYSIS 26
3.6.5 FINE-FILTER ANALYSIS 33
3.6.6 WILDLIFE MITIGATIONS 53
3.7 AIR QUALITY 56
3.7.1 ANALYSIS AREA 56
3.7.2 EXISTING CONDITIONS 56
3.7.3 ENVIRONMENTAL CONSEQUENCES 56
3.8 AESTHETICS 57
3.8.1 EXISTING CONDITIONS 57
3.8.2 ENVIRONMENTAL CONSEQUENCES 57
3.9 RECREATION 57
3.9.1 ANALYSIS METHODS 58
3.9.2 ANALYSIS AREA 58
3.9.3 EXISTING CONDITIONS 58
3.9.4 ENVIRONMENTAL CONSEQUENCES 58
3.10 ECONOMICS 58
3.10.1 EXISTING CONDITIONS 59
3.10.2 ENVIRONMENTAL CONSEQUENCES 59
3.12 SHORT TERM VERSUS LONG TERM PRODUCTIVITY 62

4.0 CHAPTER 4: LIST OF PREPARERS 1

5.0 CHAPTER 5: LIST OF AGENCIES AND PERSONS CONSULTED 1

APPENDIX A: REFERENCES I

APPENDIX B: INITIAL PROPOSAL IV

APPENDIX C: COMMENTS RECEIVED I

LIST OF TABLES

Table 2.4- 1. Summary comparison of project activities for each alternative. 2-5
Table 2.4- 2. Summary comparison of achievement of project objectives. 2-5
Table 2.4- 3. Summary of environmental effects of both the No Action and the Action Alternatives. 2-6

Table 3.3- 1. Current cover types and desired future conditions for the Kalispell Unit. 3-4
Table 3.3- 2. Current and DFC cover types for the Boorman Peak project area. 3-5
Table 3.3- 3. Boorman Peak project area: percentage of tree species composition by board foot volume from 1920's and 2008 inventory estimates. 3-5
Table 3.3- 4. Historic and current age class distribution. 3-5
Table 3.3- 5. Old-growth acreage by FOGI class in the project area. 3-6
Table 3.3- 6. Proportion (%) of analysis area by stand structure and estimated patch size. 3-6
Table 3.3- 7. Pre- and post-harvest cover type acreage in the Boorman Peak project area. 3-9
Table 3.3- 8. Pre-and post-harvest FOGI classification in the Boorman Peak project area. 3-10

Table 3.4- 1. Ashley Creek analysis area ownership. 3-16

Table 3.5- 1. Slope distribution with the project area. 3-19
Table 3.5- 2. Soil map units and associated management limitations found in the Boorman Peak project area. 3-20
Table 3.5- 3. Previous soil monitoring projects conducted on DNRC timber sales with ground based harvesting representative of the Boorman Peak project area. 3-21
Table 3.5- 4. Forecasted detrimental soil impacts within harvest units of the Boorman Peak project area. 3-21

Table 3.6- 1. Status of species considered in the fine filter analysis for this proposed project. .3-33
Table 3.6- 2. Existing Acres and Proportions of Lynx Habitat Elements on DNRC Lands in the Project Area and Cumulative Effects Analysis Area. 3-37
Table 3.6- 3. Acreage Changes in Lynx Habitat Elements Following Implementation of the Alternatives Considered. 3-38
Table 3.6- 4. Changes in Lynx Habitats in the Cumulative Effects Analysis Area. Acres of Lynx Habitats After Each Alternative and Proportion Each Suitable Habitat Represents Out of All Suitable Lynx Habitats in the Cumulative Effects Analysis Area. 3-38

Table 3.10- 1. Demographic information for Flathead County and Montana. 3-59
Table 3.10- 2. Employment and income in selected industry categories for Flathead County. ...3-59
Table 3.10- 3. Estimated revenues and expenditures from the Cliff Lake timber sale*. 3-60

LIST OF FIGURES

Figure 1-1. Boorman Peak timber sale vicinity map. 1-2
Figure 2-1. Boorman Peak Timber Sale Action Alternative harvest map. 2-4
Figure 3.4-1. Analysis areas initially considered with Hodge Creek (yellow) dismissed. 3-15

Figure 3.5- 1. Soil map units and their spatial extent within the Boorman Peak project area 3-23

ACRONYMS AND ABBREVIATIONS

ARMs	Administrative Rules of Montana
BMPs	Best Management Practices for Forestry in Montana
CWD	coarse woody debris
DBH	diameter at breast height
DFC	desired future conditions
DNRC	Montana Department of Natural Resources and Conservation
EA	Environmental Assessment
FWP	Montana Department of Fish, Wildlife, and Parks
ID Team	Interdisciplinary Team
Land Board	Montana Board of Land Commissioners
MCA	Montana Code Annotated
MEPA	Montana Environmental Policy Act
MNHP	Montana Natural Heritage Program
SFLMP	State Forest Land Management Plan
SLI	stand level inventory
SMZ	streamside management zone
TPA	trees per acre
USFS	U.S. Forest Service

1.0 CHAPTER 1: PURPOSE & NEED

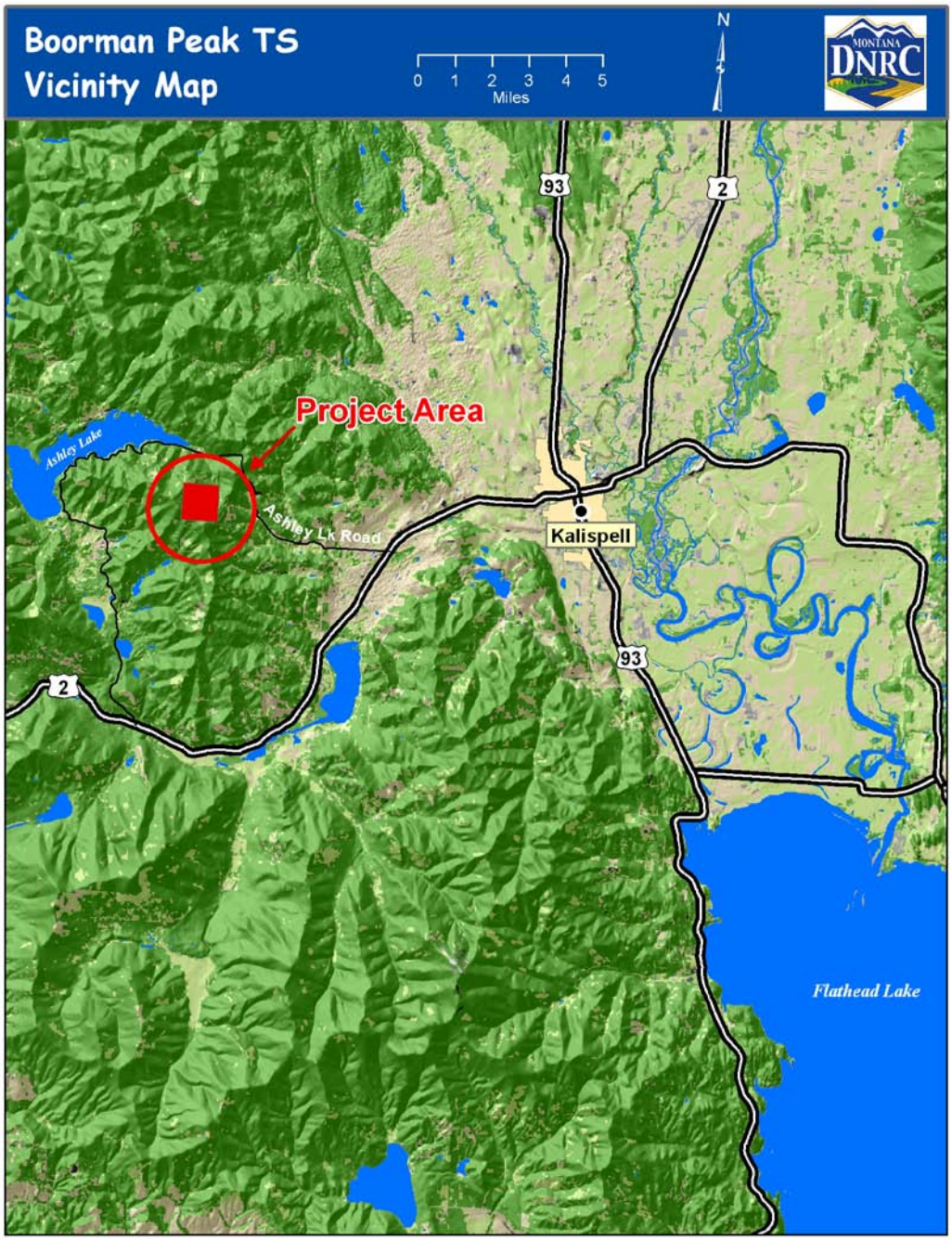
1.1 DESCRIPTION OF PROPOSED ACTION

The Kalispell Unit, Montana Department of Natural Resource and Conservation (DNRC) is proposing the Boorman Peak Timber Sale Project on State School Trust lands west of Kalispell, MT. The project proposes:

- Timber harvesting
- New road construction
- Reforestation activities

The project area is comprised of 636 acres and is located approximately 10 miles west of Kalispell, Montana in Section 16, Township 28 N, Range 23 W (Figure 1-1). State Trust lands within the project area share property boundaries with Plum Creek Timber Company. If the Action Alternative is selected, an estimated 5 to 8 million board feet (MMBF) of timber would be sold and harvested from approximately 581 acres. Old-growth maintenance treatments would be used to treat these 581 acres. To access harvest units, approximately 7 miles of new road construction would be required.

Figure 1-1. Boorman Peak timber sale vicinity map.



1.2 NEED FOR ACTION

The lands involved in the proposed project are held by the State of Montana for the support of the Common Schools Trust. The State Board of Land Commissioners (Land Board) and DNRC are required by law to administer these Trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, Montana Code Annotated [MCA]).

On June 17, 1996, the Land Board approved the State Forest Land Management Plan (SFLMP). The SFLMP provides the philosophy adopted by DNRC through programmatic review (DNRC 1996a) for managing School Trust Lands. This philosophy states that:

> *Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream… In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objective* (DNRC 1996b:1-2).

Many of the stands in the project area have high tree densities and increasing amounts of shade tolerant species that, due to the lack of natural or human-caused disturbance, would soon dominate the stands. Continued increases of the mixed conifer component in the project area would move these stands away from desired future conditions (DFC). These stands lack seral regeneration that is necessary to maintain and promote DFC in these stands. Active management in these stands would produce revenue for the Common Schools Trust while encouraging future stand conditions and development that reflect programmatic goals of managing for healthy and biologically diverse forests.

In 2003, the DNRC adopted Administrative Rules for Forest Management (Administrative Rules of Montana [ARMs] 36.11.401 through 456; DNRC 2003). The ARMs provide DNRC personnel with consistent policy, direction, and guidance for the management of forested trust lands. Together, the SFLMP and the ARMs define the programmatic framework for this project.

1.3 OBJECTIVES OF THE BOORMAN PEAK TIMBER SALE PROJECT

In order to meet the goals of the management philosophy adopted through programmatic review, the DNRC has developed the following project objectives:

> Roads: Develop a manageable, maintainable road system with the minimum number of road miles that provides appropriate access for short and long term management and use of these Trust lands.
>
> Timber: Manage for long-term forest productivity and biodiversity through the use of silvicultural treatments that: a) promote the development of desired future conditions in the project area by retaining and/or regenerating western larch and other seral species appropriate for the sites, b) increase stand vigor and reduce the amount of insect or disease infected trees, and c) will retain/maintain old-growth status across the project area.
>
> Economics: Produce net revenue for the Trust. Harvest approximately 5 - 8 MMBF of timber to generate revenue for the appropriate school Trusts and provide a sufficient amount of sawlog volume to contribute to the annual sustainable yield from Trust Lands as mandated by 77-5-223, MCA.

1.4 COOPERATING AGENCIES AND ENTITIES WITH JURISDICTION AND REQUIRED PERMITS

Plum Creek Timber Company controls the road access to the project area. Coordination would be required to obtain the appropriate road use permits/agreements.

Montana FWP has jurisdiction over the management of fisheries and wildlife in the project area.

The DNRC holds a Major Open Burning Permit issued by the Montana Department of Environmental Quality (DEQ). This permit allows DNRC to conduct prescribed wildland open burning activities in Montana, and all burning must be done in accordance with the terms specified in the permit. The DEQ regulates and enforces air quality standards in Montana. The DNRC is also a member of the Montana/Idaho Airshed Group which was formed to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction. The Airshed Group monitors

burning activity and also provides dispersion forecasts to members that indicate favorable conditions for burning without impacting air quality.

1.5 OTHER RELEVANT ENVIRONMENTAL REVIEWS IN THE AREA

In order to address direct, indirect, and cumulative effects on many resources, the analysis incorporates past, present, and reasonably foreseeable future actions within a determined analysis area. The locations and sizes of the analysis areas vary by resource (watershed, soils, etc.) and species (grizzly bear, Canada lynx, etc.) and are further described by resource in Chapter 3. Relevant ongoing and proposed projects on DNRC lands and adjacent ownerships are considered for each resource based on the appropriate analysis area.

Effects from past DNRC projects are incorporated into databases over time and become part of the existing condition that is used in each analysis.

1.6 DECISIONS TO BE MADE

Following completion of the Final Environmental Assessment (EA), the Decision Maker (Kalispell Unit Manager) will review any public comments, the EA, and information contained in the project file. The Decision Maker will consider and determine the following:

- Do the alternatives presented in the EA meet the project's objectives?
- Are proposed mitigations adequate and feasible?
- Which alternative or combination/modification of alternatives should be implemented and why?

These decisions will be published and made available to the public. The decisions in the published documentation would become DNRC's recommendations to the Land Board. The Land Board will make the final decisions regarding implementation of actions.

1.7 SCOPE OF THE ENVIRONMENTAL ANALYSIS

This section defines and explains the scope (boundaries/limits) of the Boorman Peak Timber Sale Project. It briefly describes the history of the planning process, identifies the resource issues studied in detail, and identifies the issues eliminated from detailed study.

1.7.1 History of the Boorman Peak Planning Process

This EA was prepared in accordance with the Montana Environmental Policy Act (MEPA), which requires State government to include the consideration of environmental impacts in its decision-making process. Agencies are also required to inform the public and other interested parties about proposed projects, environmental impacts that may result, and alternative actions that could achieve the project objectives. Public scoping for the Boorman Peak Timber Sale project was initiated in April 2008 with a letter to known interested parties (Appendix B, Initial Proposal). In April 2008, DNRC solicited additional public participation by placing notices in the Kalispell's *Daily Inter Lake*. The mailing list developed for this project is in the project file. The public comment period for the initial project proposal was open for 30 days generating one letter from interested parties. After conducting intensive field surveys during May and June 2008, it was discovered that the project area had considerable amounts of old-growth timber. A decision was made to send out an additional scoping notice to the same mailing list with this updated information with a 30 day comment period. This letter was sent out on July 17, 2008. This additional scoping solicitation generated one 1 letter and 1 personal communication from interested parties. The Interdisciplinary Team (ID Team) began compiling the issues and gathering information related to current conditions in the winter of 2008 - 2009. Final issues were defined in March of 2009.

The issues and concerns identified through public scoping were summarized and used to further refine the project.

1.7.2 Issues Studied in Detail

The ID team carefully considered comments received from DNRC resource specialists, the public, and other agencies.

The ID team determined that the following issues were relevant to the decisions that must be made concerning the Boorman Peak Timber Sale project. Further, these issues directly influenced the technical design of the project including the development of the alternatives (Chapter 2, Alternatives).

Issues were grouped by general resource area (Vegetation, Watershed, etc.) and are listed below. .

***Vegetation*–**

- Timber harvesting and associated activities may affect forest stand characteristics with regards to species composition, stand age, succession, and old-growth characteristics.
- Timber harvesting and associated activities may affect stand structure and development.
- Windthrow and age associated mortality may affect timber productivity and value.
- Timber harvesting and associated activities may increase noxious weeds in the project area.
- Timber harvesting and associated activities may decrease the Kalispell Unit's percentage of old-growth acres. The Kalispell Unit currently has 3,088 acres of old-growth.

***Watershed and Hydrology* –**

- Timber harvesting and road construction has the potential to increase water yield, which, in turn, may affect erosive power, sediment production and stream channel stability.
- Timber harvesting and road construction may increase sediment delivery into streams/lakes and affect water quality.

***Soils* –**

- Soil productivity and stability may be adversely affected by forest management activities.
- Road construction and log landings sites can displace and compact surface soils which can permanently change the land use of these impacted areas from forest products to transportation and can establish corridors for the spread of noxious weeds.
- Removal of both coarse and fine woody material off site during timber harvest operations can reduce nutrient pools required for future forest stands and can affect the long-term productivity of the site.
- Ground based harvest techniques can displace and compact soils which can adversely affect the hydrologic function, soil structure and long-term productivity of the impacted area.
- Reduced infiltration capacity of an impacted soil can result in overland flow and off site erosion, typically localized to main skid trails and log landing sites.

***Wildlife* –**

- Concern was expressed that timber harvesting could reduce forested cover, which could reduce the amount of mature forested habitats available to those species that rely on them.

- Concern was expressed that timber harvesting could decrease the ability of some wildlife species to move across the landscape, which could alter their ability to use the area.
- Concern was expressed that timber harvesting could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependant upon these resources, which
- could alter their survival and/or reproductive ability.
- Concern was expressed that timber harvesting and associated activities could remove canopy closure or alter stand conditions, which could result in the reduction or modification of habitat components, leading to a decreased ability for the area to support Canada lynx.
- Concern was expressed that timber harvesting and associated activities could displace gray wolves from important habitats, particularly denning and rendezvous sites.
- Concern was expressed that timber harvesting and associated activities could alter grey wolf prey availability.
- Concern was expressed that timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.
- Concern was expressed that timber harvesting and associated activities could remove snags needed by flammulated owls for nesting.
- Concern was expressed that timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.
- Concern was expressed that timber harvesting and associated activities could reduce thermal cover on big game winter ranges, which could reduce carrying capacity of the winter range.
- Concern was expressed that timber harvesting and associated activities could reduce elk security habitat, which could affect hunter opportunity.

Illegal off-road vehicle access **–**
Local residents and adjacent property owners raised a concern about the potential to increase the illegal off-road vehicle use in the area due to easier access when the timber harvest and road building are complete.

Air Quality **–** Log hauling on native surface roads may produce levels of dust that reduce air quality in the vicinity of residences. This issue will be analyzed in terms of effects on air quality due to dust produced from log hauling and smoke produced from burning slash.

Aesthetics **–** The concern was raised that forests management activities may affect aesthetics in the project area, in regards to visual scenery. In particular, one comment did not want to see any clearcutting.

1.7.3 Issues Eliminated from Detailed Study

The ID team eliminated the following issues from detailed study because they were beyond the scope of this project or because this project would not be likely to impact them. The project file contains details dealing with these issues. This Draft EA contains no further or minimal information on these eliminated issues.

Historical, Cultural, and Archaeological Sites **–** The DNRC archaeologist requested the State Historic Preservation Officer to conduct a search of the Cultural Resource Inventory System and Cultural Resources Annotated Bibliography System databases. The results of those searches indicated that cultural

or paleontologic resources have not been identified in the project area. It is the position of the DNRC that the presence of Heritage Properties in the area of potential effects in unlikely.

Fire **–**Slash created from logging may increase fuel loadings increasing the fire hazard. These concerns will be mitigated through standard DNRC operating procedures or are very unlikely to occur. The DNRC will meet State Hazard Reduction Law requirements and treat all logging slash to meet the standards in the law. High hazard fuel reduction is required within 100 feet of homes and open roads. Hazard reduction requirements will address ground fuels that would dry out or contribute to fire danger.

Fisheries **–** During the scoping period the DNRC fisheries specialist reviewed existing GIS and available fisheries-related data for the project area and did not have any fisheries issues or comments. Fisheries resources were later dismissed from further analysis by the project hydrologist after field review of the project area and haul routes.

2.0 CHAPTER 2: ALTERNATIVES

2.1 INTRODUCTION

Chapter 2 describes the alternatives developed and considered for the Boorman Peak Timber Sale project. This chapter will introduce the No Action Alternative and the Action Alternative as well as provide summaries and comparisons of the alternatives and predicted effects of each alternative, based on the detailed environmental analysis in Chapter 3.

2.2 DEVELOPMENT OF ALTERNATIVES

The role of an ID Team is to summarize issues and concerns, develop management options within the project area, and analyze the potential impacts of a proposal on the human and natural environments.

Foresters provided the ID Team with a harvest and road proposal to accomplish and meet the desired future forest conditions on Kalispell Unit and the objectives described in Chapter 1. The proposal addresses the requirement of new road construction and management of the numerous timber stands currently experiencing a reduction in timber productivity and diminishing tree species diversity. The timber sale proposal also provides an opportunity to encourage regeneration of seral species that reflect the desired future conditions identified for the project area. The ID Team further developed the proposal within the framework of the SFLMP and the ARMs. The ID Team discussed how to address both public and internal issues, mitigations required by the ARMs, and additional mitigations that may be implemented to reduce or minimize effects related to the project.

Issues related to maintaining healthy old-growth stands, timber stand age and condition, big game winter range and other wildlife habitat concerns resulted in the development of one Action Alternative. This Action Alternative focuses on treating the highest priority area while limiting any potential adverse affects to wildlife habitat.

2.3 ALTERNATIVE DESCRIPTIONS

This section describes the elements and mitigation measures of the Action Alternative, and also includes a description of the No Action Alternative. Actions designed to protect resources during harvesting, road construction, or site preparation activities would be incorporated into a timber sale contract as contract specifications and stipulations. These specifications and stipulations would be applied to the Action Alternative and are a form of mitigation. Mitigation measures designed to reduce impacts on a particular resource are discussed in section 2.3.2 of this chapter.

2.3.1 No Action Alternative

- Timber harvesting as proposed would not occur.
- New roads would not be built.
- Recreational uses of the area, both general and special would continue to include hiking and hunting.
- Forest and plant succession would continue to be mainly influenced by the occurrence of natural events, such as insects and disease outbreaks, windthrow, or wildfire.

2.3.2 Action Alternative

The Action Alternative is designed to improve timber stand productivity and forest health within the Boorman Peak analysis area, as a necessary means for providing revenue generating opportunities in the

future, while limiting present logging and road development costs. Timber harvesting would occur to maintain or promote the desired future condition (DFC) of western larch/Douglas-fir on the moister subalpine fir (ABLA) habitat types, and the DFC of ponderosa pine or Douglas-fir on the drier Douglas-fir (PSME) habitat types. The Action Alternative would strive to move timber stands toward a more healthy and vigorous condition while maintaining old-growth characteristics. Silvicultural treatments designed for meeting the above objective would consist exclusively of old-growth maintenance treatments.

The Action Alternative would apply silvicultural treatments to 581 acres, harvesting approximately 5 – 8 MBF of timber. The old-growth maintenance treatment is explained under the Silvicultural Treatment section below and Figure 2 – 1 displays harvest unit locations.

This alternative would also require extensive road construction to access the harvest areas. Approximately 7 miles of new road would be constructed.

***Silvicultural Treatments (Timber Management)* –**

Old-growth Maintenance – This treatment is designed to maintain the old-growth characteristics of the stand while removing shade-tolerant tree species (such as sub-alpine fire, Englemann spruce, grand fir and some Douglas-fir), and creating openings to allow regeneration of seral species (ponderosa pine and western larch). This treatment would be used to maintain or move stands toward the desired future condition. Tree spacing will be variable with some larger openings in the tree canopy created to allow regeneration of seral species. At least the minimum number of large live trees to meet DNRC's old-growth definition would be retained following treatment. Small clumps of trees will be left to further emulate the natural fire regime and benefit wildlife.

The Action Alternative is based on the trust mandate, principles of the SFLMP and the associated ARMs, as well as other laws and/or rules applicable to timber harvesting activities. This alternative would, in the long term, move timber stands toward a desired age class, density, species composition, and structure. In the short term, this alternative would maintain the current old-growth status of these stands.

Mitigation Measures for the Action Alternative –

The following mitigations would be required under the Action Alternative:

Vegetation

- Grass seed new and disturbed roads and landings; spot spray new weed infestations.
- Wash logging equipment prior to use.
- Trample slash in skid trails.

Watershed and Soils

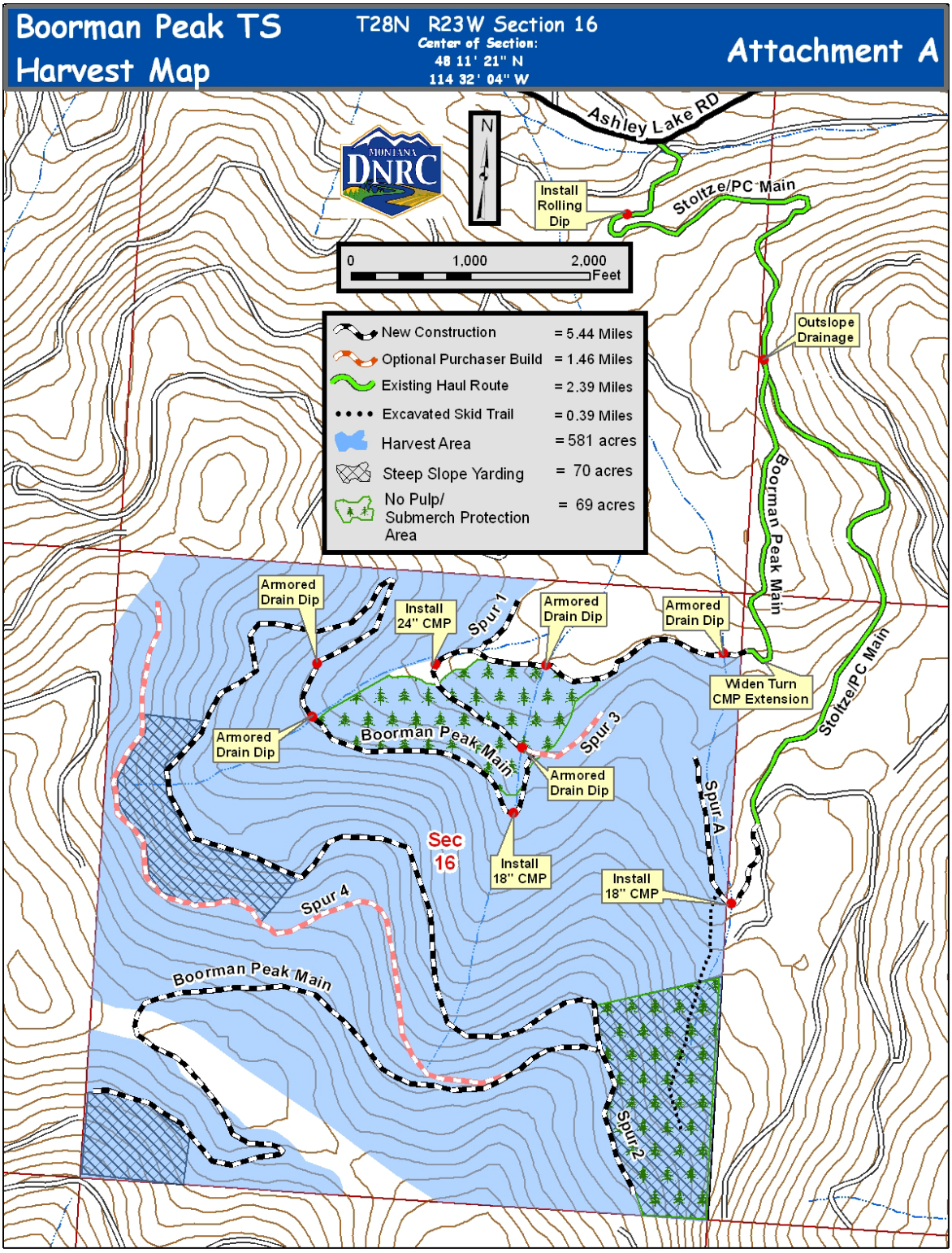
- Limit equipment operations to periods when soils are relatively dry, (less than 20% soil moisture), frozen or snow covered (12 inches packed or 18 inches unconsolidated) to minimize soil compaction and rutting, and maintain drainage features.
- Ground-based logging equipment (tractors, skidders, and mechanical harvesters) is limited to slopes less than 40% on ridges, convex slopes; and to 35% or less on concave slopes without winter conditions.
- The Forest Officer shall approve a plan for felling, yarding and landings in each harvest unit prior to the start of operations in the unit. The locations and spacing of skid trails and landings shall be designated and approved by the Forest Officer prior to construction.
- Levels of coarse and fine woody material will be retained on site as prescribed by the forest officer and recommended by the project soil scientist using guidance from the best available science (*Graham et al. 1994*). 15-20 tons/acre of material >3" is recommended for the Boorman

Peak project area with as many needles and fine material as possible which are typically retained during skidding operations.

Wildlife

- Consult a DNRC biologist if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing Threatened and Endangered Species (ARM 36.11.428 through 36.11.435) are needed.
- Manage for snags, snag recruits, and coarse woody debris according to ARM 36.11.411 through 36.11.414, particularly favoring western larch, ponderosa pine, Douglas fir, and western white pine.
- Favor western larch and ponderosa pine in retention and regeneration decisions for pileated woodpecker and flammulated owl nesting and foraging habitats.
- Effectively close roads after the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags to firewood gathering and use temporary roads wherever possible.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads.
- Manage for higher timber retention in draws and ridgelines.

Figure 2-1. Boorman Peak Timber Sale Action Alternative harvest map.



2.4 SUMMARY COMPARISON OF ALTERNATIVES

Each alternative is unique in terms of activities, achievement of project objectives, and effects that would occur. This section presents key characteristics of the alternatives, using tables to display differences and make comparisons. Table 2.4–1 provides a brief comparison of on-the-ground activities that would occur if the No Action Alternative or the Action Alternative were implemented. Table 2.4–2 provides a comparison of how each alternative would meet the project objectives identified in Chapter 1.

Table 2.4- 1. Summary comparison of project activities for each alternative.

Alternative	MMBF Harvested	Acres Treated	Acres by Harvest Method	Road Management
No Action Alternative	0 MMBF	0	Old-growth Maintenance: 0 acres	Miles new road: 0 Miles open road: 0
Action Alternative	5-8 MMBF (6 MMBF used for analysis)	581	Old-growth Maintenance: 581 acres	Miles new road: 7 Miles open road: 0

Table 2.4- 2. Summary comparison of achievement of project objectives.

Objective	Indicators	No Action Alternative	Action Alternative
Produce net revenue for the Trust and provide a sufficient amount of sawlog volume to contribute to the annual sustained yield from Trust Lands as mandated by MCA.	Stumpage receipts (dollars)	0	$900,000
Develop a manageable, maintainable road system with the minimum number of road miles that provides appropriate access for short and long term management and use of these Trust Lands.	Miles of new road	0	7
Manage for long-term productivity and biodiversity through silvicultural treatments that: a) promote DFC by the retention and/or regeneration of ponderosa pine, western larch, and other seral species appropriate for the sites, b) increase stand vigor, and c) maintain the old-growth characteristics of the stands	Acres proposed for old-growth maintenance	0	581

Table 2.4–3 summarizes the environmental effects of each alternative. Additional details of environmental effects can be found in Chapter 3.

Table 2.4- 3. Summary of environmental effects of both the No Action and the Action Alternatives.

Resource Issue	Direct & Indirect Effects	Cumulative Effects
Vegetation: Age Class and Cover Type	**No Action –** Continued movement of stands toward mixed conifer. Reduction in stand age due to higher rate of mortality and windthrow in older trees. Regeneration favors shade tolerant tree species with continued over-representation of sub-alpine fire, Douglas-fir, and Englemann Spruce. **Action –** Increase in western larch, Douglas-fir and ponderosa pine composition by removing shade tolerant species. Western larch and ponderosa pine composition would increase and bring the stand closer to historic representation of cover types.	**No Action –** Reduction in western larch and ponderosa pine composition. Diversity of age classes would decline. **Action –** Increase in western larch and ponderosa pine composition. Promote the establishment of ponderosa pine in appropriate areas.
Vegetation: Old growth stands	**No Action –** Old-growth stands would continue to develop under natural influences and continue to be at risk due to windthrow, age associated mortality, and lack of seral replacement cohorts. **Action –**Stands would likely maintain old-growth status longer due to increase in stand health and vigor.	**No Action –** Old-growth status may change dependant on tree mortality rates or wildfire occurrence. **Action –** May result in less loss of old-growth due to increase in stand health and vigor.
Vegetation: Stand Structure and Development	**No Action –** Windthrow and age associated mortality continues to threaten the upper canopy. Fuel build up would continue and potential for stand replacement fires would continue to increase. **Action –** Old-growth maintenance treatments would encourage a seral species cohort to replace the upper canopy.	**No Action –** May change dependent on tree mortality rates, or wildfire occurrence. **Action –** Acreage on the Kalispell Landscape with two-storied and un-even aged conditions would not change.
Vegetation: Timber Productivity and Value	**No Action –** Continued decline of timber productivity and continued increase in forest fuel build up. **Action –** Treatments on 581 acres would reduce the stands susceptibility to shade tolerant replacement, salvage some dead and dying trees, and improve individual tree growing conditions. Approximately 311 acres would be partially regenerated with healthy and/or disease – resistant seedlings. Stocking levels would be reduced on 581 acres improving tree growth and vigor.	**No Action –** Continued decline in tree growth and value in project area. **Action –** Improved tree growth and/or tree vigor on 581 acres or 1% of the forested acres within the Kalispell landscape.
Vegetation: Sensitive Plants	**No Action –** No direct or indirect effects anticipated. **Action -** No direct or indirect effects anticipated.	**No Action –** No cumulative effects anticipated. **Action –** No cumulative effects anticipated.
Vegetation: Noxious Weeds	**No Action** – There are currently no noxious weeds in the project area. **Action –** Site disturbance associated with	**No Action –** No cumulative effects anticipated. **Action –** Possible slight increase in

	logging 581 acres and use of roads may increase the risk and acreage susceptible to weed establishment	acreage infested with weeds.
Hydrology: Water Quality	**No Action** – Similar to existing conditions. **Action –** Due to the lack of stream channels in the project area and hydrologic connectivity to water bodies supporting beneficial uses sediment delivery in not possible. Due to these constraints, there is a low risk of low level impacts from road drainage surface water concentration and subsequent sediment production in the Boorman Peak project area.	**No Action** – – Similar to existing conditions. **Action –** The hydrologic synchronization of road surface runoff allowing erosive power to be concentrated and potentially causing local scour and erosion. The new road construction would increase road densities from 5 to 8.5mi/mi^2 in the Ashley Creek analysis area. With the proper implementation of BMP's, road surface drainage features will be properly spaced to mitigate this concern resulting is a moderate risk of low level cumulative impacts.
Hydrology: Water Yield	**No Action** – Similar to existing conditions. **Action –** Increases in water yield are not expected to be large enough to create scoured stream channels, produce measurable increases in the water level of surrounding lakes and ponds, or create surface flow to any other body of water beyond that occurring under the existing conditions.	**No Action** – Similar to existing conditions. **Action –** Harvest activities are not expected to produce measurable changes in runoff or lake levels in or near the project area. These changes would not be sufficient to cause in-channel adjustments to flows. The runoff patterns in the proposed project area are not expected to be changed by the proposal, and the projected increases are not expected to create scouring of new channels as a result of the proposed project.
Soils	**No Action –** No change from existing condition. **Action –** No impacts on slope stability. Detrimental soil impacts on 15% or less of proposed harvest area.	**No Action –** No change from existing condition. **Action** – Cumulative impacts on 20% or less of harvested areas; in most units impacts would be less than 15%.
Wildlife: Mature Forested Habitats and Connectivity	**No Action** – No near-term changes in wildlife use would be expected; wildlife favoring dense stands of shade-tolerant tree species would benefit over time, while those requiring conditions likely found under natural disturbance regimes would be somewhat underrepresented. Habitat for forested interior species and mature-stand-associated species would likely improve; however western larch and ponderosa pine, as preferred snag species, would decline in abundance over time. **Action –** Connectivity would be retained in areas of high wildlife use, such as ridgelines and draws. Old growth	**No Action** – No appreciable changes to amount of mature, forested habitats, level of harvesting, or connectivity would be anticipated. This alternative would continue to contribute to the mature forested stands within the cumulative analysis area. However, the project area would remain an island of mature forest surrounded by stands providing minimal contributions to old growth habitats for several more decades. Use by species currently found in the analysis area would be expected to continue. Potential habitat for mature-stand-

	maintenance treatments would reduce some habitats for species associated with mature stands. In general, habitat conditions in the project area would improve for species adapted to the more open forest condition, while reducing available habitat in the project area for species that prefer dense, mature forest conditions.	associated species would likely persist at current levels. **Action** – Reductions in connectivity associated with this alternative would be additive to losses associated with past and present harvesting activities Habitats for forested interior species. would be expected to be reduced. All of the acres of old growth proposed for harvest would receive maintenance type treatments, which while reducing habitat for those species relying upon closed canopy forested habitats, would promote sustainability of these old stands by reducing competition and near term fire risk and would allow them to maintain their old growth classification (Green et al. 1992).
Wildlife: Snags and CWD	**No Action –** Continued decay and decline in existing snags and trees would continue to contribute to the coarse woody debris in the project area. However, in the long-term, densities of shade-intolerant trees and resulting snags could decline as these species are replaced by increasing numbers of shade-tolerant species Wildlife species requiring snags and coarse woody debris in the project area would see immeasurable changes in available habitats until some other form of disturbance reduces these habitat attributes. **Action –** Present and future snags and CWD would be reduced due to timber harvesting on 581 acres within the project area. A minimum of two large snags (>21 in. dbh where they exist), two large snag recruits/acre (>21 in. dbh), and 5-15 tons of CWD per acre would be planned for retention within the proposed units. While the proposed harvest may reduce density of snags and their recruits in the near future through old growth maintenance treatments the sustainability of snags in the area will increase. Harvesting would reduce snags, snag recruits, and CWD levels, resulting in minor adverse effects that would affect wildlife requiring these attributes for 30-100 years.	**No Action –** Wildlife species requiring snags and coarse woody debris in the cumulative effects analysis area would see immeasurable changes in available habitats until some other form of disturbance reduces these habitat attributes. **Action –** Wildlife species that rely on snags and coarse woody debris in the cumulative effects analysis area would be expected to persist at similar levels, albeit slightly lower numbers on proposed harvest sites following treatment.
Wildlife: Canada Lynx	**No Action** – In the short-term, no changes in lynx habitat elements would be expected in the project area. Mature foraging and denning habitats would be expected to remain at similar levels or increase in the future as shade-tolerant trees develop in the	**No Action** – No appreciable change in lynx habitats would occur under this alternative except the continued maturation of stands. Across all ownerships, continued stand maturation, in the absence of other

	understory and coarse woody debris accumulates through time due to natural events. Therefore, in the short term, no effects to lynx would be expected. **Action –** Approximately 514 acres of lynx habitats would be harvested with this alternative. These prescriptions would convert available lynx habitat elements into forested travel/other habitats. In the short-term (approximately two years), lynx would likely avoid proposed harvest units that would be converted to forested travel/other habitats due to timber harvest disturbance. Minor adverse direct and indirect effects to lynx habitats that would be expected to affect Canada lynx in the project area for about 20 years following successful regeneration and forest ingrowth into harvest units.	disturbance, would move temporary non-lynx habitat towards young foraging habitat or forested travel/other habitat. Minor beneficial cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative effects analysis area for 20-40 years. **Action –** Reductions in mature foraging, denning, and forested travel/other habitats in the proposed units would not be expected to appreciably alter lynx use of the cumulative effects analysis area. Following harvesting, sufficient denning and foraging habitats would be retained to satisfy DNRC's commitment (ARM 36.11.435) of retaining 5 acres lynx denning habitats and 10 percent mature foraging or young foraging habitats in the cumulative effects analysis area. Minor adverse cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative effects analysis area for about 20 years.
Wildlife: Gray Wolf	**No Action** – No changes in available habitats or prey or level of human disturbance would be anticipated. **Action –** Wolves using the area could be disturbed by harvesting activities, and are most sensitive at den and rendezvous sites, which are not known to occur within the project area. Harvest would result in the reduction of 549 acres of big game winter range within the project area. These reductions in big game winter range may result in shifts in winter time prey availability for wolves After harvesting activities, human disturbance levels would likely revert to pre-harvest levels. Likewise, potential for any wolf use of the project area for denning and rendezvous sites would likely revert to pre-harvest levels. Minor adverse direct and indirect effects would be expected to affect gray wolves.	**No Action** – No changes would be anticipated that would alter levels of gray wolf use of the area. **Action –** The reductions that would occur under this alternative to big game winter range would not be expected to affect the overall use of the cumulative effects analysis area by wolves. Human-disturbance levels would be expected to revert to levels similar to current levels after the proposed harvesting has been completed and roads would again be closed. No substantive change in wolf use of the CE analysis area would be expected; wolves would be expected to continue to use the area in the long term (approximately 5-10 years).
Wildlife: Fisher	**No Action** – No effects to fishers would be expected under this alternative. No change to the stands providing fisher denning and foraging habitats would be expected. Human disturbance and potential trapping mortality would expect to remain at current low levels.	**No Action** – No effects to riparian or upland fisher habitats on DNRC managed lands would be expected with this alternative. No changes to landscape connectivity within the cumulative effects analysis area would be expected.

	Action – Due to lack of riparian fisher habitats within the project area as well as the reasonably dense canopy left with old growth maintenance type treatments, overall negligible changes to potential fisher habitats would occur with the proposed prescriptions. Old growth maintenance treatments will promote the sustainability of large older age class trees in the project area further improving the development and sustainability of large snags. These large snags and trees will be a source for fisher denning and resting sites in the near future (10-20 years). Minor reductions in connectivity would be expected in a landscape where connectivity has already been compromised. Minor adverse direct and indirect effects would be anticipated that would affect fisher in the project area for approximately 30 years	**Action –** Harvest would reduce the amount of the preferred fisher cover types exhibiting structural attributes for suitable habitat on DNRC owned lands in the cumulative effects analysis area from 636 acres to 87 acres. Minor reductions in landscape connectivity within the cumulative effects analysis area would occur, theses reductions would be additive to the losses associated with past timber harvesting. Minor adverse cumulative effects would be anticipated that would affect fisher in the project area for approximately 30 years.
Wildlife: Flammulated Owl	**No Action –** Existing flammulated nesting habitats within the project area would continue maturing. In the long term, stands once dominated by ponderosa pine could continue to be converted to Douglas-fir stands through succession, habitat sustainability and quality for flammulated owls would continue to decline. **Action** – Proposed timber harvest would open the canopy while favoring western larch and ponderosa pine. Elements of the forest structure important for nesting flammulated owls, including snags (a minimum of 2 snags per acre > 21 in. dbh where they exist, otherwise the next largest size class), coarse woody debris (10-15 tons per acre), numerous leave trees, and snag recruits (> 21 in. dbh where they exist, otherwise the next largest size class) would be retained in the proposed harvest units. The more open stand conditions, the retention of fire adapted tree species, and the maintenance of snags and large recruitment trees would move the proposed project area toward historical conditions, which is preferred flammulated owl habitat.	**No Action** – Flammulated owl habitats would persist in the project area in the short term (~20-30 years) until continuous encroachment of Douglas-fir renders currently suitable stands too dense to be inhabitable. Portions of the cumulative effects analysis area have been harvested in the recent past, potentially improving flammulated owl habitats by creating foraging habitats and reversing a portion of the Douglas-fir encroachment, however retention of large ponderosa pine was not necessarily a consideration in many of these harvest units; thereby minimizing the benefits to flammulated owls. **Action** – Proposed harvesting would add to the amount of the cumulative effects analysis area that has been recently harvested, which would add to the amount of foraging habitats available, but possibly at the expense of nesting habitats. Although there will be reductions in mature forested stands dominated by ponderosa pine, potential nesting habitats within the cumulative effects analysis area would not be reduced.
Wildlife: Pileated Woodpecker	**No Action** – Since no harvesting would occur, no changes in the amount of continuously forested habitats would be anticipated, and long-term, succession-related declines in the abundance of shade-	**No Action** – Since existing stands would continue to age, contain increasingly larger trees, continue becoming more structurally diverse, and experience more mortality that

	intolerant tree species, which are valuable to pileated woodpeckers would be anticipated, minor adverse indirect effects to pileated woodpeckers in the project area would be expected until some other disturbance reverses stand succession. **Action** – Since harvesting would reduce the amount of continuous forested habitats available, some snags and snag recruits would be lost, mitigation measures to retain a minimum of 2 snags/acre and 2 snag recruits/acre. The old growth maintenance silvicultural prescriptions would retain an abundance of large, healthy ponderosa pine, western larch, and Douglas-fir while promoting the regeneration of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Minor adverse direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area for 30-50 years.	could provide better foraging and nesting habitats, and no further reductions in continuous forested habitats would occur, minor beneficial cumulative effects to pileated woodpeckers in the analysis area would be anticipated. **Action** – Under this alternative, reductions in pileated woodpecker habitat would be expected. Snags, coarse woody debris, and some potential nesting trees would be retained within the project area and, future recruitment of these attributes would be enhanced through the retention of many large snag recruits through old growth maintenance treatments. The loss of pileated woodpecker habitats under this alternative would be additive to habitat losses associated with past harvesting on the cumulative effects analysis area; continued widespread use would be expected. Minor adverse cumulative effects would be anticipated that would affect pileated woodpeckers in the cumulative effects analysis area for the next 30-50 years.
Wildlife: Big Game Winter Range	**No Action –** No direct or indirect effects to big game winter range would be anticipated. Big game thermal cover in the project area would not be altered in the near term. In the longer-term, continued succession could reduce forage production while increasing thermal cover in these stands. **Action** – Timber harvest on 581 acres of the winter range would create more open stands that would be largely too open to function as thermal cover or snow intercept, thus eliminating habitat attributes that would enable concentrated winter use by deer and elk. Approximately 55 acres would continue providing thermal cover and snow intercept in areas that have been identified as heavily used by big game, such as ridge tops and draws. Moderate adverse direct and indirect effects to big game (particularly white-tailed deer) would be expected for the next 40 to 60 years.	**No Action** – No appreciable changes would be anticipated in thermal cover and snow intercept. Stands that are providing thermal cover and snow intercept would be expected to continue providing these attributes. Continued winter use of the larger winter range would be expected. No cumulative effects to big game winter range would be anticipated. **Action –** Thermal cover would be largely removed from approximately 581 acres of the deer and elk winter range, which would be additive to ongoing and past reductions across the cumulative effects analysis area. Since logging activities would create disturbance in a small portion of the cumulative effects analysis area for a relatively short term, a small percentage (5 %) of the winter range in the cumulative effects analysis area would be altered, and availability of lower-quality cover on surrounding ownerships that provides some opportunity for deer and elk should

		they be displaced, minor adverse cumulative effects to white-tailed deer would be expected for the next 40-60 years.
Wildlife: Elk Security Habitat	**No Action** – No changes in elk security cover would be expected. Since no changes to existing elk security habitat would be anticipated and continued maturation of forest cover would improve elk security habitats, and the level of human access would remain unchanged, no direct or indirect effects to elk security habitat in the project area would be anticipated. **Action –** Proposed new roads would be restricted to the general public, but could facilitate non-motorized access during the hunting season using mountain bikes, horses, and/or foot travel. Within the project area, proposed units with maintenance type treatments would likely be too open to provide elk security. Under the action alternatives, approximately 504 acres of security habitat would be altered, rendering the 527-acre patch within the project area unsuitable. Since no changes in open roads or motorized access for the general public would be anticipated that would increase hunter access, sizeable amounts of amounts of elk security habitat would be affected (504 acres), and potential for decreases in bull elk survival, moderate adverse effects to elk security habitat would be anticipated that would affect elk vulnerability risk in the project area for 20 to 30 years.	**No Action** – Since no changes in open roads, motorized access, or human access would be anticipated, and no further reductions in elk security habitat would occur, no cumulative effects to elk security habitat or hunter opportunity would be anticipated. **Action –** With the proposed action available security cover within the cumulative effects analysis area would be reduced from 5.5% to 3.8 percent, which remains well below the 30 percent minimum threshold recommended by Hillis et al. (*1991*). Continued maturation of previously harvested stands within the cumulative effects analysis area would improve hiding cover within recent harvest units and partially offset these current losses within 10 to 30 years. Since no changes in open roads or motorized access for the general public would be expected, sizable changes to non-motorized access would occur, a low to moderate amount of elk security habitat would be affected, and slightly lower than existing levels of security habitat and hiding cover would persist in the cumulative effects analysis area, low to moderate adverse cumulative effects to elk security and hunter opportunity would be anticipated that would affect elk and hunters using the cumulative effects analysis area for 10-30 years.
Air Quality	**No Action** – No change from existing condition. **Action –** The amount of smoke and dust produced in the project area would temporarily increase. The increased dust and smoke emissions are not expected to exceed air quality standards, and would be temporary, localized reductions to air quality such as currently occurs.	**No Action –** No change from existing condition. **Action –** Cumulative effects during peak burning periods may affect nearby residents for short durations. Project related traffic during dry periods in addition to current road users may affect nearby residents for short durations, as well.
Aesthetics	**No Action** – In the short term, there would be little change to the current views of the project area. No indirect effects to aesthetics were determined as a result of the No Action Alternative. **Action –** This alternative would harvest approximately 581 acres and change the	**No Action** – No other major projects are planned within the project area in the next 5 years. **Action –** Natural disturbances such as wildfires, blowdown, and insect and disease outbreaks could occur over time and change the view of the

	current view on these acres. Old-growth maintenance treatments would leave a mosaic overstory. Views would be more open than current views.	project area.
Recreation	**No Action –** Amount of use would continue at the same level. **Action –** Recreational use in the Boorman Peak Timber Sale project area may change slightly, especially during hunting season. The project area had no roads, so recreational use was light. With new roads throughout the project area, people will likely access this area more frequently using non-motorized means.	**No Action –** Amount of use would continue at the same level. **Action –** Implementation of the action alternatives may result in slightly increased levels of recreational use.
Economics	**No Action –** None of the estimated revenue for trust beneficiaries would be realized. **Action –** The School Trust income from a sale under the Action Alternative is estimated to be $900,000 enough to fund the education of 127 students for 1 year based on an average cost of $7,080 as determined by information provided by the Montana Office of Public Instruction.	**No Action –** If timber from this project is not sold this volume could come from sales elsewhere, however, the timber may be from other areas and not benefit this region of the state. Long-term deferral of harvest from this forest will impact harvest patterns, changing both the region in which the trees are harvested and the volumes taken. This will impact other areas of the state where these changes occur. **Action –** This sale will be part of the annual harvest of timber from the State of Montana Forest Trust Lands. The net revenue from this sale will add to the trust fund.

3.0 CHAPTER 3: EXISTING CONDITIONS & ENVIRONMENTAL EFFECTS

3.1 INTRODUCTION

This chapter identifies and describes those resources that may be affected by the proposed action and describes the environmental effects of each alternative on the resources. The chapter is organized by general resource categories and their associated issues introduced in Chapter 1. The descriptions of the existing conditions found in this chapter can be used as a baseline for comparison with the Action Alternative. Environmental effects described in this chapter provide the basis for the Summary of Environmental Effects in Chapter 2.

Cumulative effects from current management and foreseeable future State actions are discussed in this chapter. These include other active timber sales, those in the planning stage, ongoing maintenance, and other uses of the areas being analyzed. Direct, indirect and cumulative effects on the resources being analyzed were considered.

3.2 GENERAL DESCRIPTION OF THE AREA

The proposed Boorman Peak Timber Sale Project area is located approximately ten miles west of Kalispell, Montana and includes 636 acres of State Trust Lands. It is located within Section 16, T28N, R23W. State Trust Lands within the project share property boundaries with Plum Creek Timber Company.

3.3 VEGETATION

The vegetation section describes present conditions and components of the forest as well as the anticipated effects of both the No Action and the Action Alternatives. Issues expressed during initial scoping by the public and internally were:

- Timber harvesting and associated activities may affect forest stand characteristics with regards to species composition, stand age, succession, and old-growth characteristics.
- Timber harvesting and associated activities may affect stand structure and development.
- Age related mortality and windthrow may affect timber productivity and value.
- Timber harvesting and associated activities may increase noxious weeds in the project area.
- Timber harvesting and associated activities may decrease the Kalispell's Unit percentage of old-growth acres. The Kalispell Unit currently has 3,088 acres of old-growth.

These issues can be evaluated by analyzing the anticipated changes in current forest conditions in the project area, in conjunction with the extent and location of silvicultural treatments.

3.3.1 Analysis Methods

Administrative Rules of Montana (ARM 36.11.404) direct DNRC to promote biodiversity on state lands by using a coarse filter approach that favors an appropriate mix of stand structures and compositions on state lands, referred to as a desired future condition (DFC). Forest composition, age class distribution, cover type and structure, are used to describe current forest and stand conditions in comparison to the estimated natural forest characteristics for Montana prior to extensive influences from fire suppression, logging, and development. This analysis will compare the DFC that DNRC believes to be appropriate for the site with current stand conditions.

***Forest/Timber Analysis Methods* –**

The methods used to analyze current and desired future stand conditions, old-growth timber stands, and stand development are as follows:

- *Current & Desired Future Conditions:* The DNRC site–specific model (ARM 36.11.405), was used to determine the characteristics of the desired future condition and to evaluate the potential direct, indirect, and cumulative effects. This model assigns a desired future condition in terms of cover type for each stand identified in the DNRC's Stand Level Inventory (SLI). At the administrative unit level, the aggregate acreage of each desired future cover type describes a broad picture of the desired future condition for that unit. This provides a basis for comparison of current and desired future conditions at both the project and landscape (administrative unit) levels. Current conditions are described by DNRC's 2006 SLI for the Kalispell Unit. Field observations and tree data collected during the summer of 2008 were gathered to verify and further refine descriptions of specific forest stand characteristics within the project area. This data is available at the Kalispell Unit.
- *Old Growth Timber Stands:* the methods to identify old growth timber stands, as defined by ARM 36.11.403 (48), are based on the Kalispell SLI data. The process uses the SLI to identify stands that may meet the minimum criteria (number of trees per acre that have a minimum DBH and minimum age) for a given habitat type group as described in Green et al. (1992). Field surveys during the summer of 2008 were used to verify old-growth stands identified by the Kalispell SLI data and to determine if additional stands not identified as old-growth by the SLI meet the minimum criteria set forth by DNRC's old-growth definition.
- *Stand Structure/Development:* the analysis on stand structure and development is qualitative, and discusses the conditions of timber stands, including how various natural and man-caused disturbances and site factors have affected and may continue to affect timber stand development.
- *Cover Types and Age Classes* - Climatic Section M333B - **Lower Flathead Valley (Losensky 1997) Scale** was used in this analysis for comparing historic conditions related to the distribution of forest cover types and age classes, to current conditions within the project area. The Lower Flathead Valley geographic area includes Flathead Lake west to the Montana border, from the Canadian border south to Missoula, MT (Losensky 1997).

***Sensitive Plant Analysis Methods* –**

The Montana Natural Heritage Program (MNHP) database was consulted by DNRC for information regarding occurrence of plant species of special concern and the potential for sensitive plants and their habitats within the project area

***Noxious Weed Analysis Methods* –**

During field reconnaissance, DNRC personnel assessed road conditions leading into the project area, possible road locations, various susceptible timber stands, stream conditions, and generally evaluated noxious weed occurrence, extent and location.

3.3.2 Analysis Area

***Forest/Timber Analysis Areas* –**

Two analysis areas were selected to assess the potential direct, indirect and cumulative effects on forest cover type, species composition, the distribution of age classes, structural stages, and fragmentation.

- The analysis area used to assess direct and indirect effects to forest vegetation is the **Boorman Peak Project Area** which includes 636 acres in Section 16, Township 28 N, Range 23 W (Figure 1-1).

- The analysis area used to assess cumulative effects to forest vegetation includes all scattered forested trust land parcels, administered by the Kalispell Unit for DNRC. This geographic area is a subset of the Lower Flathead Valley Climatic Section (M333B) and includes school trust lands in the vicinity of Whitefish, MT south to Arlee, MT and school trust lands in the vicinity of Bigfork, MT west to the Thompson Chain of Lakes. Current and appropriate conditions related to forest cover types and age class distribution were analyzed on this scale.

***Sensitive Plants/Noxious Weeds Analysis Area* –**

The analysis area for noxious weeds and sensitive plants species, are trust lands within the project area. Surveys identifying sensitive plant occurrences were compared to proposed harvest sites and road construction locations for assessing direct, indirect, and cumulative effects, and developing mitigation measures, if needed.

3.3.3 Existing Conditions

***Stand History/Past Management* –**

Boorman Peak Project Area: There has been no previous harvesting or management in the project area. Active fire suppression starting in the 1930's has limited the extent of wildfires to small acreages, generally less than ¼ acre in size.

Adjacent Lands to Boorman Peak Area: This project area is immediately adjacent to industrial timberland to the north, south, east and west. The majority of these adjacent lands have been heavily harvested in the past 20 years. Most of the remaining forest is comprised of younger, regenerated western larch/Douglas-fir (WL/DF) cover types.

Forest Habitat Types –

In the Boorman Peak Project Area, approximately 81% of the area is occupied by forest habitat types in the subalpine fir (*Abies lasiocarpa*) series, indicating cool and moist site conditions. The *Linnaea borealis* (twinflower) and *Menziesia ferruginea* (menziesia) types in the subalpine fir series were the most prevalent. Western larch (*Larix occidentalis*), Englemann spruce (*Picea engelmannii*), Douglas-fir (*Psuedotsuga menziesii*), grand fir (*Abies grandis*) along with subalpine fir were the most prevalent tree species. Much of the forests with these habitat types had mixed-severity fire regimes that resulted in a mosaic of openings.

Approximately 4% of the project area is occupied by forest habitat types in the western hemlock (*Tsuga heteropylla*) series, indicating warm and moist site conditions. The *Clintonia uniflora* (queencup beadlilly) type prevails. Western larch (*Larix occidentalis*), Englemann spruce (*Picea engelmannii*), Douglas-fir (*Psuedotsuga menziesii*), grand fir (*Abies grandis*), western hemlock (*Tsuga heteropylla*) along with subalpine fir were the most prevalent tree species. Much of the forests with these habitat types had mixed-severity fire regimes that resulted in a mosaic of openings.

The remaining 15% of the project area is occupied by forest habitat types in the Douglas-fir series, indicating the influence of moderately warm/dry and moderately cool/dry site conditions. The *Calamagrostis rubescens* (pinegrass) type in the Douglas-fir series is the most prevalent. Ponderosa pine (*Pinus ponderosa*), and lodgepole pine are the most prevalent trees species along with Douglas-fir. Much of the forests with these habitat types had open, park-like conditions. Numerous fire scars indicate frequent, lower intensity fires that favored development of larger diameter seral trees.

Fire Regimes **–**

A mosaic of even and multi-aged patches is present in the project area. The majority of the Boorman Peak project area and all the proposed harvest units would be classified in a mixed severity fire regime. The majority of the project area (about 80%) is located on cool moist slopes that have a heavy fuels build-up. Fires on these types of slopes tend to be stand replacement events occurring every 200 years or more. The rest of the project area (20%) is located on drier and warmer slopes that historically had more frequent and less severe fire events occurring every 50 years or less. The project area has not had a stand replacement fire event in at least 200 years as evidenced by field surveys of tree ages and distribution.

Forest Age Class & Cover Type Distribution **–**

Table 3.3–1 compares the acreage of current cover types on the Kalispell Unit with desired future conditions.

Table 3.3- 1. Current cover types and desired future conditions for the Kalispell Unit.

Cover Type	Current Cover Type (Acres	Desired Future Condition(Acres)	Current Type Minus (-) DFC (Acres)**
Subalpine fir	2249.9	254.8	1995.1
Douglas-fir	1646.5	1029.4	617.1
Hardwoods	449.0	207.0	242.0
Lodgepole Pine	2269.2	1376.8	892.4
Mixed Conifer	10265.8	2282.3	7983.3
Ponderosa pine	10636.9	11936.2	-1299.3
Other*	3635.4	3576.2	59.2
Western larch/Douglas-fir	25494.6	32974.5	-7479.9
Western white pine	567.6	3577.7	-3010.1
TOTAL	57214.9	57214.9	--

*Other = non stocked lands, nonforest, or water.
**The Current Type minus Appropriate Type column above lists the excess and deficit (-) acres for each Cover Type.

The ponderosa pine, western larch/Douglas-fir, and western white pine (*Pinus monticola*) cover types are not as well represented within the Kalispell Landscape as estimated for the early 1900's. Most notable, is the conversion of over 11,000 acres in the western larch/Douglas-fir, ponderosa pine, and western white pine cover types, over the last 100 years, to the present over abundance of the mixed conifer and subalpine fir cover types by approximately 10,000 acres.

The longer intervals between disturbances and commodity extraction generally explain the decrease in the western larch/Douglas-fir and ponderosa pine cover types. Active fire suppression initiated in the early 1900's has interrupted wildfire frequencies and intensities in conjunction with 50 years or more of logging practices that favored the removal of commercially valuable western larch ponderosa pine, western white pine and Douglas-fir for railroad ties, mining timbers, and construction lumber. Many open, mature stands dominated by western larch and other seral species with even-aged patches of immature seral trees in the understory have been replaced with more densely stocked stands in both the overstory and understory. These stands often include a higher percentage of more shade tolerant trees such as Douglas-fir, grand fir, or spruce, as a result of longer intervals between disturbances.

Table 3.3–2 compares current cover types in the Boorman Peak project area with desired future cover types. The mixed conifer and subalpine fire cover types are currently over-represented compared to

desired future conditions, while the ponderosa pine, Douglas-fir, and western larch cover types are under-represented.

Table 3.3- 2. Current and DFC cover types for the Boorman Peak project area.

Cover Type	Current Cover Type (Acres)	Desired Future Condition (Acres)	Current Type Minus (-) DFC (Acres)
Subalpine fir	74	0	74
Douglas-fir	20	41	-21
Hardwoods	0	0	0
Lodgepole pine	0	0	0
Mixed Conifer	94	0	94
Ponderosa pine	0	40	-40
Other*	0	0	0
Western larch/Douglas-fir	448	555	-107
Western white pine	0	0	0
TOTAL	636	636	--

*Other = non stocked lands or nonforest.
**The Current Type minus DFC Type column above lists the excess and deficit (-) acres for each Cover Type.

Table 3.3-3 compares current species composition in terms of board foot volume in the Boorman Peak project area to 1920's forest inventory data. The state inventory prepared for classified forest lands in the 1920's includes records for most of the Boorman Peak project area, and indicates a predominance of western larch in terms of the percent of tree species by merchantable volume. A notable concern raised during recent field visits and surveys was that many of these stands were losing their seral component and beginning to convert to a shade tolerant mixed conifer stand. In many areas, the only seral trees were the older large diameter trees in the upper canopy. The intermediate and regenerated trees were shade tolerant species.

Table 3.3- 3. Boorman Peak project area: percentage of tree species composition by board foot volume from 1920's and 2008 inventory estimates.

Species Composition Comparison (percent)		
Species	**1924 Inventory**	**2008 Inventory**
Ponderosa pine	0%	< 1%
Douglas-fir	40%	46%
Western larch	55%	40%
Engelmann spruce	5%	9%
Lodgepole pine	< 1%	< 1%
Western hemlock	-	WH -- < 1%

Table 3.3– 4 displays age class distribution on the project area and landscape scales. Stands in the seedling-sapling age class (0-39 years) are under-represented compared to the historical condition for both the Kalispell landscape and the project area, and the 40 to 150 age classes over represented. This deviation from historical conditions can partially be explained by successful fire suppression increasing the interval between large, stand replacement fires and logging practices that did not necessarily create a similar disturbance to a wildfire.

Table 3.3- 4. Historic and current age class distribution.

Percent of Analysis Areas by Age Class Groups (years):

Analysis Area	00 - 39	40- 99	100 - 149	150+
M333B (historic)	36	13	15	36
Kalispell (current)	10	21	30	39
Boorman Peak (current)	0	0	0	100

***Distribution of Old-Growth Stands* –**

As per the Land Board's decision in February, 2001, the DNRC adopted definitions for old growth by forest habitat type groups, based on minimum number and size of large trees per acre and age of those trees as noted in *Old-Growth Forest Types of the Northern Region (Green et al. 1992).* DNRC's SLI identified 2,647 acres of old-growth stands on the Kalispell Unit, including approximately 97 acres in the Boorman Peak section. Of the 97 acres identified as old-growth in the project area, 86 acres were confirmed by field surveys to meet the minimum criteria to be classified as old growth according to DNRC's adopted definition, while 11 acres did not meet the minimum criteria. Field surveys also identified an additional 452 acres of old-growth in the Boorman Peak section that was not previously identified in the SLI, bringing the total old-growth acreage in the Boorman Peak section to 538 acres, and the total amount of old-growth on the Kalispell Unit to 3,088 acres.

Recognizing that large trees are but one component of old-growth stands and that other forest stand attributes, such as the presence of snags, coarse woody debris, decadence, multi-layered overstory canopy structures, gross volume, and crown cover, are indicative of old-growth forests, DNRC developed a tool to consistently describe the attributes of old-growth stands relative to other old-growth stands on State lands. This tool, known as the Full Old-Growth Index, or FOGI, can be used to provide an indication of the level of development of old-growth stands. The FOGI describes old-growth stands with a score based on the amount or presence of the above-listed old-growth attributes. Stands with higher levels of those attributes will have high FOGI values, indicating a higher level of development of the attributes associated with old-growth stands relative to other old-growth stands, whereas stands with low FOGI values indicate a lower level of old-growth attribute development. FOGI values can be categorized into three classes— low, medium and high—indicating their relative level of development compared to other old growth stands. Stands with low FOGI values would have at least the minimum number of large trees required to be defined as old-growth, with lower amounts of snags and coarse wood debris, gross volume, crown cover, and decadence, and less complexity in the canopy structure. Stands with high FOGI values would have at least the minimum number of large live trees to be defined as old-growth, with higher amounts of the above listed attributes. Table 3.3-5 shows the acreage of old-growth according to FOGI class within the Boorman Peak Section.

Table 3.3- 5. Old-growth acreage by FOGI class in the project area.

FOGI Class	**Low**	**Medium**	**High**	**Total**
Acres	154	343	41	538

***Stand Structure and Development* –**

Stand structure and patch size indicates a characteristic of stand development and disturbance and how a stand may continue to develop. Stand structure is classified as single-storied, two-storied, or multi-storied. Patch size for this project is estimated from stand sizes and provides further insight into the severity of a disturbance as it relates to dominant tree canopies. Table 3.3-6 displays the percent of area in the Boorman Peak Project Area and Kalispell Landscape by stand structure class and estimates of stand size.

Table 3.3- 6. Proportion (%) of analysis area by stand structure and estimated patch size.

Stand Structure	Kalispell Landscape	Kalispell Average Stand Size	Project Area	Project Area Average Stand Size
Single-storied	15%	24 acres	0%	N/A
Two-storied	3%	28 acres	0%	N/A
Multi-storied	82%	31 acres	100%	29 acres

Single-storied stands are most often associated with stand replacement events, such as severe fires or regeneration harvests including clearcutting or seedtree cutting. Stands are fairly simple in vertical structure and are often even aged. Regeneration harvests, such as a seedtree or shelterwood, which retain 10% or more of the upper crown canopy and has a seedling/sapling understory are considered 2-storied stands. Two-storied stands have simple vertical structure and are frequently even aged, although at least two age classes are generally present. The multi-storied condition arises when a stand has progressed through time and succession to the point that trees in the lower canopy levels are advancing into the upper canopy levels; this is frequently seen when shade-tolerant species capable of surviving and growing in shaded understory conditions progress upward into the overstory. Three or more age classes may be present in these stands and vertical structure can be complex.

Stand size refers to openings created by disturbances and provides insight regarding the severity of a disturbance event regarding tree mortality. Larger patch sizes are generally associated with mixed severity and stand replacement fire regimes or regeneration harvests. Smaller sizes are attributed to low or moderate severity fire regimes, and harvest treatments that retain larger proportions of the overstory.

Over 80 % of the Kalispell Landscape and 100% of the Boorman Peak project area consists of stands with multi-storied structures. The various tree canopy levels may be patchy in nature or well distributed and several age classes are usually present. The current average stand size for the Boorman Peak area is 29 acres, ranging between 6 acres and 93 acres.

***Timber Productivity and Value* –**

Windthrow and Age-associated mortality: During the field surveys for the project area, a noticeably significant number of large diameter western larch and Douglas-fir were windthrown over the past few years. This event was not localized but rather widespread throughout the project area. In addition to these windthrown trees, a significant number of the large diameter standing trees had died or had very poor vigor.

Tree Vigor: Radial growth rates are static or declining in the majority of the project area according to the analysis of tree cores collected during the field survey. Over 90% of the project area is in the 150 year + age class.

***Sensitive Plants* –**

A review of the records from the MNHP for the project indicated no plant species of special concern identified within the project area. Field reconnaissance also indicated no unique or sensitive plants within the project area.

***Noxious Weeds* –**

There are no noxious weeds in the project area due to this area being undisturbed. However, the adjacent industrial timberlands do have noticeable weed populations along the roads. The main weed identified was spotted knapweed (*Centaurea maculosa*). This weed is classified as a Category 1 weed for Flathead County. Category 1 refers to currently established and generally widespread weed populations throughout many counties of the state.

Insects and Disease

There are no major insect or disease issues in the Boorman Peak project area; however, the following insects and diseases have been observed at endemic levels within the project area:

- Douglas-fir beetle (*Dendroctonus psuedotsugae*) activity was observed in the east portion of the section during the summer of 2009
- Mountain pine beetle (*Dendroctonus ponderosae*) was observed on lodgepole pine throughout the section
- Fir engraver (Scolytus ventralis) and Western balsam bark beetle (*Dryocetes confusus*) were seen on grand fir and subalpine fir throughout the project area.
- Stem rots including pini rot (*Phellinus pini*) and Indian paint fungus (*Echinodontium tinctorium*) were observed throughout the project area. Pini rot was common in older western larch as well as mature Douglas-fir and Engelmann spruce, while Indian paint fungus was seen on grand fir and subalpine fir.

3.3.4 Environmental Effects

***Forest Age Class & Cover Type Distribution* –**

No Action Alternative – Direct and Indirect Effects

Under the No Action Alternative, natural processes would continue to have a direct influence on these forest characteristics. In the absence of wildfires, the effects of windthrow and age associated mortality will continue to influence both short and long term age class distribution and cover type representation. Composition of western larch will continue to decrease due to mortality of overstory trees and a lack of larch regeneration in the understory. There will continue to be a gradual conversion of western larch/Douglas-fir cover types to subalpine fir and mixed conifer cover types.

Openings created in the canopy from these events are not expected to resemble natural fire effects. Openings are likely to be smaller and many may continue to be stocked with younger pole-sized trees. Without duff reduction and soil exposure, the regeneration of openings is expected to favor shade tolerant species over seral species. The lack of regeneration under denser canopies or the predominance of mixed conifer species in numerous understories would perpetuate the trend of increasing mixed conifer cover types over much of the project area. Without fire, the older age classes from 150 years up would continue to dominate the area and the 0-39 and 40 to 99 age classes would continue to decline, as the 70 to 80 year old trees move into the next age class without replacement.

No Action Alternative – Cumulative Effects

Under the No Action Alternative, there would likely be a decline in the overall acreage in western larch/Douglas-fir cover types on the Kalispell Unit. Western larch composition would continue to decrease, leading to a shift from western larch/Douglas-fir to mixed conifer cover types. Across the landscape, fire suppression, insect and disease occurrence, and increasing human use may influence cover type and age class distribution to an unknown degree. In the absence of stand replacement fires, variability of age class and cover type distribution would decrease.

Action Alternative – Direct and Indirect Effects

Under the Action Alternative, timber harvesting would occur on 581 acres. Harvesting would entail using old-growth maintenance treatments. These treatments were designed to maintain old-growth characteristics while encouraging seral replacements for the older trees. These treatments would involve

removing most of the subalpine fir, Englemann spruce, grand fir, and lodgepole pine. Approximately one-third of the smaller (less than 21" DBH) western larch and Douglas-fir would be removed. Some of the larger (greater than 21" DBH) western larch and Douglas-fir would be removed to allow openings to encourage seral regeneration. The overall stocking of large trees in these stands will not fall below the Green et al. thresholds. These openings would emulate the mixed severity fire regime that historically occurred in these stands.

Table 3.3-7 shows the changes and post-harvest distribution of cover types that would occur in the Boorman Peak section under the Action Alternative. Harvesting treatments would reduce the acreage in the mixed conifer and subalpine fir cover types by converting 84 and 64 acres, respectively, to the western larch/Douglas-fir type. The Douglas-fir and ponderosa pine cover types would increase by 18 and 37 acres, respectively, due to harvesting in the western larch/Douglas-fir type. The addition of acres from the mixed conifer and subalpine fir cover types combined with the subtraction of acres to the Douglas-fir and ponderosa pine cover types would result in a net increase of 94 acres in the western larch/Douglas-fir cover type. The overall result of harvesting activities would by reflected by a cover type distribution in the project area that is more closely aligned with the DFC for the project area (Table 3.3-6).

Table 3.3- 7. Pre- and post-harvest cover type acreage in the Boorman Peak project area.

Cover Type	Current (Pre-harvest) Acres	Acres Treated	Postharvest Acres	Change in Acreage	Desired Future Condition Acres
Sublapine fir	74	64	10	-64	0
Douglas-fir	20	18	37	18	41
Mixed conifer	94	84	10	-84	0
Ponderosa pine	0	0	37	37	40
Western larch/Douglas-fir	448	415	542	94	555
Total	636	581	636	--	636
*numbers may not sum due to rounding					

There would be no change in age classes under the Action Alternative because of the use of old-growth maintenance treatments and the relatively even proportion of trees cut across size classes.

Action Alternative – Cumulative Effects

The Action Alternative would result in a decrease in the acreage for the mixed conifer and subalpine fir cover types and an increase in acreage of the western larch/Douglas-fir, Dougas-fir, and ponderosa pine cover types on the Kalispell Unit. These changes would shift the cover type distribution on the Kalispell Unit toward desired future conditions. Future timber sales by both the DNRC and other entities within the administrative boundary of the Kalispell Unit would likely result in increases of cover types comprised mainly of shade intolerant species such as western larch and ponderosa pine, and decreases of cover types comprised primarily of shade tolerant species such as grand fir and subalpine fir.

Cumulative effects in age class will be minimal because the Boorman Peak project is not altering the age distributions of the stands. Across the landscape, fire suppression, insect and disease occurrence, and increasing human use may influence cover type and age class distribution to an unknown degree.

***Distribution of Old-Growth Stands* –**

No Action Alternative – Direct, Indirect, and Cumulative Effects

There are 17 old-growth stands accounting for 538 acres within the project area. Under the No Action Alternative, stands would continue to develop under the influence of suppressed wildfire activity and other natural disturbances such as windthrow and age associated mortality. Maintenance of old-growth characteristics and defining criteria will be dependent on the persistence and the rate of mortality.

Action Alternative – Direct, Indirect, and Cumulative Effects

Under the Action Alternative, timber harvesting would occur in 485 acres of old-growth. Due to the use of old-growth maintenance treatments, implementation of the Action Alternative would result in no loss of existing old-growth due to harvesting activities in both the project area and on the Kalispell Unit. At least the minimum number of large live trees necessary to meet DNRC's adopted old-growth definition would be retained in all existing old-growth stands in the project area. However, old-growth attribute levels in these stands would be reduced, as the number of large live trees, snags, coarse woody debris, crown cover, gross volume, and amount of decadence would be reduced from current levels. Canopy structure in these stands would be simplified due to tree removal in the lower- and mid-canopy levels. The reduction of old-growth attributes in treated old-growth stands would shift the FOGI class in those stands classified as "medium" or "high" prior to harvesting to the "low" class following harvesting, as shown in Table 3.3-8. In the "high" class, 25 acres would be reclassified as "low" following harvesting, and in the "medium" class, 310 acres would be reclassified as "low" following harvesting. The 150 acres classified as having "low" FOGI values prior to harvesting would remain classified as such following harvesting.

Table 3.3- 8. Pre-and post-harvest FOGI classification in the Boorman Peak project area.

FOGI Class	Current Acres	Acres Treated	Postharvest Acres	Change in Acreage
Low	154	150	489	336
Medium	343	310	33	-310
High	41	25	16	-26
Total	538	485	538	--

***Stand Structure and Development* –**

No Action Alternative – Direct and Indirect Effects

Stand structure and development would continue to change as a result of damaging agents. Older stands (150 years +) comprising most of the project area are experiencing noticeable reductions in live tree canopy closure due to windthrow and age related mortality. The mosaic pattern of multi-aged and multi-storied or small even-aged patches is likely to persist with this type of disturbance. More shade tolerant species would increase in all canopy levels continuing to replace or inhibit growth of seral species, as dense small diameter trees develop in the understory. Area coverage of forest in early successional stages, especially in larger patch sizes would continue to decrease. Forest fuels, both ground and vertical would continue to build up in stand areas where mortality is occurring, increasing the potential for severe, less controllable fires that may result in large scale stand replacement fires.

No Action Alternative – Cumulative Effects

Forest succession and fire suppression would continue. Conditions favoring the establishment of shade tolerant species in canopy gaps, the slow growth of seedlings and saplings under closed canopies or the hindrance of tree establishment under closed canopies, and increasing fuel loadings would continue. In the absence of disturbance, whether natural or human-caused, multi-storied stands would be expected to develop over time across the landscape.

Action Alternative – Direct and Indirect Effects

Under the Action Alternative, old-growth maintenance treatments are proposed on 581 acres. These treatments will leave a moderately stocked overstory over most of the project area. Trees may be retained in groups or individually distributed across the unit depending on current stocking of healthy desirable leave trees. Less homogenous stand conditions would occur, reflecting attributes of forests initiated under the mixed severity fire regime. These maintenance treatments would generally reduce the mid and lower-level canopy components within harvested stands. Some openings would be created to allow regeneration of seral species to replace the upper level canopy as the stand ages.

Action Alternative – Cumulative Effects

Since stand structure will not change there are no cumulative effects.

***Timber Productivity and Value* –**

No Action Alternative – Direct and Indirect Effects

Due to the effects of windthrow and age-associated mortality the commercial value of sawlogs would continue to decline. Non-sawlog or pulp values are generally less than that received for sawlogs, and the value of this timber trust asset would continue to decline. Growth rates of individual trees in denser, older stands would remain static or continue to decline and opportunities for establishment of replacement trees would be limited to small openings favoring shade tolerant trees. Development of larger diameter commercially valuable western larch as a persistent component in the overstory of older stands would be hindered.

No Action Alternative – Cumulative Effects

Without silvicultural treatments or wildfires to control tree densities, reduce losses to insects or disease, and recover mortality or initiate new stands, the trend towards increasing acreage on the Kalispell Unit covered by older, slower growing stands that are more susceptible to beetle infestations, stem decays, or wildfires would continue.

Action Alternative – Direct and Indirect Effects

Silvicultural treatments would be applied to 581 acres, or 91% of the Boorman Peak project area under the Action Alternative. The effects for maintenance treatments as described above would occur on the treated acres. Timber productivity on the treated acres would increase or be maintained at a level closer to the site potential, improving the future opportunities for generating revenue for the trust with the use of the timber resource.

Action Alternative – Cumulative Effects

The percentage of forested land that is producing timber closer to the site potential would increase by approximately 1% on the Kalispell Unit. The acres of forest stands that are less susceptible to beetle infestations, stem decays, or wildfires would increase. Higher potential for greater long-term revenue from the timber resource is expected.

***Sensitive Plants* –**

No Action Alternative – Direct and Indirect Effects

A review of the records from the MNHP for the project indicated no plant species of special concern identified within the project area. Field reconnaissance also indicated no unique or sensitive plants within the project area.

No Action Alternative – Cumulative Effects

Cumulative effects to the distribution or viability of sensitive plants populations are not expected under No Action Alternative.

Action Alternative – Direct and Indirect Effects

Since no sensitive plants are present within the project area, the Action Alternative would not have any direct or indirect effects to sensitive plants.

Action Alternative – Cumulative Effects

Since no sensitive plants are present within the project area, the Action Alternative would not have any cumulative effects to sensitive plants.

***Noxious Weeds* –**

No Action Alternative – Direct and Indirect Effects

There are currently no noxious weeds in the project area.

No Action Alternative – Cumulative Effects

Cumulatively there would be no effects under the No Action Alternative.

Action Alternative – Direct and Indirect Effects

Logging disturbance would increase the potential for establishment of noxious weeds with the exposure of mineral soil in skid trails, landings, existing roads, and new road construction sites. Potential for weed establishment is also possible from illegal off-road vehicle use in the project area. Applying integrated weed management techniques within the sale design would reduce the occurrences and spread of weeds. Grass seeding new roads and landings and spot spraying new weed infestations would reduce or prevent establishment of additional populations. Washing logging equipment prior to use would limit the introduction of weed seeds into the forest. Trampling slash in skid trails and closing off-road vehicle entry points would limit the potential for soil disturbance within these routes during or after logging, reducing the potential for weed establishment.

Under the Action Alternative, harvesting would occur on 581 acres, and involve 7 miles of new road construction. Acreage within harvest units are at higher risk of incurring weed establishment within the units due to soil disturbances that may occur from skidding, landing, and heavy equipment use for scarifying or fuels reduction treatments. This risk would be limited by mitigation measures described above. Eliminating possible off-road vehicle entry points, trampling slash in road prisms, grass seeding sites disturbed during road construction or work, and additional road closures in combination with spot herbicide treatments would limit the potential risk of weed establishment.

Action Alternative – Cumulative Effects

In combination with other management activities and recreational use of the Kalispell Landscape, the Action Alternative would increase the risk of further encroachment of forested sites by noxious weeds. The potential risk would be limited with the use of prevention measures implemented under the site-specific mitigation measures for the Boorman Peak project.

***Insects and Diseases* –**

No Action Alternative – Direct and Indirect Effects

Under the No Action Alternative, the incidence of insects and diseases would gradually increase over time in the Boorman Peak section. As stands continue to age, the incidence of stem rots would increase and eventually result in increased mortality consistent with the development of old-growth forests. Trees weakened by stem rots or other factors would be more susceptible to insect attack.

No Action Alternative – Cumulative Effects

Implementation of the No Action Alternative would be unlikely to change or appreciably contribute to forest insect populations or disease presence across the Kalispell Unit. Given the age structure and intensive management of stands immediately surrounding the Boorman Peak section, it is likely that current insect and disease activity within the Boorman Peak section would remain confined to that section. Additionally, given the endemic levels of insect populations within the Boorman Peak section, it is unlikely that forest insect populations within the Boorman Peak section would increase to the level of becoming an identifiable point source of potential infestation in surrounding forested lands.

Action Alternative – Direct and Indirect Effects

Under the Action Alternative, insect and disease incidence with the Boorman Peak section would decrease. The removal of true firs and lodgepole pine would decrease levels of insects affecting those species, and the removal of some Douglas-fir would reduce the Douglas-fir beetle population. The presence of stem rots in the section would also decrease, although some of the large western larch left following treatment would contain pini rot.

Action Alternative – Cumulative Effects

Implementation of the Action Alternative would slightly reduce insect and disease incidence across the Kalispell Unit; however, forested lands within the Kalispell Unit that are currently impacted by or at risk of forest insects and diseases would be unlikely to be affected by the proposed action.

3.4 HYDROLOGY AND WATERSHED RESOURCES

3.4.1 Introduction

The following section contains the effects analysis to hydrologic and watershed resources within the Boorman Peak Project area resulting from the proposed actions outlined in ***Chapter 2: Alternatives.*** Potential issues affecting these resources were identified from both public and internal scoping with the identified issues being the focus of the following effects analysis. These issue statements identified are presented below.

- Timber harvesting and road construction has the potential to increase water yield, which, in turn, may affect erosive power, sediment production and stream channel stability.
- Timber harvesting and road construction may increase sediment delivery into streams/lakes and affect water quality.
- Timber harvesting activities may adversely affect fish habitat parameters of large woody debris, channel complexity, stream shading, and stream temperature.

Field review of the Boorman Peak project area in the summer of 2008 helped to further focus the analysis of potential issues. Hydrologic pathways of precipitation inputs were found to solely consist of subsurface recharge to Ashley Lake through well drained glacial till deposits and not through a network of surface water stream channels. Due to these findings, all fisheries habitat parameters and sediment delivery issues were dismissed from further analysis. Water yield from timber harvest activities will also be dismissed from further analysis to due to the moderate precipitation zone of the project area combined with the proposed selective harvest. The proposed selective harvest will leave a residual stand that will retain similar evapotranspiration characteristics resulting in no change over existing conditions. For more information regarding the siviculture treatment see the vegetation analysis within this document.

The remaining issue that will be carried through this analysis is the potential for increased erosive power and sediment production from surface drainage on new road construction. The potential water yield from these road surface source areas as well as the potential cumulative watershed effects of new road construction will also be addressed.

3.4.2 Analysis Methods

The methods for this watershed analysis will incorporate various data sources to disclose the potential impacts to watershed resources from the proposed actions. A coarse filter approach was first employed to gather pertinent background information from various State agencies including the Department of Environmental Quality, Montana Fish, Wildlife and Parks as well as DNRC. The following effects analysis incorporates this coarse filter analysis into field reconnaissance data as well as information contained in the Geology and Soils section to forecast potential effects. Field review of BMP application and effectiveness on existing roads that will be used for haul routes will also be used. The data sources outlined above provide sufficient information to disclose relevant potential direct, indirect and cumulative impacts as a result of implementing the proposed actions.

3.4.3 Analysis Area

Two analysis areas were initially delineated within the Ashley Creek watershed that contained proposed actions. These analysis areas are depicted in ***Figure 3.4.1***. After further review, the Hodge Creek Watershed analysis area was dismissed from further analysis due to the minimal activity planned within its boundaries, and the lack of stream channels within and/or adjacent to the project area. The combination of the above listed factors provide rational that no adverse effects to watershed resources would be measurable or detectable at the watershed outlet. The remaining 1,308 acre Ashley Creek analysis area, outlined in red, will be the area where effects of the proposed actions will be forecasted.

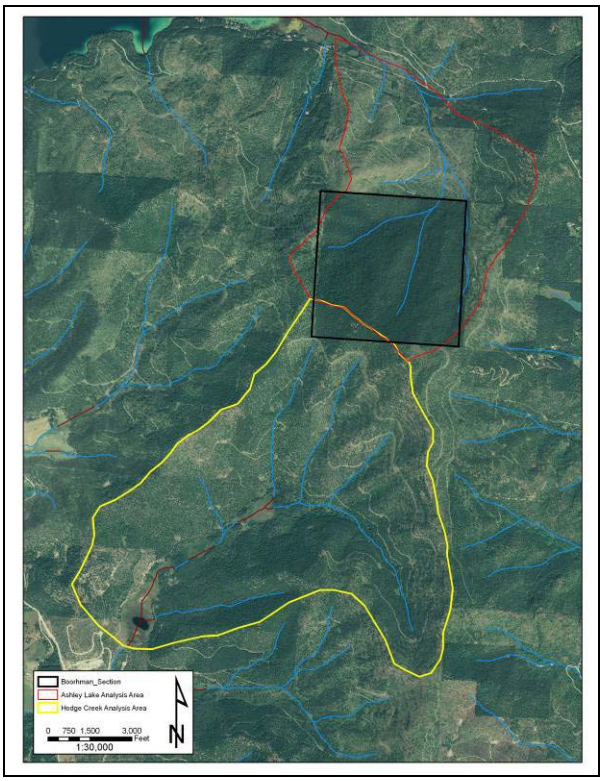


Figure 3.4-1. Analysis areas initially considered with Hodge Creek (yellow) dismissed.

3.4.4 Water Uses and Regulatory Framework

Water Quality Standards

This portion of the Ashley Creek watershed, including Ashley Lake, is classified as B-1 by the State of Montana DEQ, as stated in *ARM 17.30.608*. The water-quality standards for protecting beneficial uses in B-1 classified watersheds are located in *ARM 17.30.622*. Water in B-1 classified waterways is suitable for drinking, culinary and food processing purposes after conventional treatment for naturally present impurities; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life; waterfowl and furbearers; and agricultural and industrial water supply. State water-quality regulations limit any increase in sediment above naturally occurring concentration in water classified B-1. Naturally occurring "means condition or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied" (*ARM 17.30.602 [19]*). Reasonable land, soil, and water conservation practices include "methods, measures or practices that protect present and reasonably anticipated beneficial uses…" (*ARM 17.30.602 [25]*). The State of Montana has adopted BMPs through its nonpoint source management plan as the principle means of meeting *Water Quality Standards* (DEQ, 2007).

3.4.5 Existing Conditions

The Ashley Creek analysis area contains the Boorman Peak project area at its headwaters with an average annual precipitation of 22 inches. These headwaters contain two draw features trending to the northeast, converging prior to exiting State ownership in the northeast portion of the section. Field review of the project area found no scoured channel features with defined bed or banks though chronically moist soils were identified in draw bottoms. Continuing downslope onto private ownership, the constriction of these draw features decreases drastically to a broad depositional fan also void of any defined stream channels. Roads crossing this broad draw have 18 inch CMP's but lack any visual clues denoting intermittent or ephemeral flows. No culvert is installed where forest road 679 dissects the lower portion of the analysis

area prior to entering Ashley Lake thus eliminating any potential for surface water connectivity to Ashley Lake. For a further description of landscape morphology, refer to section **3.5 GEOLOGY AND SOILS**.

The Ashley Creek analysis area contains mixed ownership consisting of Federal and State agencies, private industrial timber companies and a small fraction of private, non-industrial ownership. The breakdown of land ownership within the Ashley Creek analysis area is presented in ***Table 3.4.1***.

Table 3.4- 1. Ashley Creek analysis area ownership**.**

Ownership	Acres	% of Analysis Area
U.S Forest Service	13.3	1%
State of Montana	630	48%
Plum Creek Timber Company	472	36%
Stolze Land and Lumber	182	14%
Private - Other	11	1%
Total	**1308**	**100%**

.

Mixed ownership lends itself to a mixed management history which is very recognizable in Ashley Creek. Historic aerial photos from 1990 reveal that upwards of 90% of the Ashley Creek analysis area was forested with minimal forest management activities besides some road construction accessing the area from forest road 679. Since 1990 extensive forest management has been conducted on private industrial ownership, particularly clearcut and seedtree siviculture prescriptions as well as the road networks necessary for timber transportation. Since this period stands have regenerated and currently have moderate to high stocking levels on previously harvested lands.

Road access is currently controlled by a gate at the junction with forest road 679 which effectively prevents trespass road use. BMP's have been applied on all roads currently used for access and log hauling and are effective in providing road surface drainage. All other roads experience minimal use, are well vegetated and are hydrologically stable.

3.4.6 Environmental Effects

No Action – Direct and Indirect Effects

Under the no action alternative no new roads would be constructed resulting in no additional sediment production. Existing roads would continue to have controlled access limiting vehicle traffic and necessary road maintenance. Existing roads would continue to met BMP's and provide adequate road surface drainage to effective buffers well away from any surface water source.

Action Alternative – Direct and Indirect Effects

Under the action alternative, 6.75 miles of new road would be constructed in the Boorman Peak project area on DNRC land with an additional 0.39 miles on Plum Creek land totaling 7.14 miles The new road construction would increase road densities to 6.75 mi/mi^2 in the Boorman Peak project area. High road densities such as this have the potential to concentrate road surface drainage and intercept lateral hillslope flow resulting in increased erosive power and subsequent sediment production. BMP applications including cross drain installation and drive through drain dips can mitigate the concentration of road surface waters by designing drainage outlets in effective buffer zones so that concentrated waters are dispersed and infiltrate into the soil profile prior to rill, gully or channel formation. Due to the well drained nature of the glacial till deposits in the project area, infiltration excess overland flow (Hortonian)

is not expected though saturation excess overland flow is probable though only in isolated and spatially discontinuous areas. Sediment production will increase during new road construction and will remain elevated for 2-3 years after project completion until road surfaces and cut/fill slopes revegetate and stabilize. Due to the lack of stream channels in the project area and hydrologic connectivity to water bodies supporting beneficial uses sediment delivery is not possible. Due to these constraints, there is a low risk of low level impacts from road drainage surface water concentration and subsequent sediment production in the Boorman Peak project area.

No Action – Cumulative Effects

Under the no action alternative, no new roads would be constructed and environmental effects would be the same as described in direct and indirect effects of the no action alternative.

Action Alternative – Cumulative Effects

Potential cumulative effects for the action alternative would include the hydrologic synchronization of road surface runoff allowing erosive power to be concentrated and potentially causing local scour and erosion. The new road construction would increase road densities from 5 to 8.5mi/mi^2 in the Ashley Creek analysis area. With the proper implementation of BMP's, road surface drainage features will be properly spaced to mitigate this concern resulting is a moderate risk of low level cumulative impacts.

3.4.7 References

MDEQ, 2007. Montana nonpoint source management plan. Montana Department of Environmental Quality. Helena, MT 238pp.

3.5 GEOLOGY AND SOILS

3.5.1 Introduction

The following section contains the effects analysis to geologic and soil resources within the Boorman Peak Project area resulting from the proposed actions outlined in ***Chapter 2: Alternatives.*** Potential issues affecting geologic and soil resources were identified from both public and internal scoping with the identified issues being the focus of the following effects analysis. These issue statements identified are presented below.

- Road construction and log landings sites can displace and compact surface soils which can permanently change the land use of these impacted areas from forest products to transportation and can establish corridors for the spread of noxious weeds.

- Removal of both coarse and fine woody material off site during timber harvest operations can reduce nutrient pools required for future forest stands and can affect the long-term productivity of the site.

- Ground based harvest techniques can displace and compact soils which can adversely affect the hydrologic function, soil structure and long-term productivity of the impacted area.

- Reduced infiltration capacity of an impacted soil can result in overland flow and off site erosion, typically localized to main skid trails and log landing sites.

3.5.2 Analysis Methods

Methods for disclosing impacts to geologic and soil resources relied on information from multiple data sources. These sources included field evaluation and verification, the soil survey of the flathead national forest area (USDA 2007 and Martinson et al., 1999), geologic map of the Kalispell 1° x 2° quadrangle, Montana, and Alberta and British Columbia (Harrison et al. 2000), dnrc soil monitoring data (dnrc 2005) as well as professional training and judgment. Information from these various sources was used to describe the geologic structure and physical soil properties within the project area which helped to forecast potential forest management limitations. Variables included soil texture, soil depth, percent coarse fragments, plasticity index, liquid limit, permeability, and unified classification. The risk of adverse effects to soils resources resulting from the proposed action was then qualitatively assessed using this information as well as soil monitoring data collected on over 90 monitoring sites spanning 20 years of dnrc timber sales projects.

3.5.3 Analysis Area

Direct, indirect and cumulative effects to soil resources for the issues described above will be disclosed in this report. The analysis area for direct and indirect impacts of this project consists of the harvest units within the State owned section and the area within the clearing limits for new road construction. Cumulative effects by definition are the collective impacts on the human environment of the proposed action when considered in conjunction with other past, present and future actions related to the proposed action by location or generic type. For an impact to soil resources to be cumulative they must overlap a least twice in both time and space. Considering this constraint, the cumulative effects analysis area for the proposed action will be the same as for direct and indirect impacts.

3.5.4 Relevant Plans, Rules, and Mitigations

Developed in 1996, the State Forest Land Management Plan (SFLMP) is a programmatic plan that outlines the approach and philosophy guiding land management activities on forested school trust lands throughout the state of Montana (*DNRC 1996*). Within this plan, detrimental soil disturbance is defined and recommends that projects implemented by DNRC should strive to maintain the long-term soil productivity of a site by limiting detrimental soil impacts to 15 percent or less of a harvest unit and retain adequate levels of both coarse and fine woody material to facilitate nutrient retention and cycling.

To accomplish these goals and objectives contract stipulations and site specific BMPs are developed by resource specialist to provide protection for soil resources in a project area. The Forest Management Rules [ARM 36.11.422 (2) (2) (a)] state that appropriate BMPs shall be determined during project design and incorporated into implementation. ARM 36.11.414 mandates that adequate coarse woody debris shall be left on site to facilitate nutrient conservation and cycling. To ensure the incorporated BMPs are implemented and site productivity maintained, specific requirements are incorporated into the DNRC timber sale contracts. The following are some general BMP's and mitigations that would be incorporated into the proposed action to ensure adequate soil protection and long-term productivity of the site.

- Limit equipment operations to periods when soils are relatively dry, (less than 20% soil moisture), frozen or snow covered (12 inches packed or 18 inches unconsolidated) to minimize soil compaction and rutting, and maintain drainage features.
- Ground-based logging equipment (tractors, skidders, and mechanical harvesters) is limited to slopes less than 40% on ridges, convex slopes; and to 35% or less on concave slopes without winter conditions.
- The Forest Officer shall approve a plan for felling, yarding and landings in each harvest unit prior to the start of operations in the unit. The locations and spacing of skid trails and landings shall be designated and approved by the Forest Officer prior to construction.

- Levels of coarse and fine woody material will be retained on site as prescribed by the forest officer and recommended by the project soil scientist using guidance from the best available science (*Graham et al. 1994*). 15-20 tons/acre of material >3" is recommended for the Boorman Peak project area with as many needles and fine material as possible which are typically retained during skidding operations.

These general BMPs along with site specific mitigations designed during contract development have been monitored for effectiveness by DNRC since 1988 and have repeatedly been shown to be an effective measure to achieve objectives described in the SFLMP (*DNRC 2005*).

3.5.5 Existing Conditions

Geology and Landscape Morphology

The geology of the Boorman Peak project area consists solely of the Helena formation. The Helena Formation is a mid-proterozoic aged argillite deposited in an intracratonic block-faulted basin approximately 1.45 Ga years ago. The Helena formation is quite resistant to weathering with outcrops exposed on all ridgelines within the project area. Due to the slow weathering rate and mineralogy of this formation, weathered residuum is only a fair nutrient source for overlying soils. Overburden material and soils are shallow and stable with no signs of historic mass failures, current slumping or soil creep within the section.The morphology of the project area is moderately incised with two major ephemeral draws of narrow width dissecting the section from southwest to northeast. The majority of the hillslopes can be described as planer to slightly convex of moderate slope (15-40%) with short, steep pitches (>40%) adjacent to broad ridge tops. The slope distribution of the project area is presented in ***Table 3.5-1.***

Slope Class (%)	Area (Acres)	% Project Area
0-10	41.8	7%
11-20	138.1	22%
21-30	253.1	40%
31-40	182.3	29%
41-50	14.9	2%
>50	0.2	<1%

Table 3.5- 1. Slope distribution with the project area.

Boorman Peak, just south of the project area, is the high point at 5,432 feet and the watershed divide for three separate 6th code watersheds all draining to Ashley Creek. Descending to the north through the project area is the low point at approximately 4,320 feet in the northeast portion of the section. Given the headwater nature of the project area and the moderate amount of topographic relief, a relatively small amount of potential erosive energy is available reflecting the morphology observed at present.

Soils

Three map units have been identified by the *Soil Survey of the Flathead National Forest Area, Montana* (Martinson and Basko, 1998) within the Boorman Peak project area. ***Figure 3.5-1*** located section ***3.5.7 Appendix - Maps*** shows the spatial location of each map unit. A soil map unit is a general grouping of soils based on a distinctive and similar pattern of landtypes, soil, vegetation and geology. Defining similar areas on the landscape by these variables allows management limitations and potential hazards to be forecasted within a projects area. The three soil map units found within the Boorman Peak project area as well as hazard ratings associated with the outlined issues stated above are presented in ***Table 3.5-2***.

Land Type	Land Type Description	% of Project Area	Texture	Compaction Hazard *	Displacment Hazard ♦	Erosion Hazard †
26G-8	Low to moderate slope valley bottoms and hillslopes	25.6%	Silt Loam	Moderate	Moderate	Moderate
57-9	Rolling to steep hillslopes and ridgetops	9.5%	Gravelly Silt loam	Moderate	Severe	Low
23-9	Level to very steep glaciated uplands with smooth slopes	64.9%	Very Gravelly Silt Loam	Moderate	Moderate	Low

Table 3.5- 2. Soil map units and associated management limitations found in the Boorman Peak project area.

*Compaction hazard considers soil drainage efficiency and soil texture, slope, aspect and precipitation.
♦Displacement hazard considers presents of ash and ash depth as well as slope.
†Erosion hazard considers amount of coarse fragments and soil texture.

In general the soils within the project area can be described as shallow to moderately deep, silt loams with coarse fragment content increasing with depth. Soils on and adjacent to ridge tops are shallow and well drained with depth to bedrock ranging from 18 to 30 inches. Upland soils, especially east and south facing aspects, become dry early in the summer while colluvial soil in draw bottoms and in the flat areas in the northeast portion of the section and poorly drained and remain moist well into the summer. These soils rarely have soil moisture below 20% by weight and will require snow covered or frozen conditions for operations.

Soil organic matter and duff depth varies throughout the project area by landtype and vegetative cover. Ridge tops and upland areas typically have less organic matter capping the soil profile than moist habitat types in draw bottoms and north aspects. Ubiquitous to all soils in the project area is a layer of windblown volcanic ash from the eruption of present day Crater Lake (Mt. Manzama) in the Cascade Mountains of Oregon. This layer of volcanic ash is found immediately under the duff layer and varies in thickness from trace amounts to 4 or 5 inches dependant on landscape position. Volcanic ash can be directly tied to the productivity of the forest soil due to its moisture holding capacity.

Coarse and fine woody material distributions are also similar to duff depth found throughout the project area. On average, ocular assessments estimate 20-25 ton/acre of coarse and fine woody material within the project area with high spatial variability. Most woody material in draw bottoms and moist areas is in advanced stages of decay providing organic material to surface soils which supports excellent ectomycorrhiza habitat.

Past Management Activity

No previous management entries have been made into the Boorman Peak project area. At present, no maintained recreational trails are present in the section though game trails are used for walk on hunting access but are minimal in scope.

Noxious Weeds

No invasive noxious weeds were observed within the Boorman Peak project area during field reconnaissance in the summer of 2008. Spotted Knapweed is present on most all road right of ways on Plum Creek property surrounding the section. At present, wildlife movement and recreation access has not spread noxious weeds in the project area.

3.5.6 Environmental Effects

No Action – Direct and Indirect Effects

Under the no action alternative forest management activities would be deferred. No impacts to soil productivity would occur and soil productivity would continue on a stable trend.

Action Alternative – Direct and Indirect Effects

Under the action alternative approximately 581 acres would be harvested employing traditional ground based methods. Soil disturbance is expected but in varying magnitudes and spatial extents. Ground based

harvest systems have the potential to compact main skid trails with displacement occurring during skidding and turning of log skidders. Light surface displacement can be beneficial for stand regeneration and is not considered detrimental to the productivity of the site. Excessive displacement can remove productive ash layers in the surface soils important for moisture retention resulting in short to long-term impacts to soil productivity. General mitigation measures listed in section ***3.5.4 Relevant Plans, Rules, and Mitigations*** along with site specific mitigation designed during project development are designed to limit the magnitude and extent of detrimental impacts. To adequately forecast the magnitude and extent of potential detrimental soil disturbance from the proposed action, monitoring results collected from previous DNRC timber sales on similar soils can be used. Presented in ***Table 3.5-3*** is previous soil monitoring projects for DNRC timber sales conducted on soils similar to those in the Boorman Peak project area.

Timber Sale and Harvest Unit	Parent Material	Total Impacts (%)	Soil Mapunit
ChickenWerner, Unit #10	Glacial Till Silty	8.5	26C-8
Coal Creek, Unit #5	Glacial till Loamy	19.1	26C-8
Goat Rot Hill, Unit #2	Glacial Till	13.8	26A-9
Lower Stillwater, #2	Outwash Gravels	6.4	28-7
Lower Stillwater, #6	Outwash Gravels	9.0	26G-7
Dog Meadow North, Unit #9	Glacial Till, Silt Loam	21.2	26C-8
Average		**13.0**	

Table 3.5- 3. Previous soil monitoring projects conducted on DNRC timber sales with ground based harvesting representative of the Boorman Peak project area.

Based on DNRC soil monitoring, impacts to soil resources from timber harvest activities within the Boorman Peak project area are expected to within the recommendation of the SFLMP of 15% of a harvest unit or less. Presented in ***Table 3.5.4*** in the projected areal extent of detrimental soil impacts assuming all slopes >40% (See Table 3.5.1) will employ hand felling and all BMP and mitigation measures will be properly implemented. Soil disturbance as a result of mechanical harvesting methods is expected to have a high risk of moderate impacts to soil function and long-term productivity to the site and should be within the recommendations of the SFLMP if all BMP's and site specific mitigations are properly implemented.

Harvest Method	Treated Acres	Impact Rate (%)	Range (± σ)	Average Impacted Area (acres)	Range of Impacted Area (acres)
Ground Based	581	13.0%	6.4% - 21.2%	76	37 - 123

Table 3.5- 4. Forecasted detrimental soil impacts within harvest units of the Boorman Peak project area.

In addition soil impacts as a result of harvest operations, the land use of an additional 41 acres will be permanently converted from forest products to transportation with the development of 6.75 miles of permanent road on DNRC lands as well as an additional 0.39 miles on Plum Creek lands (2.4 acres). These estimates assume an average clearing limit of 50 feet One temporary excavated skid trail is also proposed with an approximate length of 1,214 feet or 0.6 acres assuming an average clearing limit of 20 feet. Impacts to soil resources along excavated skid trails would be long-term and would not expect to be recovered for approximately 40-50 years post harvest. Transportation related affects to soil resources are thus expected on 44 acres under the proposed action. A majority of these impacts will permanently change the land use of these locations as mentioned above while long-term impacts to soil productivity are expected on 0.6 acres where an excavated skid trail is proposed. In summary, impacts to soil resources from road construction, log landings and excavated skid trails is expected to have a high risk of high level impacts due to the extensive road network proposed and document effects of excavation on long-term soil productivity.

Not only will this road network convert the land use of the affected area, the road network will be a corridor for noxious weed spread if access is not controlled and an integrated weed management plan adopted and persistently monitored. By adopting an integrated weed management plan, which includes general mitigation measures such as equipment washing, prompt grass seeding of disturbed areas and herbicide application to road ways, the proposed action presents a moderate risk of moderate level impacts from noxious weed spread.

Nutrient cycling and the long-term productivity of the site will be maintained by retaining 15-20 tons/acre of coarse woody material greater then 3 inches in diameter. Due to the select harvest prescribed for a majority of the stand and the volume of standing live trees retaining in the residual stand, coarse and fine woody material supply will continue at slightly lower rates then existing conditions. This slightly lower recruitment rate will be mitigated by coarse woody material retention during harvest operation which will likely offset any potential effects to woody material supply as a result of management activities. There is a low risk of low level impacts expected under the action alternative to nutrient cycling and associated effects to site productivity.

Assuming that site specific mitigation measures are properly implemented and relevant BMP's are applied to skid trails and log landing sites surface erosion within harvest units is expected to be minimal and generally localized to the most impacted areas. Further confidence in the lack of forecasted surface erosion can be gained due to the low energy environment within a majority of the project area, moderate precipitation, woody debris retention, and selective siviculture prescription. Erosion from road surfaces will be addressed in ***3.6 Hydrology and Watershed***.

No Action - Cumulative Effects

No cumulative effects are expected to soil and geologic resources under the no action alternative.

Action Alternative – Cumulative Effects

Cumulative effects by definition are the collective impacts on the human environment of the proposed action when considered in conjunction with other past, present and future actions related to the proposed action by location or generic type. For an impact to soil resources to be cumulative they must overlap a least twice in both time and space. Considering this constraint and the lack of previous management actions as well as scoped future actions within the Boorman Peak project area, there is a no risk of cumulative impacts to soil productivity.

3.5.7 Appendix – Maps

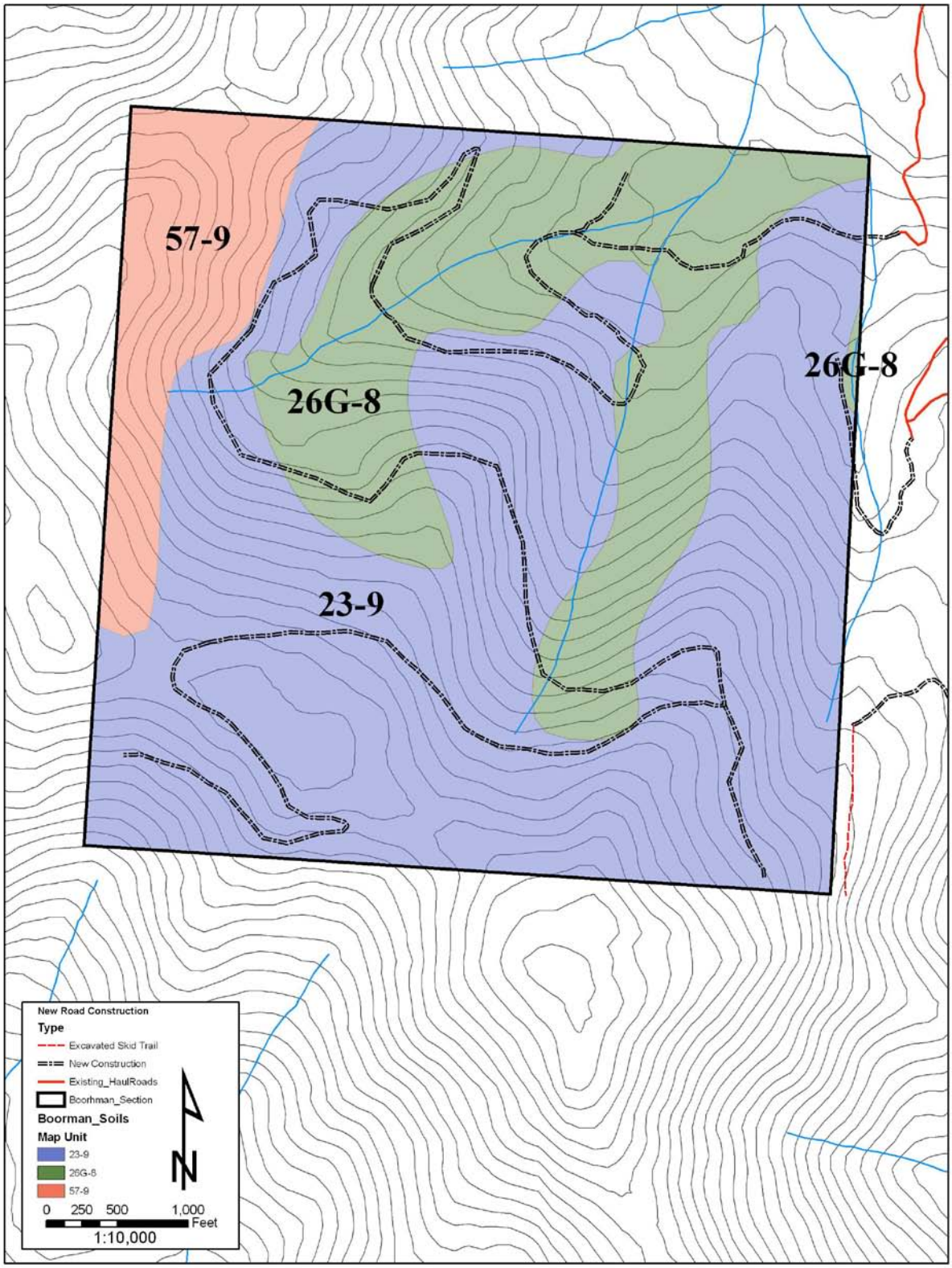


Figure 3.5- 1. Soil map units and their spatial extent within the Boorman Peak project area

.

3.6 WILDLIFE ANALYSIS

3.6.1 Introduction

This analysis is designed to identify and document existing conditions for wildlife resources found in the vicinity of this project and display the anticipated effects that may result from each alternative of this proposal. During initial scoping, several comments were received regarding the effects of proposed timber harvesting that led to the following list of issues:

- Concern was expressed that timber harvesting could reduce forested cover, which could reduce the amount of mature and old forested habitats available to those species that rely on them.
- Concern was expressed that timber harvesting could decrease the ability of some wildlife species to move across the landscape, which could alter their ability to use the area.
- Concern was expressed that timber harvesting could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependant upon these resources, which could alter their survival and/or reproductive ability.
- Concern was expressed that timber harvesting and associated activities could remove canopy closure or alter stand conditions, which could result in the reduction or modification of habitat components, leading to a decreased ability for the area to support Canada lynx.
- Concern was expressed that timber harvesting and associated activities could displace gray wolves from important habitats, particularly denning and rendezvous sites.
- Concern was expressed that timber harvesting and associated activities could alter gray wolf prey availability.
- Concern was expressed that timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.
- Concern was expressed that timber harvesting and associated activities could remove snags needed by flammulated owls for nesting.
- Concern was expressed that timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.
- Concern was expressed that timber harvesting and associated activities could reduce thermal cover on big game winter ranges, which could reduce carrying capacity of the winter range.
- Concern was expressed that timber harvesting and associated activities could reduce elk security habitat, which could affect hunter opportunity.

The following sections disclose the anticipated direct, indirect and cumulative effects to these wildlife resources in the analysis area from the proposed actions. Past and current activities on all ownerships within each analysis area as well as planned future agency actions have been taken into account for the cumulative effects analysis.

3.6.2 Analysis Areas

The discussions of existing conditions and environmental effects will focus on two different scales. The first will be the “project area”, which consists of section 16 in T28N, R23W, where the proposed logging activities would occur. The second scale or the “cumulative effects analysis area” relates to the surrounding landscape for assessing cumulative effects to wildlife and their habitats. For several resources analyzed below where no specific biological parameters were indicated (such as the home range area for a particular species) the 8 sections surrounding the project area and the project area (9 square miles total) is delineated for analysis of cumulative effects. These 9 parcels represent a land area of about 5,760 acres. Within this smaller cumulative effects analysis area, the ownership pattern is a mosaic of

industrial private timberland (49%), DNRC project area (11%), other private landowners (39%), and a minor component of U.S. Forest Service managed lands (1%). A second 28,000-acre cumulative effects analysis area was also identified and is also used for wide-ranging mammals and their habitats, such as Canada lynx, gray wolves, fishers and elk. This area was selected based on local geographic features, the location of a major highway and several major roads, and the size of the area roughly approximates the size of a potential home range for each of these species. Within this larger cumulative effects analysis area, the ownership pattern is a mosaic of industrial private timberland (32%), DNRC project area (3%), other private landowners (64%), and a minor component of U.S. Forest Service managed lands (1%).

3.6.3 Analysis Methods

DNRC attempts to promote biodiversity by taking a 'coarse-filter approach', which favors an appropriate mix of stand structures and compositions on State lands (ARM 36.11.404). Appropriate stand structures are based on ecological characteristics (e.g., land type, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist and biodiversity would be maintained. This coarse-filter approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a "fine-filter" approach for threatened, endangered, and sensitive species (ARM 36.11.406). The fine-filter approach focuses on a single species' habitat requirements.

For each species or habitat issue, existing conditions of wildlife habitats are described and compared to the anticipated effects of the No Action Alternative and the proposed Action Alternative to determine the foreseeable impacts to potentially affected wildlife species and their habitats.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, Montana Natural Heritage Program (MNHP) data, and consultations with other professionals provided information for the following discussion and effects analysis. Specialized methodologies are discussed under the species in which they occur. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by the Action Alternative.

3.6.4 Coarse Filter Wildlife Analysis

Of the 108 mammal species found in Montana, 74 are suspected or known to occur in Flathead County (Foresman 2001). The majority of terrestrial vertebrates that were present at the time of European settlement likely still occur in the vicinity of the proposed project area. Six amphibian and seven reptile species have also been documented in Flathead County (Maxell et al. 2003) and at least 163 species of birds have been documented in the vicinity in the last 10 years (Lenard et al. 2003). Terrestrial species that rely on special habitat elements, such as white bark pine (*Pinus albicaulis*), western white pine (*Pinus monticola*), or burned areas, may not be present or occur in lower abundance due to the decline of these elements across the landscape. Over time, due to fire suppression, tree densities have increased and shade-tolerant species, such as Douglas-fir and grand fir have become more prevalent than they were historically. These departures probably benefit wildlife species that rely on shade-tolerant tree species and/or closed-canopy habitats, while negatively affecting species that rely on shade-intolerant tree species and/or open habitats.

Old Growth Associated Species

Issue: Concern was expressed that timber harvesting could reduce forested cover, which could reduce the amount of mature forested habitats available to those species that rely on them.

Introduction
A variety of wildlife species rely upon mature to old stands for some or all life requirements. Some examples of these species includes pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*). Wildlife species dependent upon interior forest conditions can be sensitive to the amount and spatial configuration of appropriate habitats.

Analysis Areas
Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the eight surrounding sections and the project area (approximately 5,760 acres) Habitats and wildlife found on these lands would be those most likely to be influenced by cumulative effects associated with nearby activities and habitat alteration on project area lands. This scale of analysis was also selected because it is large enough to support a diversity of species that use mature forested habitats in the geographic vicinity of the project area.

Analysis Methods
Mature forested habitats including stand density and size class of trees were assessed using field evaluations, aerial photograph interpretation, and GIS analysis. Factors considered within the analysis include the level of harvesting, and the amount of densely forested habitats.

Existing Environment

The project area currently contains approximately 538 acres of old growth forest comprised of Douglas-fir/western larch and mixed-conifer stands that have a reasonably closed canopy. Currently all of these acres meet Green et al. (1992) standards for old growth classification and are at least 150 years old.

The network of open roads and through the cumulative analysis area coupled with timber management on roughly 4,000 acres in the past 40 years has reduced most of the landscape-level old growth habitats. Aerial photograph interpretation shows approximately 69 percent of the lands in the cumulative effects analysis area are non-stocked stands or are very young stands that provide little to no contributions to old growth habitats as a result of past harvest activities.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Old Growth Associated Species
Forest conditions would continue to age and move toward denser stands of shade-tolerant tree species with high canopy cover. No appreciable changes to forest age, or the distribution of dense forested cover would be anticipated. No changes in wildlife use would be expected; wildlife favoring dense stands of shade-tolerant tree species would benefit, while those requiring conditions likely found under natural disturbance regimes would continue to be underrepresented. No direct or indirect effects to old growth associated species would be expected that could affect wildlife in the project area.

Direct and Indirect Effects of the Action Alternative on Old Growth Associated Species
Approximately 485 acres of Douglas-fir, western larch and mixed-conifer stands would be harvested, all of which are old growth stands with a closed canopy. All of these acres of old growth habitats proposed for harvest would receive maintenance type treatments, which would reduce tree density in some areas resulting in reduced habitat for those species relying upon closed canopy forested habitats. Sufficient numbers of large trees of old age would be retained in amounts equal to or greater than those recommended by Green et al. (1992). Overall, the resultant changes in stand density would reduce habitats for species associated with closed canopy habitats, such as American marten, which have benefited from the increasing stand ages and densities caused by modern fire suppression. In general, under this alternative habitat conditions would improve for species adapted to more open forest conditions

and greater structural heterogeneity, while reducing habitat quality for species that prefer more homogeneous, dense forest conditions. Thus, since: 1) harvesting would reduce the amount of forested cover, and 2) some changes to wildlife use would be expected, minor adverse direct and indirect effects to old growth associated species would be expected that could affect wildlife in the project area.

Cumulative Effects of the No-Action Alternative on Old Growth Associated Species
Habitats within the cumulative effects analysis area are a mosaic of habitat types, mostly representing younger age classes. Past harvesting has reduced the amount of mature, forested habitats (approximately 69 percent of the cumulative effects analysis area); however these areas may continue to contribute to mature forests in the future. This alternative would continue to contribute to the mature forested stands within the cumulative analysis area. However, the project area would remain an island of mature forest surrounded by stands providing minimal contributions to old growth habitats for several more decades. Ongoing and future activities on industrial timberlands and other private lands would continue reducing old growth forested habitats. Under this alternative, continued use of the analysis area by species currently found within the analysis area would be expected. Habitat for forested-interior species and old growth associated species, such as American marten, northern goshawk, and pileated woodpecker, would likely persist. Thus, since 1) no changes to existing stands would occur, 2) no further changes to forest age, or the distribution of dense forested cover would be anticipated, and 3) no changes to wildlife use would be expected, no cumulative effects to old growth associated species would be expected that could affect wildlife in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Old Growth Associated Species
Past harvesting on adjacent industrial timberlands and other privately owned lands has reduced the amount of mature, forested habitats within the cumulative effects analysis area (approximately 69 percent). Reductions in mature, forested habitats associated with this alternative would be additive to losses associated with past and present harvesting activities. Habitats for forested interior species and old growth associated species, such as American marten, and northern goshawk would be expected to be reduced. All of the acres of old growth proposed for harvest would receive maintenance type treatments, which while reducing habitat for those species relying upon closed canopy forested habitats, would promote sustainability of these old stands by reducing competition and near term fire risk and would allow them to maintain their old growth classification (Green et al. 1992). Thus, since 1) harvesting would remove dense stands, further reducing the amount of forested cover in the cumulative effects analysis area, and 2) some changes to wildlife use would be expected, minor adverse cumulative effects to old growth associated species would be expected that could affect wildlife in the cumulative effects analysis area.

Landscape Connectivity

Issue: Concern was expressed that timber harvesting could decrease the ability of some wildlife species to move across the landscape, which could alter their ability to use the area.

Introduction

A variety of wildlife species require connectivity of forest habitat types in order to access habitats required for some or all of their life requirements. Wildlife species that require connectivity of forest habitat types between patches or those species that are dependent upon interior forest conditions can be sensitive to the amount and spatial configuration of appropriate habitats. Some species are adapted to thrive near patch edges, while others are adversely affected by the presence of edge or the other animals that prosper in edge habitats. Connectivity of forested habitats facilitates movements of those species that avoid non-forested areas and other openings; connectivity under historical fire regimes likely remained relatively high as fire differentially burned at various intensities through various habitats across the landscape.

Analysis Areas
Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the eight surrounding sections and the project area (approximately 5,760 acres). Habitats and wildlife found on these lands would be those most likely to be influenced by cumulative effects associated with nearby activities and habitat alteration on project area lands. This scale of analysis was also selected because it is large enough to support a diversity of species that require connected forested habitats in the geographic vicinity of the project area.

Analysis Methods
Landscape connectivity, including patch size and patch shape were assessed using field evaluations, aerial photograph interpretation, and GIS analysis. Factors considered within the analysis include the level of harvesting, amount of densely forested habitats, and connectivity.

Existing Environment

The project area currently contains approximately 538 acres of old growth forest comprised of Douglas-fir/western larch and mixed-conifer stands that have a reasonably closed canopy. With no history of timber management within the project area connectivity has remained high. This parcel is not part of a formally identified linkage zone.

The network of open roads and through the cumulative analysis area coupled with timber management on roughly 4,000 acres in the past 40 years has reduced most of the landscape-level connectivity. Aerial photograph interpretation shows approximately 69 percent of the lands in the cumulative effects analysis area are non-stocked stands or are very young stands that provide little to marginal landscape connectivity as a result of past harvest activities.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Landscape Connectivity
Forest conditions would continue to age and move toward denser stands of shade-tolerant tree species with high canopy cover. No appreciable changes to landscape connectivity would be anticipated. No changes in wildlife use would be expected; wildlife favoring dense stands with high connectivity would benefit, while those requiring conditions likely found under natural disturbance regimes would continue to be underrepresented. No direct or indirect effects to landscape connectivity would be expected that could affect wildlife in the project area.

Direct and Indirect Effects of the Action Alternative on Landscape Connectivity
Approximately 581 acres of Douglas-fir/western larch and mixed-conifer stands would be harvested, all of which have a closed canopy. All of the acres proposed for harvest would receive maintenance type treatments that would retain sufficient numbers of large trees of old age would be retained in amounts equal to or greater than those recommended by Green et al. (1992). Areas associated with several ridgeline and draw features would receive treatments intended to retain high levels of connectivity in those areas to facilitate wildlife movements. These areas identified through field visits and used to help shape the layout of the sale, showed evidence of high levels of wildlife use. Minor reductions in landscape connectivity would be anticipated with the proposed harvesting. In general, under this alternative habitat conditions would improve for species adapted to more open forest conditions and greater structural heterogeneity, while reducing habitat quality for species that prefer more homogeneous, dense forest conditions. Thus, since: 1) harvesting would reduce the amount of forested cover, 2) minor changes to landscape connectivity would occur, and 3) some changes to wildlife use would be expected, minor adverse direct and indirect effects to landscape connectivity would be expected that could affect wildlife in the project area.

Cumulative Effects of the No-Action Alternative on Landscape Connectivity
Habitats within the cumulative effects analysis area are a mosaic of habitat types, mostly representing open and younger age classes. Past harvesting has reduced the amount of landscape connectivity within the cumulative effects analysis area (approximately 69 percent); however these areas may contribute to connectivity in the future. Under this alternative the project area would remain an island of mature forest surrounded by stands providing minimal contributions to connectivity for several more decades. Ongoing and future activities on industrial timberlands and other private lands would continue altering connectivity. Under this alternative, continued use of the analysis area by species currently found within the analysis area would be expected. Habitat for forested-interior species would likely persist. Thus, since 1) no changes to existing stands would occur, 2) no further changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated, and 3) no changes to wildlife use would be expected, no cumulative effects to landscape connectivity would be expected that could affect wildlife in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Landscape Connectivity
Past harvesting on adjacent industrial timberlands and other privately owned lands has reduced the amount of landscape connectivity within the cumulative effects analysis area (approximately 69 percent). Reductions in connectivity associated with this alternative would be additive to losses associated with past and present harvesting activities. Across the cumulative effects analysis area harvesting activities have compromised connectivity. Habitats for forested interior species would be expected to be reduced. All of the acres of old growth proposed for harvest would receive maintenance type treatments, which while reducing habitat for those species relying upon closed canopy forested habitats, would promote sustainability of these old stands by reducing competition and near term fire risk and would allow them to maintain their old growth classification (Green et al. 1992). These maintenance treatments would allow for some retention of connectivity attributes with in the treated stands. Thus, since 1) harvesting would remove dense stands, further reducing the amount of forested cover in the cumulative effects analysis area, 2) reductions in landscape connectivity would occur, and 3) some changes to wildlife use would be expected, minor adverse cumulative effects to landscape connectivity would be expected that could affect wildlife in the cumulative effects analysis area.

Snags and Coarse Woody Debris

Issue: Concern was expressed that timber harvesting could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependant upon these resources, which could alter their survival and/or reproduction.

Introduction
Snags and coarse woody debris are important components of forested ecosystems. The 5 primary functions of dead wood in the forested ecosystems are to: 1) increase structural diversity, 2) alter the canopy microenvironment, 3) promote biological diversity, 4) provide important habitat for wildlife, and 5) act as a storehouse for nutrient and organic matter recycling agents (Parks and Shaw 1996). Snags and defective trees (partially dead, spike top, broken top) are used by a wide variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags and defective trees may be the most valuable individual component of Northern Rocky Mountain forests for wildlife species (Hejl and Woods 1991). The quantity, quality, and distribution of snags affect the presence and population size of many of these wildlife species.

Snags provide foraging sites for insectivorous species and offer opportunities for primary cavity-nesting species to excavate nests. The cavities created by primary excavators (i.e. woodpeckers) also provide habitat for secondary cavity users, including other birds and small and mid-sized mammals. Snags and defective trees can also provide nesting sites for secondary cavity users where cavities are formed by broken tops and fallen limbs. Primary risk factors include loss to legal and illegal firewood cutting,

prescribed burning, removal for wood fiber, purposeful felling during timber harvest operations for human safety, and incidental loss during logging due to equipment operation and yarding activities.

The tree species, diameter, height, decay stage, and densities of snags determine the snag-habitat value for wildlife species. Larger, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites (Bull et al. 1997). Many species that use smaller diameter snags will also use large snags; however, the opposite is not true. Typically, older-aged stands will have greater numbers of large snags. Snags in early stages of decay are often used more for feeding substrates, while mid-level decay provides opportunities for cavity excavation (Schepps et al. 1999). Some species of trees decay at slower rates than others, thereby providing habitat for longer periods of time. For example, western larch, western white pine, and ponderosa pine are harder woods that decay less rapidly than Douglas-fir, subalpine fir, or Engelmann spruce trees. Finally, snag densities are another important aspect of habitat value for cavity-nesting birds, as many of these species tend to nest in areas where snag densities are high, using one snag for nesting but having others nearby for foraging or roosting opportunities.

Coarse woody debris provides structural diversity and promotes biological diversity by providing habitat for many wildlife species. Many small mammals require coarse woody debris to survive. In turn, these species distribute fungi which are beneficial for seedling establishment and tree growth (Graham et al. 1994). Additionally, coarse woody debris can provide feeding substrates for species such as pileated woodpeckers and black bears, as logs will often host high densities of insects (Aney and McClelland 1985). Forest carnivores such as pine marten and lynx rely on coarse woody debris to provide resting and denning habitat (Patton and Escano 1990, Squires et al. 2008).

The quality and distribution of coarse woody debris can affect habitat quality for wildlife species that rely upon it to meet various life requisites. Longer lengths of large diameter downed wood typically provide higher quality habitat for wildlife than do smaller and/or shorter pieces. Single scattered logs can provide lookout and travel sites while log piles provide denning and resting habitat. Under natural conditions, logs tend to occur in patches or clumps, often where a blow-down event has occurred, with scattered lone logs occasionally distributed in between.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the eight surrounding sections and the project area (approximately 5,760 acres). Wildlife species associated with snags and coarse woody debris found on these lands would be those most likely to be influenced by cumulative effects associated with nearby activities and proposed habitat alteration on the project area. This scale of analysis would be large enough to support a diversity of species that use coarse woody debris, from birds to small mammals and meso-carnivores.

Analysis Methods

Snags and coarse woody debris were visually assessed during site visits and reviewing past DNRC harvesting information. Factors considered within the analysis include the level of harvesting, number of snags, relative amounts of coarse woody debris, and risk level of firewood harvesting.

Existing Environment

During field visits, approximately 9.5 variably spaced snags per acre and approximately 30-40 tons of coarse woody debris per acre were observed in the project area. Within the project area there are approximately 8 snags per acre in the 8-16” dbh class. There are approximately 0.5 snags per acres in the 17-20” dbh class, and lastly there is approximately one snag per acre in the >21” dbh class. Coarse woody debris exhibits a large range of decay classes as blow down events have been and continue to be a

common occurrence within the project area. As a result the approximate 30-40 tons of coarse woody debris per acre also exhibits a large range of decay classes from sound to fully decayed.

Within the cumulative effects analysis area, past harvesting has limited snag and coarse woody debris densities in much of the area. Timber harvest has reduced snag densities on adjacent lands to well below two snags per acres. During field visits the majority of snags observed on adjacent ownerships appeared to fall in the 8-16" dbh class. Coarse woody debris on adjacent lands also appeared to heavily represent smaller class sizes (8-16" dbh).

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Snags and Coarse Woody Debris
No direct changes in snag or coarse woody debris densities would be expected. Existing snags would continue to provide wildlife habitats and new snags would be recruited as trees die. However, in the long-term, densities of shade-intolerant trees and resulting snags could decline as these species are replaced by increasing numbers of shade-tolerant species. Shade-intolerant species tend to provide important habitats, such as nesting structures and foraging habitats, for cavity-nesting birds. Coarse woody debris would persist without other disturbances influencing its distribution and quality. Continued decay and decline in existing snags and trees would continue to contribute to the coarse woody debris in the project area. Thus, since, 1) no harvesting would occur that would alter present or future snag or coarse woody debris concentrations, and 2) no changes to human access for firewood gathering would occur, negligible direct and indirect effects would be anticipated to snags and coarse woody debris would be expected to affect wildlife species requiring these habitat attributes.

Direct and Indirect Effects of the Action Alternative on Snags and Coarse Woody Debris
Present and future snags and coarse woody debris would be reduced due to timber harvesting on 581 acres within the project area. Prescriptions call for retention of a minimum of 2 large snags per acre (> 21 in. dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (>21 in. dbh where they exist, otherwise the next largest size class), and 15-20 tons of coarse woody debris per acre would be planned for retention within the proposed units where it exists. However, some snags and/or recruit trees could be lost due to safety and operational concerns, but replacements would be identified to ensure ample amounts are present after logging. Future snag quality in the harvested units would be enhanced with proposed silvicultural prescriptions that should lead to the re-establishment of shade-intolerant species that tend to provide important habitats, such as long lasting nesting structures and foraging habitats, for cavity nesting birds. Given the amounts, range of variability in sizes and decay classes of snags and coarse woody debris present in the project area, prescriptions aiming to maintain a variety of these resources would benefit the suite of species that rely on these habitat components. Stands within the project area will be treated with an old growth maintenance treatment which will result in the retention of many snag recruitment trees in old age classes that will be available post treatment. Additionally conditions within the stand post treatment will reduce the risk of the loss of these snag recruitment tress due to bug infestations or fire. While the proposed harvest may reduce density of snags and their recruits in the near future the sustainability of snags in the area will increase. Thus, since: 1) harvesting would reduce snag, snag recruitment trees, and coarse woody debris, and 2) no changes to human access for firewood gathering would occur, minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect wildlife species requiring these habitat attributes for 30-100 years.

Cumulative Effects of the No-Action Alternative on Snags and Coarse Woody Debris
Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered with changing species composition in the stands due to advances in succession. Snags have been retained during some of the past harvesting in the cumulative effects analysis area. Portions of the cumulative effects analysis area would continue to have minor amounts snags and

coarse woody debris. Wildlife species in the cumulative effects analysis area that rely on snags and coarse woody debris would be expected to persist. Thus, since 1) no further harvesting would occur, 2) negligible changes in the numbers of snags, and 3) no change in the level of firewood gathering, no cumulative effects to snags and coarse woody debris would be anticipated.

Cumulative Effects of the Action Alternative on Snags and Coarse Woody Debris
Some snags and coarse woody debris could be removed from the project area, while others may be recruited. Stands within the project area will be treated with an old growth maintenance treatment which will result in the retention of many snag recruitment trees in old age classes that will be available post treatment. Additionally conditions within the stand post treatment will reduce the risk of the loss of these snag recruitment tress due to bug infestations or fire. While the proposed harvest may reduce density of snags and their recruits in the near future the sustainability of snags in the area will increase. The losses of snags and coarse woody debris associated with this alternative would be additive to the losses associated with past and ongoing harvesting on surrounding lands. However, the project requirements to retain a minimum of 2 large snags per acre (>21 in. dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (> 21 in. dbh where they exist, otherwise the next largest size class), and 10-15 tons of coarse woody debris per acre would mitigate additional cumulative effects associated with this project. Wildlife species that rely on snags and coarse woody debris in the cumulative effects analysis area would be expected to persist at similar levels, albeit slightly lower numbers on proposed harvest sites following treatment. Thus, since: 1) a slight, but cumulative amount of the cumulative effects analysis area would be harvested reducing snags and snag recruit trees while increasing sustainability and maintaining or increasing coarse woody debris levels, 2) no change in access for the general public and associated firewood gathering would be anticipated, and 3) there would be slightly increased representation of shade-intolerant species that could become snags in the long term, minor adverse effects to wildlife requiring snags and coarse woody debris would be anticipated that would affect these species in the cumulative effects analysis area for 30-100 years.

3.6.5 Fine-Filter Analysis

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and species managed as big game by the Department of Fish, Wildlife, and Parks. Table 3.6-1 – Status of Species Considered in the Fine Filter Analysis for This Proposed Project summarizes how each species considered was included in the following analysis or removed from further analysis because suitable habitat does not occur within the project area or proposed activities would not affect their required habitat components.

Table 3.6- 1. Status of species considered in the fine filter analysis for this proposed project.

SPECIES		DETERMINATION - BASIS
Threatened and Endangered Species	Grizzly Bear	No further analysis conducted – The project area is over six miles from "occupied habitat" as mapped by T. Wittinger, Unpub. Interagency Map (2002). Given the relatively low quality habitat and high degree of human influences between the project area and the "occupied habitat" little or no use would be expected. Thus, no direct, indirect or cumulative effects to grizzly bears would be expected to occur as a result of either alternative.
	Canada Lynx	***Included*** – Potential lynx habitats occur within the project area.
	Gray Wolf	***Included*** – The project area is approximately seven air miles from the Ashley Lake pack and contains approximately 570 acres of white-tailed deer winter range.

Sensitive Species	Bald Eagle	No further analysis conducted – The project area is 4.5 miles from the Ashley Lake bald eagle nest site, and is over 1.25 miles from Ashley Lake. Little or no use of the project area would be anticipated. Thus, no direct, indirect, or cumulative effects to bald eagles would be expected to occur as a result of either alternative.
	Black-backed Woodpecker	No further analysis conducted – No recently (less than 5 years) burned areas are in the project area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
	Coeur d'Alene Salamander	No further analysis conducted – No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
	Columbian Sharp-tailed Grouse	No further analysis conducted – No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
	Common Loon	No further analysis conducted – Although Ashley Lake typically supports several pairs of nesting common loons, the project area is over 1.25 miles from the lake. Thus, no direct, indirect or cumulative effects to common loons would be expected to occur as a result of either alternative.
	Fisher	***Included*** – Potential fisher habitat occur in the project area.
	Flammulated Owl	***Included*** – Potential flammulated owl habitat occurs in the project area.
	Harlequin Duck	No further analysis conducted – No suitable high-gradient streams occur within the project area. Thus, no direct, indirect, or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
	Northern Bog Lemming	No further analysis conducted – No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
	Peregrine Falcon	No further analysis conducted – No suitable cliffs/rock outcrops occur within the project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
	Pileated Woodpecker	***Included*** – Old forest stands comprised of western larch and Douglas-fir that are suitable for use by pileated woodpeckers occur in the project area.
	Townsend's Big-eared Bat	No further analysis conducted – No caves or mine tunnels occur in the project area. Thus, no direct, indirect, or cumulative effects to Townsend's big-eared bats would be anticipated as a result of either alternative.
Big Game Species	Big Game Winter Range	***Included*** – Approximately 570 acres of the project area was identified as white-tailed deer winter range.
	Elk Security Habitat	***Included*** – Approximately 527 acres of elk security habitat exists within the project area.

Threatened and Endangered Species

Canada Lynx

Issue: Concern was expressed that timber harvesting and associated activities could remove canopy closure or alter stand conditions, which could result in the reduction or modification of habitat components, leading to a decreased ability for the area to support lynx.

Introduction

Canada lynx are listed as "threatened" under the Endangered Species Act. Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). The proposed project area ranges from approximately 4,320 to 5,280 feet in elevation and is dominated by Douglas-fir, ponderosa pine, western larch, and mixed conifers. Lynx habitat in western Montana consists primarily of stands that provide habitat for snowshoe hares, either dense, young coniferous stands or dense, mature forested stands. Mature subalpine fir stands with abundant coarse woody debris also provide structure important for denning and cover for kittens, and dense cover used for for travel and security. These conditions are found in a variety of habitat types, particularly within the subalpine fir series (Pfister et al. 1977). Historically, high intensity, stand-replacing fires of long fire intervals (150 to 300 years) within continuous dense forests of lodgepole pine, subalpine fir, and Engelmann spruce created extensive even-aged patches of regenerating forest intermixed with old stands that maintained a mosaic of snowshoe hare and lynx habitat.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on a 28,000 acre cumulative effects analysis area generally centered on the project area. This scale of analysis approximates the home range size of a lynx (Ruediger et al. 2000).

Analysis Methods

To assess lynx habitat, DNRC SLI data were used to map specific habitat classes used by lynx. Lynx habitat (ARM 36.11.403(40)) was assigned to a stand if the SLI data indicated habitat types (Pfister et al. 1977) that are consistent with those reportedly used by lynx (Ruediger et al. 2000). Other parameters (stand age, canopy cover, and amount of coarse woody debris) were used in modeling the availability of the following 5 specific lynx habitat elements:

1) denning,
2) young foraging,
3) mature foraging,
4) forested travel/other habitat, and
5) temporary non-lynx habitats.

Denning habitat provides important vegetative and woody structure needed to provide denning sites and security for juvenile lynx, while foraging habitat is important for the survival of both adult and juvenile lynx, however, it is not considered limiting for lynx in most forested landscapes in western Montana (USFS Northern Rockies Lynx Amendment ROD 2007). "Forested travel/other habitat" is a general habitat category that provides for secondary prey items and contains modest levels of forest structure usable by lynx. Temporary non-lynx habitat consists of non-forest and open forested stands that are not expected to be used by lynx until adequate horizontal cover reestablishes. Factors considered in the analysis include landscape connectivity and the amount DNRC-owned lands within the cumulative effects analysis area in denning, foraging, and unsuitable habitats.

Existing Environment

Approximately 561 acres of lynx habitat (*TABLE 3.6-2 – LYNX HABITATS*) occur in the 636 acre project area. Much of this habitat was identified as mature foraging habitats, with lesser amounts of denning and

forested travel/other habitat. Connectivity within the project area has remained intact as there is no history of timber harvest on this parcel.

Canada lynx have been documented in the cumulative effects analysis area. DNRC-owned habitats within the cumulative effects analysis area occur almost exclusively on the project area parcel and are dominated by mature foraging habitats with slightly lesser amounts of denning and forested travel/other habitat (*TABLE 3.6-2 – LYNX HABITATS*). The lack of fire, including the effects of fire suppression has led to the development and maintenance of mature foraging, denning, and forested travel/other habitats on DNRC lands. Administrative rules of Montana (ARM 36.11.435 (8)(a) & (b)(i)) require a minimum of 5 acres and 10 percent of the lynx habitats on DNRC-managed lands to be in denning and foraging habitats, respectively. Currently, DNRC lands within the cumulative effects analysis area exceed the minimum thresholds for both foraging and denning habitat requirements (*TABLE 3.6-2 – LYNX HABITATS*).

Interpretations of aerial photographs of lands not under DNRC ownership show the majority of habitats (approximately 69 percent) to be dominated by temporary non-lynx type habitats. The distribution of the various lynx habitat elements in the remaining portions of the cumulative effects analysis area is the result, primarily, of past timber harvesting and the lack of recent wildfire. Connectivity at the cumulative effects analysis level has been compromised by past harvesting and road construction.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Canada Lynx
In the short-term, no changes in lynx habitat elements would be expected in the project area. Mature foraging and denning habitats would be expected to remain at similar levels or increase in the future as shade-tolerant trees develop in the understory and coarse woody debris accumulates through time due to natural events. Therefore, in the short term, no effects to lynx would be expected. In the longer-term, without disturbance, mature foraging and denning habitats may increase. Landscape connectivity would not be altered. Thus, since: 1) ample denning habitat would remain, 2) sufficient mature foraging habitat would exist, 3) most of the lynx habitats would be in a usable state for lynx, and 4) landscape connectivity would not be altered, minor beneficial direct and indirect effects to lynx habitats would be expected to occur in the project area for 10-20 years.

Direct and Indirect Effects of the Action Alternative on Canada Lynx
Approximately 514 acres of lynx habitats would be harvested with this alternative (TABLE 3.6-3 – CHANGES IN LYNX HABITATS). Within units proposed to receive maintenance type prescriptions, canopy cover and horizontal cover would be removed to prepare for regenerating trees. These prescriptions would convert available lynx habitat elements into the forested travel/other habitat class. Of these acres, the majority of the lynx habitats are mature foraging, with lesser amounts of denning and forested travel/other habitats; after the proposed harvesting, these habitats would move into forested travel/other. In the proposed units, 15 to 20 tons of coarse woody debris would be retained to provide some horizontal cover and security structure for lynx. In the short-term (approximately two years), lynx would likely avoid proposed harvest units that would be converted to forested travel/other habitats due to timber harvest disturbance. Overall forest connectivity would be reduced; however current landscape connectivity in the area has been compromised through past harvesting activities. Collectively, since: 1) ample denning habitat would be retained, 2) sufficient mature foraging habitats would exist, 3) moderate amounts of lynx habitats would be in the temporary non-lynx habitat category meaning most of the lynx habitats would be in a usable state for lynx, and 4) some further reduction in landscape connectivity would be anticipated, minor adverse direct and indirect effects to lynx habitats that would be expected to affect Canada lynx in the project area for about 20 years following successful regeneration and forest ingrowth into harvest units.

Cumulative Effects of the No-Action Alternative on Canada Lynx

No appreciable change in lynx habitats would occur under this alternative (Table 3.6-4 –CHANGES IN LYNX HABITATS IN THE CUMULATIVE EFFECTS ANALYSIS AREA) except the continued maturation of stands. Some modifications of lynx habitats could be possible with any management that may occur on industrial timberlands and other private lands. Across all ownerships, continued stand maturation, in the absence of other disturbance, would move temporary non-lynx habitat towards young foraging habitat or forested travel/other habitat. No further changes in landscape connectivity would be anticipated due to DNRC activities at this time. Thus, since: 1) adequate denning habitats would persist, 2) sufficient mature foraging habitats would exist, 3) young foraging habitats would continue to provide habitat for snowshoe hares outside of DNRC ownership, 4) longer term availability of young foraging habitats would likely decline without disturbance, 5) temporary non-lynx habitats will continue to mature and move into habitats suitable for lynx use, and 6) landscape connectivity would persist, minor beneficial cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative effects analysis area for 20-40 years.

Cumulative Effects of the Action Alternative on Canada Lynx
Within the cumulative effects analysis area lynx habitats would continue to persist (TABLE 3.6-4 – CHANGES IN LYNX HABITATS IN THE CUMULATIVE EFFECTS ANALYSIS AREA). Reductions in mature foraging, denning, and forested travel/other habitats in the proposed units would not be expected to appreciably alter lynx use of the cumulative effects analysis area. These reductions and the subsequent increase in forested travel/other habitats would be additive to existing forested travel/other habitats that exist in the cumulative effects analysis area. Following harvesting, sufficient denning and foraging habitats would be retained (TABLE 3.6-4 –CHANGES IN LYNX HABITATS IN THE CUMULATIVE EFFECTS ANALYSIS AREA) to satisfy DNRC's commitment (ARM 36.11.435) of retaining 5 acres lynx denning habitats and 10 percent mature foraging or young foraging habitats in the cumulative effects analysis area. Additionally some modifications of lynx habitats could be possible with any management that may occur on industrial timberlands and other privately owned lands in the cumulative effects analysis area. Across all ownerships, continued stand maturation would move habitats towards forested travel/other, mature foraging, and denning habitats and away from the young foraging stage, which would decrease habitat quality for snowshoe hares, thereby possibly reducing the availability of prey for lynx in the long-term. Existing denning habitat on DNRC-owned lands would be expected to persist in the absence of timber harvesting or other natural disturbance reducing habitat quality. Landscape connectivity would be further reduced with the proposed activities (see WILDLIFE-LANDSCAPE CONNECTIVITY). Thus, since: 1) adequate denning habitats would persist, 2) sufficient mature foraging habitats would exist, 3) young foraging habitats would continue developing for the next 20-50 years across the cumulative effects analysis area, and 4) there may be some reductions in landscape connectivity, minor adverse cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative effects analysis area for about 20 years.

Table 3.6- 2. Existing Acres and Proportions of Lynx Habitat Elements on DNRC Lands in the Project Area and Cumulative Effects Analysis Area**.**

	PROJECT AREA		***CUMULATIVE EFFECTS ANALYSIS AREA***	
LYNX HABITAT ELEMENT	***ACRES***	***PERCENT OF LYNX HABITATS***	***ACRES***	***PERCENT OF LYNX HABITATS***
Denning	***120***	***21***	***120***	***21***
Mature foraging	***284***	***51***	***284***	***51***

Forested travel/other	***157***	***28***	***157***	***28***
Young foraging	***0***	***0***	***0***	***0***
Temporary non-habitat	***0***	***0***	***0***	***0***
Grand Total-Lynx Habitats	***561***	***100***	***561***	***100***
Permanently Unsuitable	***79***		***533***	
Total Acres	***640***		***1,094***	

Table 3.6- 3. Acreage Changes in Lynx Habitat Elements Following Implementation of the Alternatives Considered**.**

CHANGES TO LYNX HABITATS	ALTERNATIVES	
	A	**B**
Denning habitat converted to forested travel/other	0	74
Mature foraging habitat converted to forested travel/other	0	206
Forested travel/other habitat treated but remaining as forested travel/other	0	138
Temporary non-lynx habitat	0	0
Total increase in forested travel/other	0	280
Total lynx habitat affected	0	514

Table 3.6- 4. Changes in Lynx Habitats in the Cumulative Effects Analysis Area. Acres of Lynx Habitats After Each Alternative and Proportion Each Suitable Habitat Represents Out of All Suitable Lynx Habitats in the Cumulative Effects Analysis Area**.**

		Alternative A	Alternative B
Lynx Habitat		Ac in Cumulative Effects Analysis Area	Ac in Cumulative Effects Analysis Area
Denning	Acres post-treatment	120	34
	percent of lynx habitats	**21%**	**2.1%**
Foraging	Acres post-treatment	284	63
	percent of lynx habitats	**51%**	**11%**
Forested Travel	Acres post-treatment	157	464
	percent of lynx habitats	**28%**	**83%**
Temporary Non-	Acres post-	0	0

Lynx Habitats	treatment percent of lynx habitats	**0%**	**0%**
Total Lynx Habitats	Acres post-treatment	561	561
PERMANENTLY UNSUITABLE		533	533
TOTAL ANALYSIS AREA		1,094	1,094

Gray Wolf

Issue: Concern was expressed that timber harvesting and associated activities could displace gray wolves from important habitats, particularly denning and rendezvous sites.

Issue: Concern was expressed that timber harvesting and associated activities could alter grey wolf prey availability.

Introduction

The gray wolf was listed as "endangered" under the Endangered Species Act in the northern portion of Montana, which includes the project area. To meet the delisting criteria, the 3 recovery areas need to support a minimum of 30 breeding pairs for 3 consecutive years. The 3 recovery zones have met the recovery objectives for breeding pairs since 2000. In 2007, 107 packs that met the definition of a 'breeding pair" were documented within the tri-state region (USFWS et al. 2008). Of those 107 packs, 73 occurred in Montana, with 23 of those found in northern Montana portion of the recovery area along with 13 additional packs that didn't meet the requirements to be considered a "breeding pair" (Sime et al. 2008). The USFWS recently de-listed the gray wolf (March 28, 2008); however, a preliminary injunction upheld on July 18, 2008 lead to the re-listing of wolves in Montana as "endangered." On January 14, 2009, Deputy Secretary of the Interior Lynn Scarlett again announced the removal of the Montana and Idaho portions of the northern Rocky Mountain population of gray wolves from protection under the Endangered Species Act. On March 6, 2009, Secretary of the Interior Ken Salazar affirmed the decision by the U.S. Fish and Wildlife Service to remove gray wolves from the list of threatened and endangered species in Montana. The final delisting rules are expected to be published by approximately April 1, 2009, and will become effective 30 days later. For this analysis and project, they will be considered as endangered to address uncertainty associated with de-listing.

Wolves are a wide-ranging, mobile species. Adequate habitat for wolves consists of areas with adequate prey and minimal human disturbance, especially at den and/or rendezvous sites. The Ashley Lake pack has been in the vicinity for at least the last two years and has not been a breeding pair counted towards the recovery goals. The home range for this pack is variable, but does not typically include the project area (USFWS et al. 2008).

The Northern Rocky Mountain Wolf Recovery Plan (USFWS 1987) identified the key components of wolf habitat as: 1) a sufficient, year-round prey base of ungulates (big game) and alternate prey, 2) suitable and somewhat secluded denning and rendezvous sites, and 3) sufficient space with minimal exposure to humans.

Wolves are opportunistic carnivores that frequently take vulnerable prey (including young individuals, older individuals, and individuals in poor condition). In general, wolf densities are positively correlated to prey densities (Oakleaf et al. 2006, Fuller et al. 1992). Wolves prey primarily on white-tailed deer, and, to a lesser extent, elk and moose, in northwest Montana (Kunkel et al. 1999). However, some studies

have shown that wolves may prey upon elk more frequently during certain portions of the year (particularly winter) or in areas where elk numbers are higher (Arjo et al. 2002, Kunkel et al. 2004, Garrott et al. 2006). Thus, reductions in big game populations and/or winter range productivity could indirectly be detrimental to wolf populations.

Wolves typically den during late April in areas with gentle terrain near a water source (valley bottoms), close to meadows or other openings, and near big game wintering areas. When the pups are 8 to 10 weeks old, wolves leave the den site and start leaving their pups at rendezvous sites while hunting. These sites are used throughout the summer and into the fall. Disturbance at den or rendezvous sites could result in avoidance of these areas by the adults or force the adults to move the pups to a less adequate site. In both situations, the risk of pup mortality increases. No known den or rendezvous sites are known in the project area; however, landscape features frequently associated with these sites occur in the cumulative analysis area. Wolves may be using the project area or nearby vicinity for hunting, breeding, and other life requirements.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on the 28,000 acre cumulative effects analysis area described above. This area does not include the annual home range for the Ashley Lake wolf pack but it would be large enough to support this pack.

Analysis Methods

Since changes in winter range could have a sizable effect on availability of prey for wolves, portions of this analysis tier to the big game winter range section below. Disturbance at den and rendezvous sites is important during certain portions of the year, and timing of proposed activities in relation to these sites is also important. Direct and indirect as well as cumulative effects were analyzed using field evaluations, aerial photograph interpretation, and a GIS analysis of habitat components. Factors considered in the analysis include the amount of winter range modified and level of human disturbance in relation to any known wolf dens or rendezvous sites.

Existing Environment

Approximately 570 acres of white-tailed winter range exists within the project area. There is no current knowledge of any den or rendezvous sites within the project area (*K. Laudon, DFWP, personal communication, January 30, 2009*). Currently there are no established roads within the project area.

Within the larger, cumulative effects analysis area, white-tailed winter range is abundant (approximately 12,000 acres). Numerous landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water and in gentle terrain, occur in the cumulative effects analysis area. The locations of the den and rendezvous sites of the Ashley Lake pack are not known at this time (*K. Laudon, DFWP, personal communication, January 30, 2009).* Wolves from the Ashley Lake wolf pack have utilized some of the cumulative effects analysis area in the past and would be expected to continue into the future. Past harvesting on all ownerships in the cumulative effects analysis areas have altered big game and wolf habitats. Harvesting has reduced the amount of mature forest within the cumulative effects analysis area in turn reducing the amount of thermal cover and snow intercept available to big game. Additionally harvest has resulted in an extensive road network within the cumulative effects analysis area increasing the access to these areas and as a result the pressure on wolves in the area. Wolves using this area must also deal with the impacts of several major roadways and human dwellings in the cumulative effects analysis area. There are small farms on less than ten percent of the cumulative effects analysis area. These small farms may graze livestock which pose a risk for wolves utilizing the area.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Gray Wolves
Disturbance to wolves would not increase. No changes in big game habitat, including no changes to forested cover on white-tailed deer or elk winter range would be expected during the short-term; therefore, no changes in wolf prey availability would be anticipated. No changes in the ability for wolves to use the project area would be expected. Thus, since: 1) no changes in human disturbance levels would occur, and 2) no changes to big game winter range would occur, no direct and indirect effects would be expected to affect gray wolves.

Direct and Indirect Effects of the Action Alternative on Gray Wolves
Wolves using the area could be disturbed by harvesting activities, and are most sensitive at den and rendezvous sites, which are not known to occur within the project area. After harvesting activities, human disturbance levels would likely revert to pre-harvest levels. Likewise, potential for any wolf use of the project area for denning and rendezvous sites would likely revert to pre-harvest levels. In the short term (approximately two years), the proposed harvest units could lead to shifts in big game use, which could lead to a shift in wolf use of the project area due to human disturbance associated with logging activities. If this alternative were to be selected, 7.2 miles of new road would be constructed within the project area. While these roads would be closed to motorized vehicles there would be increased access for non-motorized users. This increased access would in turn increase the risk of human contact with wolves and with big game. Increased human contact with wolves and big game may lead to increased indirect risk of human caused mortality to wolves. Harvest would result in the reduction of cover on 581 acres within the project area. These reductions on big game winter range may result in shifts in prey availability for wolves. Shifts in prey availability may reduce the amount of wolf use in the project area. Additional impacts to big game winter range are discussed in subsequent discussion. Thus, since: 1) minor, short-term increases and no long-term changes in human disturbance levels would occur with no increases near known wolf den and/or rendezvous sites anticipated, 2) no current wolf use is known in the project area, 3) there would be increased potential for increased non-motorized access and 4) there would be reductions in habitat quality of big game winter range that may shift wolf use, minor adverse direct and indirect effects would be expected to affect gray wolves.

Cumulative Effects of the No-Action Alternative on Gray Wolves
White-tailed deer, mule deer, and elk winter range would not be affected and change in big game populations, distribution, or habitat use would be not anticipated. Levels of human disturbance would be expected to remain at present levels. Future harvesting on lands within the cumulative effects analysis area may cause shifts in white-tailed deer use and subsequently gray wolf use of the cumulative effects analysis area. However, no changes in road amounts or changes to vegetation abundance or structure would occur on the project area that would alter levels of gray wolf use of the cumulative effects analysis area under this alternative. Thus, since: 1) no changes in human disturbance levels would occur, particularly near known wolf den and/or rendezvous sites, and 2) no changes to big game winter range would occur, no cumulative effects would be expected to affect gray wolves.

Cumulative Effects of the Action Alternative on Gray Wolves
Since the expected direct and indirect effects of this project on habitat attributes within the project area that are important for wolves would be minor, cumulative effects would also be minor. Some slight shifts of big game use may occur. Reductions in cover may cause slight decreases in use by deer and elk; however, no appreciable changes in deer and elk distribution or abundance would be expected at the scale of the cumulative effects analysis area. Minor reductions to big game winter range would be expected and are addressed in subsequent discussion. The reductions that would occur under this alternative to big game winter range would not be expected to affect the overall use of the cumulative effects analysis area by wolves. Under this alternative approximately 7.2 miles of new road would be constructed within the

project area. These roads would be closed to motorized public use but may facilitate non-motorized access. This increased access may result in an increase in human and wolf interactions. Additionally increased access may allow for increased hunter big game interactions as well. These reductions in cover would be additive to losses from past timber-harvesting activities in the cumulative effects analysis area. Human-disturbance levels would be expected to revert to levels similar to current levels after the proposed harvesting has been completed and roads would again be closed. No substantive change in wolf use of the cumulative effects analysis area would be expected; wolves would be expected to continue to use the area in the long term (approximately 5-10 years). Thus, since: localized disturbance due to logging activities in the area; 2) there would be an increase in non-motorized human access potential on 7.2 miles of new closed roads; 3) there are no, known den or rendezvous sites in the cumulative effects analysis area; and 4) winter range habitat quality would be reduced on 479 acres, which could slightly lower winter carrying capacity across the cumulative effects analysis area and alter prey distribution, particularly for white-tailed deer; minor adverse cumulative effects to gray wolves would be anticipated.

Sensitive Species

When conducting forest-management activities, the SFLMP directs DNRC to give special consideration to sensitive species. These species may be sensitive to human activities, have special habitat requirements, are associated with habitats that may be altered by timber management, and/or may, if management activities result in continued adverse impacts, become listed under the federal Endangered Species Act. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful "fine filter" for ensuring that the primary goal of maintaining healthy and diverse forests is met. As shown in *Table 3.6-1 - Status of Species Considered in the Fine Filter Analysis for This Proposed Project*, the sensitive species portion of this analysis will focus on fishers, flammulated owls, and pileated woodpeckers.

Fisher

Issue: Concern was expressed that timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.

Introduction

Fishers are generalist predators that prey upon a variety of small mammals and birds, as well as snowshoe hares and porcupines. They also take advantage of carrion and seasonally available fruits and berries (Foresman 2001). Fishers use a variety of successional stages, but are disproportionately found in mature stands with dense canopies (Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994) and avoid openings or young forested stands (Buskirk and Powell 1994). However, some use of openings does occur for short hunting forays or if sufficient overhead cover (shrubs, saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites and tend to use areas within 150 feet of water (Jones 1991). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining travel corridors.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on the 28,000 acre cumulative effects analysis area described above. This scale includes enough area to approximate overlapping home ranges of male and female fishers (Heinemeyer and Jones 1994).

Analysis Methods

To assess potential fisher habitat and travel cover on DNRC managed lands in the cumulative effects analysis area, sawtimber stands within preferred fisher cover types (ARM 36.11.403(60)) below 6,000 feet in elevation with 40 percent or greater canopy closure were considered potential fisher habitat. DNRC manages preferred fisher cover types within 100 feet of Class 1 and 50 feet of Class 2 streams, so that 75 percent of the acreage (trust lands only) would be in the sawtimber size class in moderate to well-stocked density (ARM 36.11.440(1)(b)(i)). Fisher habitat was further divided into upland and riparian-associated areas depending upon the proximity to streams and based upon stream class. Direct and indirect effects were analyzed using field evaluations and GIS analysis of potential habitat. Cumulative effects were analyzed using field evaluations and GIS analysis of potential habitat and aerial photograph interpretation of potential habitat on all other lands within the cumulative effects analysis area. Factors considered include amount of suitable fisher habitats, landscape connectivity, and human access. Snags and coarse woody debris were visually assessed during site visits and reviewing past DNRC harvesting information. Factors considered within the analysis include the level of harvesting, number of snags, relative amounts of coarse woody debris, and risk level of firewood harvesting.

Existing Environment

The project area ranges from 4,320 to 5,320 feet in elevation. There are no riparian fisher habitats within the project area which are generally used for denning and resting (Heinemeyer and Jones 1994). Modeling fisher habitats using SLI data generated an estimate of 600 acres of fisher travel and foraging habitats (600 upland acres) in the project area (Heinemeyer and Jones 1994). Currently there are no roads within the project area. At the scale of the project area, the stands comprising this habitat comprise one moderately to densely forested patch that persists as an island surrounded by sapling stands of varied density on adjacent private industrial forest lands. Within the upland areas on the project area, most of the preferred fisher cover types are moderately or well-stocked and likely support the structural features necessary for use as travel habitats. During field visits, approximately 9.5 variably spaced snags per acre and approximately 30-40 tons of coarse woody debris per acre were observed in the project area.

Within the cumulative effects analysis area on DNRC managed lands there are only 9 acres of moderately or well-stocked fisher cover types that support the structural features necessary for use as fisher travel, resting and denning habitats. Thus, DNRC lands inherently support little riparian habitat that would promote maintaining landscape connectivity at the scale of the cumulative effects analysis area. Approximately nine miles of perennial and 72 miles of intermittent streams occur on private industrial forest lands and other private lands. The areas adjacent to these streams may contribute to the total riparian fisher habitats within the cumulative effects analysis area, although these streams are sometimes found to be absent from the landscape when ground-truthed as has been the case on nearby DNRC parcels. DNRC managed lands within the cumulative effects analysis area provide approximately 657 acres of potential upland fisher habitats. It is likely that lands managed as private industrial forest lands and other private owners within the cumulative effects analysis area provide additional upland fisher habitats. Within the cumulative effects analysis area there is an extensive network of existing roads many of which are closed to public access but may facilitate non-motorized traffic within the area. Within the cumulative effects analysis area, past harvesting has limited snag and coarse woody debris densities in much of the area. Timber harvest has reduced snag densities on adjacent lands to well below two snags per acres. Coarse woody debris on adjacent lands also appeared to heavily represent smaller class sizes (8-16” dbh).

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Fishers

No effects to fishers would be expected under this alternative. No change to the stands providing fisher denning and foraging habitats would be expected. Human disturbance and potential trapping mortality

would expect to remain at current low levels. No changes in landscape connectivity would occur. Thus, since: 1) no changes to existing habitats would be anticipated, 2) landscape connectivity would not be altered, 3) no appreciable changes to snags, snag recruits, and coarse woody debris levels would be anticipated, and 4) no changes to human access or potential for trapping mortality would be anticipated, no direct or indirect effects would affect fishers in the project area.

Direct and Indirect Effects of the Action Alternative on Fishers

Approximately 552 of the 600 acres (92 percent) of upland fisher habitats in the project area would be included in proposed harvest units. All of these acres are presently meeting structural requirements for fisher travel use. The majority of the upland fisher habitats within the project area are proposed to receive treatments that would likely yield stands too open for appreciable fisher use. Prescriptions call for retention of a minimum of 2 large snags per acre (> 21 in. dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (>21 in. dbh where they exist, otherwise the next largest size class), and 15-20 tons of coarse woody debris per acre would be planned for retention within the proposed units where it exists. Stands within the project area will be treated with an old growth maintenance treatment which will result in the retention of many snag recruitment trees in old age classes that will be available post treatment. Additionally conditions within the stand post treatment will reduce the risk of the loss of these snag recruitment tress due to bug infestations or fire. While the proposed harvest may reduce density of snags and their recruits in the near future the sustainability of snags in the area will increase. Additionally, much of this acreage may continue meeting structural requirements for fisher after the proposed treatments. Due to lack of riparian fisher habitats within the project area as well as the reasonably dense canopy left with old growth maintenance type treatments, overall negligible changes to potential fisher habitats would occur with the proposed prescriptions. Old growth maintenance treatments will promote the sustainability of large, older age class trees in the project area further improving the development and sustainability of large snags. These large snags and trees could be a source for fisher denning and resting sites in the near future (10-20 years). Approximately 7.2 miles of new road would be built within the project area which may increase non-motorized use in the area although they will be closed to public motorized use. Increased use of the area by trappers due to increased road access is not expected due to the low quality of the fisher habitat in the area. Minor reductions in connectivity would be expected in this landscape where connectivity has already been compromised (see WILDLIFE- AND LANDSCAPE CONNECTIVITY). Thus, since: 1) harvesting would reduce or remove upland fisher habitats in preferred cover types, 2) minor reductions in landscape connectivity would occur, 3) harvesting would reduce snag and coarse woody debris levels, however some of these resources would be retained and sustainability would be promoted in residual old growth stands, and 4) motorized human access levels would remain the same, minor adverse direct and indirect effects would be anticipated that would affect fisher in the project area for approximately 30 years.

Cumulative Effects of the No-Action Alternative on Fishers

No effects to riparian or upland fisher habitats on DNRC managed lands would be expected with this alternative. No changes to landscape connectivity within the cumulative effects analysis area would be expected. Connectivity may be further altered through land management on industrial private timberlands and other private lands within the analysis area. Road access within the cumulative effects analysis area would not appreciably change; therefore, fisher vulnerability to trapping would remain unchanged. Fisher habitats could be altered with present and future harvesting on industrial private timberlands and other private lands. Thus, since: 1) no changes to existing habitats on DNRC ownership would occur, 2) landscape connectivity afforded by the stands on DNRC ownership would not change, 3) no changes to snags, snag recruits, or coarse woody debris levels would be expected, and 4) no changes to human access or potential for trapping mortality would be anticipated, no further cumulative effects to fishers would be anticipated in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Fishers
Approximately 552 acres of potential upland fisher habitats in the cumulative effects analysis area would be harvested. This would reduce the amount of the preferred fisher cover types exhibiting structural attributes for suitable habitat on DNRC owned lands in the cumulative effects analysis area from 657 acres to 105 acres. These reductions would be additive to the losses associated with past timber harvesting in the cumulative effects analysis area. Outside of the project area no changes in the amount of the preferred fisher cover types meeting structural requirements for fishers would occur in the cumulative effects analysis area. Minor reductions in landscape connectivity within the cumulative effects analysis area would occur, theses reductions would be additive to the losses associated with past timber harvesting. Human disturbance would be expected to return to pre-harvest levels following treatment. Thus, since: 1) harvesting would alter tree density and structure in stands of preferred fisher cover types, but considerable upland habitats within the cumulative effects analysis area would persist, 2) no changes to preferred cover types or fisher habitats associated with the riparian areas in the cumulative effects analysis area would be anticipated, 3) negligible reductions in landscape connectivity would be anticipated, 4) harvesting would partially reduce snags and snag recruits, while increasing the coarse woody debris levels, largely in the smaller-sized pieces, 5) no changes to motorized human access would occur, as the 7.2 mile of new roads constructed within the project area would be closed to public access and would not likely to be sought out by trappers, minor adverse cumulative effects would be anticipated that would affect fisher in the project area for approximately 30 years.

Flammulated Owl
Issue: There is concern that timber harvesting and associated activities could remove snags needed by flammulated owls for nesting.

Introduction
Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and are secondary cavity nesters. They usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12-25" dbh aspen, ponderosa pine, or Douglas-fir. Without disturbance, Douglas-fir encroachment into ponderosa pine stands can increase stand density and result in decreased habitat quality for flammulated owls.

Analysis Area and Methods
Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the on the 8 surrounding sections and the project area (approx 5,760 acres). This scale includes enough area to support several pairs of flammulated owls (McCallum 1994).

To assess potential flammulated owl habitats on the project area, SLI data were used to identify stands in preferred habitat types (ARM 36.11.403(28)). Direct and indirect effects as well as cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and a GIS analysis of available habitats. Factors considered within the cumulative effects analysis area included the degree of harvesting and the amount of continuous forest within the cumulative effects analysis area.

Existing Environment
The stands in the project area are largely ponderosa pine/Douglas fir and mixed conifer. Within the project area there are approximately 70 acres of flammulated owl habitats and an additional 570 acres of stands with a considerable component of ponderosa pine that may be suitable in the future. The current conditions may be partially a result of the encroachment by shade-tolerant species in the past. During field visits, approximately 9.5 variably spaced snags per acre and approximately 30-40 tons of coarse woody debris per acre were observed in the project area. Within the project area there are approximately 8

snags per acre in the 8-16” dbh class. There are approximately 0.5 snags per acres in the 17-20” dbh class, and approximately one snag per acre in the >21” dbh class. The snags exhibit a large range of decay classes.

In the cumulative effects analysis area, much of the area (roughly 69 percent) exists in relatively open forested conditions which are primarily the result of recent timber harvesting activity. Largely, these areas are not currently useful for flammulated owl nesting, but may serve as foraging habitats. Modern fire suppression has allowed Douglas-fir in-growth to create denser stands of mixed ponderosa pine and Douglas-fir in portions of the cumulative effects analysis area, which has reduced habitat quality for flammulated owls. Collectively, the flammulated owl habitats in the cumulative effects analysis area are relatively limited. Timber harvest has reduced snag densities on adjacent lands to well below two snags per acres. During field visits the majority of snags observed on adjacent ownerships fall in the 8-16” dbh class.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Flammulated Owls
Existing flammulated nesting habitats within the project area would continue maturing. In the long term, stands once dominated by ponderosa pine could continue to be converted to Douglas-fir stands through succession, become densely stocked, and exist at high risk to insects, disease and stand-replacement fire. Therefore, habitat sustainability and quality for flammulated owls would continue to decline. Thus, since: 1) no harvesting would occur, 2) no changes to potential nesting habitats would be anticipated, and 3) there would be slight long-term, succession-related declines in foraging habitats coupled with advancing succession leading to denser stands, a moderate degree of adverse indirect effects would be expected to affect flammulated owls in the project area would be expected.

Direct and Indirect Effects of the Action Alternative on Flammulated Owls
Flammulated owls are tolerant of human disturbance (McCallum 1994), however the elevated disturbance levels associated with harvesting could negatively impact flammulated owls should they be using existing habitat during the nesting period. Proposed timber harvest would open the canopy while favoring western larch and ponderosa pine. Elements of the forest structure important for nesting flammulated owls, including snags (a minimum of 2 snags per acre > 21 in. dbh where they exist, otherwise the next largest size class), coarse woody debris (15-20 tons per acre), numerous leave trees, and snag recruits (> 21 in. dbh where they exist, otherwise the next largest size class) would be retained in the proposed harvest units. Realistically, however, some snags would likely be removed due to safety and/or logistical concerns (see snags and coarse woody debris section), which could affect flammulated owls. The more open stand conditions, the retention of fire adapted tree species, and the maintenance of snags and large recruitment trees would move the proposed project area toward historical conditions, which is preferred flammulated owl habitat. Thus, since: 1) harvesting would open up dense stands, 2) elements of forest structure (snags, snag recruits, and CWD) used for foraging and nesting by flammulated owl would be retained, 3) prescriptions would lead to more open stands with mature ponderosa pine present, and 4) prescriptions would promote future development of ponderosa pine and western larch within the harvest units, moderate positive direct and indirect effects would be expected to affect flammulated owls in the project area for the next 30-50 years.

Cumulative Effects of the No- Action Alternative on Flammulated Owls
Flammulated owl habitats would persist in the project area in the short term (~20-30 years) on 70 acres until continuous encroachment of Douglas-fir renders currently suitable stands too dense to be inhabitable. Portions of the cumulative effects analysis area have been harvested in the recent past, potentially improving flammulated owl habitats by creating foraging habitats and reversing a portion of the Douglas-fir encroachment, however retention of large ponderosa pine was not necessarily a

consideration in many of these harvest units; thereby minimizing the benefits to flammulated owls. No harvesting would occur on DNRC lands and areas exhibiting mature forested conditions would be expected to persist and could provide flammulated owl nesting habitats. Other portions of the cumulative effects analysis area that are not currently providing flammulated owl habitats, due to encroachment, are not expected to change any time in the future. Collectively, stands would continue maturing and becoming more densely stocked, which would reduce habitat quality for flammulated owls. Thus, since: 1) no harvesting would occur on the project area, 2) no changes to potential nesting habitats would be anticipated, and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession leading to denser stands, a low degree of adverse indirect effects would be expected to affect flammulated owls in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Flammulated Owls
Proposed harvesting would add to the amount of the cumulative effects analysis area that has been recently harvested, which would add to the amount of foraging habitats available, but possibly at the expense of nesting habitats. Within the cumulative effects analysis area, the amount of that has been harvested in the recent past would increase from 3,973 (69 percent) acres to 4,554 (79 percent) acres. Although there will be reductions in mature forested stands dominated by ponderosa pine, additional potential nesting habitats within the cumulative effects analysis area would not be expected to change in the near future. The portions of the cumulative effects analysis area that are not currently providing flammulated owl habitats, due to encroachment, would not be expected to change any time in the near future. Collectively, stands would continue maturing and becoming more densely stocked, which would reduce habitat quality for flammulated owls. Thus, since 1) harvesting would improve flammulated owl nesting habitats and create foraging habitats, and 2) a small increase (10%) in the amount of the cumulative effects analysis area that would be more representative of historic conditions would occur, minor beneficial cumulative effects would be expected to affect flammulated owls in the cumulative effects analysis area.

Pileated Woodpecker

Issue: Concern was expressed that timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers, which could adversely affect their ability to survive and reproduce.

Introduction
Pileated woodpeckers play an important ecological role by excavating cavities that are used in subsequent years by many other species of birds and mammals. Pileated woodpeckers excavate the largest cavities of any woodpecker. Preferred nest trees are western larch, ponderosa pine, cottonwood, and quaking aspen, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat carpenter ants, which inhabit large downed logs, stumps, and snags. Aney and McClelland (1985) described pileated nesting habitat as..."stands of 50 to 100 contiguous acres, generally below 5,000 feet in elevation with basal areas of 100 to 125 square feet per acre and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and downed wood for feeding, closely tie these woodpeckers to mature forests with late-successional characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979).

Analysis Area
Direct and indirect effects were analyzed for activities conducted within the project area. For cumulative effects analysis purposes, the eight surrounding sections and the project area (approximately 5,760 acres) were used as the scale of the analysis. This scale includes enough area to support multiple pairs of pileated woodpeckers if enough suitable habitat is present (Bull and Jackson 1995).

Analysis Methods

To assess potential pileated woodpecker nesting habitats on DNRC-managed lands in the cumulative effects analysis area, SLI data were used to identify sawtimber stands with more than 100 square feet basal area per acre, were older than 100 years old, and had greater than 40 percent canopy closure. Foraging habitats are areas that do not meet the definition above, but include the remaining sawtimber stands with greater than 40 percent canopy cover. Direct and indirect effects as well as cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and these mapped potential habitats. Factors considered included the amount of potential habitat, degree of harvesting, and the amount of continuous forested habitat.

Existing Environment

In the project area, potential pileated woodpecker nesting habitat exists across the 636-acre parcel in stands dominated by Douglas-fir/western larch. Although nesting habitat is defined differently than foraging habitat, nesting habitat also provides foraging opportunities for pileated woodpeckers. No timber activities have been completed to date within the project area. Large live and dead trees are common within the project area. Large (>21 inch dbh) western larch, which could become suitable nesting sites, exist within the project area, and existing Douglas-fir/western larch stands are likely providing foraging habitats.

Similar to the project area, nesting habitats within the cumulative effects analysis area are dominated by western larch/Douglas-fir cover types. Within the cumulative effects analysis area, extensive harvesting has occurred on adjacent lands, which has fragmented the landscape to a large degree. As a result approximately 4,613 acres of the cumulative effects analysis area (80%) is not currently providing quality pileated habitat.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Pileated Woodpeckers

No disturbance of pileated woodpeckers would occur that might impact nesting pileated woodpeckers. Forest succession and natural disturbance agents would continue to bring about changes in existing stands. Trees would continue to grow, mature, and die, thus providing potential nesting and foraging structure for pileated woodpeckers. Continual conversion to shade-tolerant species would reduce the quality of habitat for pileated woodpeckers over time. Therefore, a reduction in suitable nesting trees would be likely over time, which could lead to decreased quality of suitable nesting habitat in the project area. Thus, since: 1) no further harvesting would occur, 2) no changes in the amount of continuously forested habitats would be anticipated, 3) no appreciable changes to existing pileated woodpecker habitats would be anticipated, and 4) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers would be anticipated, negligible adverse indirect effects to pileated woodpeckers in the project area would be expected until some other disturbance reverses stand succession.

Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers

Pileated woodpeckers tend to be tolerant of human activities (Bull and Jackson 1995), but might be temporarily displaced by the proposed harvesting. Under this alternative 581 acres of pileated woodpecker habitat would be harvested. Harvesting 581 acres would reduce continuously forested habitats for pileated woodpeckers. Elements of the forest structure important for nesting pileated woodpeckers, including snags (a minimum of 2 snags > 21 inch dbh per acre where they exist and would be expected to persist), coarse woody debris (15 to 20 tons per acre), numerous large trees, and snag recruits (a minimum of 2 trees per acre >21 inch dbh where they exist) would be retained in the proposed units. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979), near-term habitat quality in the project area would be expected to be

reduced on 581 acres, although old growth maintenance treatments would retain many large snag recruits that would minimize the effect of snag reduction within the project area. The old growth maintenance silvicultural prescriptions would retain an abundance of large, healthy ponderosa pine, western larch, and Douglas-fir while promoting the regeneration of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Thus, since: 1) harvesting would reduce the amount of continuous forested habitats available, 2) potential nesting and foraging habitats would be reduced, 3) several snags and snag recruits per acre would be removed; however mitigation measures to retain a minimum of 2 snags per acre and 2 snag recruits per acre in most of the units would be included, and 4) harvest prescriptions would promote seral species in the proposed units, minor adverse direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area for 20-50 years.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers
No disturbance of pileated woodpeckers would occur. Trees would continue to grow, mature, and die, thus providing potential nesting and foraging structure for pileated woodpeckers. Individuals utilizing the cumulative effects analysis area would be expected to continue to do so. Any ongoing harvesting on adjacent lands would continue to remove potential pileated woodpecker habitats while reducing the amount of the cumulative effects analysis area that would be in mature, forested cover types. Thus, since: 1) no further changes to existing habitats would occur, 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated, and 3) long-term, succession-related declines in the abundance of shade-intolerant tree species would occur, which are valuable to pileated woodpeckers, no cumulative impacts to pileated woodpeckers would be anticipated in the short-term (0-20 years), but slight adverse cumulative to pileated woodpeckers in the cumulative effects analysis area would be expected over the longer term (>50 years).

Cumulative Effects of the Action Alternative on Pileated Woodpeckers
Under this alternative, pileated woodpecker habitat would be temporarily degraded on 581 acres. Snags, coarse woody debris, and some potential nesting trees would be retained within the project area and, future recruitment of these attributes would be enhanced through the retention of many large snag recruits through old growth maintenance treatments. Within the project area, canopy cover on at least 581 acres proposed for maintenance type treatments would average about 40% post harvest and retain many large snag recruits enhancing the sustainability of large snags within the project area. Recently harvested stands within the project area and elsewhere on the cumulative effects analysis area have reduced pileated woodpecker habitats as well. The loss of pileated woodpecker habitats under this alternative would be additive to habitat losses associated with past harvesting on the cumulative effects analysis area; continued widespread use would be expected. Additionally, continued maturation of stands across the analysis area is increasing suitable pileated woodpecker habitats. Thus, since: 1) harvesting would reduce the amount of continuous forested habitats available in the cumulative effects analysis area, but forested habitats would persist; 2) in the short-term (20-50 years), habitat quality of potential nesting and foraging habitats would be reduced, but habitats (approximately 636 acres) would persist in the cumulative effects analysis area; 3) several snags and snag recruits per acre would be removed in the proposed units, however, mitigation measures would retain some of these attributes in several of the units; and 4) harvest prescriptions would promote seral species in the proposed units, overall minor adverse cumulative effects would be anticipated that would affect pileated woodpeckers in the cumulative effects analysis area for the next 20-50 years.

Big Game Species

Big Game Winter Range

Issue: Concern was expressed that timber harvesting and associated activities could reduce thermal cover on big game winter ranges, which could reduce carrying capacity of the winter range.

Introduction

Winter ranges enable big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to occur at lower elevation zones that receive less snow, and support large numbers of big game, which are widely distributed during the remainder of the year. These winter ranges have adequate midstory and overstory to reduce wind velocity and intercept snow, while moderating ambient temperatures. Besides providing a moderated climate, the snow-intercept capacity effectively lowers snow depths, which enables big game movement and access to forage. Snow depths differentially affect big game; deer are most affected, followed by elk, then moose.

Analysis Area

Direct and indirect effects were analyzed on the project area Cumulative effects were analyzed on the 28,000 acre cumulative effects analysis area defined by existing barriers that may impede wildlife movement (i.e. Ashley Lake, highway two, and other roads). This cumulative effects analysis area should supply enough area to provide winter habitat for several hundred wintering white-tailed deer.

Analysis Methods

Effects were evaluated using a combination of field evaluation, aerial photograph interpretation, assessment of Montana Department of Fish, Wildlife, and Parks (DFWP) winter range map layers, and GIS analysis. Factors considered within this cumulative effects analysis area include acres of winter range harvested and level of human disturbance and development.

Existing Environment

The majority of the project area was identified as white-tailed deer winter range as mapped by DFWP unpublished interagency map (2004). Winter snow depths and suitable microclimates influence big game distribution and use within the vicinity. Mature Douglas-fir/western larch stands in the project area are providing attributes facilitating use by wintering big game. Approximately 636 acres in the project area are providing mature forest cover and in turn thermal cover and snow intercept. Evidence of use by deer and elk was noted throughout the project area during field visits.

Currently within the cumulative effects analysis area approximately 12,350 acres of white-tailed deer winter range exists as identified by DFWP. Presently, a limited acreage of stands across the 28,000-acre cumulative effects analysis area is capable of providing thermal cover and snow intercept for big game. In the recent past, harvesting on private industrial forest lands and other private lands within the cumulative effects analysis area has reduced thermal cover and snow intercept (approximately 69% of the cumulative effects analysis area). These reductions are additive to past reductions on other ownerships. Human disturbance within the winter range is present and largely associated with human developments, home sites, the Ashley Lake Road and Highway 2.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Big Game Winter Range

No direct or indirect effects to big game winter range would be anticipated. No additional disturbance or displacement would be anticipated within the project area. Big game thermal cover in the project area would not be altered in the near term. In the longer-term, continued succession could reduce forage production while increasing thermal cover in these stands. No appreciable changes to winter carrying capacity would be anticipated. Since: 1) subtle changes in thermal cover due to mortality and successional advances increasing canopy densities would be anticipated, 2) the amount of mature forested habitats on the winter range would not change appreciably, and 3) the levels of human disturbance would remain the same, no direct or indirect effects to big game winter range would be anticipated.

Direct and Indirect Effects of the Action Alternative on Big Game Winter Range
Some displacement would be expected as a result of the proposed harvesting operations attributable to motorized logging disturbance. The old growth maintenance-type prescriptions on 581 acres of the winter range would create more open stands that would be largely too open to function as thermal cover or snow intercept, thus eliminating habitat attributes that would enable concentrated winter use by deer and elk. Approximately 55 acres would continue providing thermal cover and snow intercept in areas that have been identified as heavily used by big game, such as ridge tops and draws. These losses of thermal cover and snow intercept would require 40-60 years for suitable sized trees (>40 ft. tall) to develop in the stand. Thus, since: 1) the relatively short-term that logging activities would create disturbance in this area, 2) a large percentage of the winter range in the project area would be altered, moderate adverse direct and indirect effects to big game (particularly white-tailed deer) and habitat carrying capacity would be expected for the next 40 to 60 years.

Cumulative Effects of the No-Action Alternative on Big Game Winter Range
No changes would be anticipated in thermal cover and snow intercept. Stands that are providing thermal cover would be expected to continue providing this attribute under this alternative. Continued winter use of the larger winter range would be expected. Harvesting on private lands could continue to displace wintering big game and reduce available winter range habitats. Those portions of the winter range where timber harvesting occurred in the last 30 years could start developing thermal cover and snow intercept in the next 10-30 years. Human disturbance levels would be anticipated to continue at the same levels levels. Thus, there would be no cumulative effects to big game winter range or big game species as a result of this alternative.

Cumulative Effects of the Action Alternative on Big Game Winter Range
Thermal cover would be largely removed from approximately 581 acres of the deer and elk winter range, which would be additive to ongoing and past reductions across the cumulative effects analysis area. Approximately 69% of the cumulative effects analysis area could start providing some habitat attributes suitable for winter big game use in the near future as they continue maturing with time. Thus, since: 1) logging activities would create disturbance in a small portion of the cumulative effects analysis area for a relatively short term, 2) a small percentage (5 %) of the winter range in the cumulative effects analysis area would be altered, 3) white-tailed deer and elk possess a degree of behavioral adaptability, and 4) availability of lower-quality cover on surrounding ownerships that provides some opportunity for deer and elk should they be displaced, a low degree of adverse cumulative effects to white-tailed deer and reduced carrying capacity of the winter range would be expected for the next 40-60 years.

Elk Security Cover
Issue: Concern was expressed that timber harvesting and associated activities could reduce elk security habitat, which could affect hunter opportunity.

Introduction
Timber harvesting can increase elk vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during hunting season (*Hillis et al. 1991*). As visibility and accessibility increase within forested landscapes, elk have a greater probability of being observed and, subsequently, harvested by hunters. Because the female segments of the elk population are normally regulated carefully during hunting seasons, primary concerns are related to a substantial reduction of the male segment and subsequent decrease in hunter opportunity. The presence of fewer males at the beginning of the hunting season reduces the odds of any given hunter to see or harvest such an animal throughout the remainder of the season.

Analysis Area
Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 28,000 acre cumulative effects analysis area. This cumulative effects analysis area provides enough area for a moderate sized elk herd to avoid hunting pressure during the general hunting season and approximates the size of a fall, elk herd home range.

Analysis Methods
Given that areas within 0.5 mile of an open road do not provide elk security habitat (*Hillis et al. 1991*), existing open roads and proposed new roads that would remain open to the public were buffered 0.5 mile and identified as areas not meeting elk security habitat criteria. Within the cumulative effects analysis area recent timber harvest activities were taken in to account as they may reduce the amount of secure habitat for elk. Additionally, elk security habitat patches need to be somewhat larger forested blocks (>250 acres) with adequate cover to afford elk security during the general big game hunting season, so areas failing to meet this criteria were also removed, leaving patches that were distant enough from open roads, were large enough to meet the minimum criteria, and had adequate cover density to provide elk security habitat (*Hillis et al. 1991*). Factors considered in the analysis include the amount of security habitat available and level of human access for recreational hunting.

Existing Environment
Within the project area, there are approximately 527 acres of security habitat. Additionally, hiding cover, which is inherently a component of elk security habitat, is abundant within the project area. The project area is relatively inaccessible because there are no open roads or restricted roads in the parcel. Available access to the parcel is primarily through sizable networks of closed roads restricted to motorized activities that occur on neighboring industrial forest lands.

Within the cumulative effects analysis area, there are 1,552 acres that all meet the cover, distance (>0.5mi from an open road) and size (>250 acres) requirements of elk security across ownerships within the cumulative effects analysis area. This amount of security habitat (5.5 percent of the analysis area) does not meet the 30 percent minimum threshold established by Hillis et al. (*1991*). Additionally a large portion of the acreage within the cumulative effects analysis area that exhibits characteristics of elk security (>0.5 mi for an open road and >250 acres) has been harvested in the past 10-30 years resulting in low to moderate levels of cover. These recent harvests have reduced the quality of the elk security habitat within the area. In contrast with the project area, hunter access across the cumulative effects analysis area is relatively unlimited, and continuous with approximately 102 miles of open roads. Evidence of non-winter use by elk was noted throughout the project area during field reviews.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative
No changes in elk security cover would be expected. Existing cover would continue to contribute to security habitat. Timber stands would continue advancing to climax plant species. No alterations in cover would occur that would increase elk vulnerability during the hunting season. No changes would be anticipated related to disturbance, potential mortality due to hunting, or human access. Thus, since: 1) no changes to existing elk security habitat would be anticipated and continued maturation of forest cover would improve elk security habitats, 2) the level of human access would remain unchanged, no direct or indirect effects to elk security habitat in the project area would be anticipated.

Direct and Indirect Effects of the Action Alternative
No changes in open roads or motorized access would occur; however, up to 7.2 miles of restricted roads would be constructed within the project area. During all phases of the project, any roads opened with project activities would be restricted to the general public and closed after completion of project activities.

Proposed new roads would be restricted to the general public, but could facilitate non-motorized access during the hunting season using mountain bikes, horses, and/or foot travel. Within the project area, proposed units with maintenance type treatments would likely be too open to provide elk security. Under the action alternative, approximately 504 acres of security habitat would be altered, rendering the 527-acre patch within the project area unsuitable. Overall, increased sight distances and the reduction in hiding cover may increase elk vulnerability risk in the project area. Collectively, since: 1) no changes in open roads or motorized access for the general public would be anticipated that would increase hunter access, 2) sizeable amounts of amounts of elk security habitat would be affected (504 acres), and 3) potential for decreases in bull elk survival, moderate adverse effects to elk security habitat would be anticipated that would affect elk vulnerability risk in the project area for 20 to 30 years.

Cumulative Effects of the No-Action Alternative
Approximately 5.5 percent of the cumulative effects analysis area would continue providing elk security habitat, which falls well below the 30 percent minimum threshold recommended by Hillis et al. (*1991*). Continued maturation within previously harvested stands on all ownerships within the cumulative effects analysis area would improve hiding cover within those older units. No other changes in disturbance and potential mortality due to hunting would be anticipated. Thus, since: 1) no changes in open roads, motorized access, or human access would be anticipated, and 2) no further reductions in elk security habitat would occur, no cumulative effects to elk security habitat or hunter opportunity would be anticipated.

Cumulative Effects of the Action Alternative
No changes would be anticipated in the amount of open roads or motorized access for the general public that would influence elk vulnerability, but project-level alterations of cover and increases in restricted roads could reduce elk security habitat. Approximately 504 acres of elk security habitats in the project area would be removed with the proposed activities reducing the total acreage from 527 acres to 23 acres. Increased sight distances could reduce elk survival in the project area and proposed road construction could facilitate an increase in non-motorized traffic. Motorized access in the cumulative effects analysis area is relatively limited, but non-motorized access via closed roads is relatively high. Improvements to permanent, restricted roads could facilitate slight increases in illegal motorized uses. Portions of the cumulative effects analysis area have been harvested, reducing hiding cover and elk security habitat. Any harvesting that may occur on industrial private timberlands and other privately owned lands within the cumulative effects analysis area could reduce cover attributes further, however no changes in open roads or motorized human access are anticipated. Cover reductions that would occur under this alternative, would be additive to past harvesting conducted on neighboring lands within the last 30 years within the cumulative effects analysis area. With the proposed action available security cover within the cumulative effects analysis area would be reduced from 5.5% to 3.8 percent, which remains well below the 30 percent minimum threshold recommended by Hillis et al. (*1991*). Continued maturation of previously harvested stands within the cumulative effects analysis area would improve hiding cover within recent harvest units and partially offset these current losses within 10 to 30 years. Thus, since: 1) no changes in open roads or motorized access for the general public would be expected, 2) sizable changes to non-motorized access would occur, 3) a low to moderate amount of elk security habitat would be affected, and 4) slightly lower than existing levels of security habitat and hiding cover would persist in the cumulative effects analysis area, low to moderate adverse cumulative effects to elk security and hunter opportunity would be anticipated that would affect elk and hunters using the cumulative effects analysis area for 10-30 years.

3.6.6 Wildlife Mitigations

- Consult a DNRC biologist if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing Threatened and Endangered Species (ARM 36.11.428 through 36.11.435) are needed.
- Manage for snags, snag recruits, and coarse woody debris according to ARM 36.11.411 through 36.11.414, particularly favoring western larch, ponderosa pine, Douglas fir, and western white pine.
- Favor western larch and ponderosa pine in retention and regeneration decisions for pileated woodpecker and flammulated owl nesting and foraging habitats.
- Effectively close roads after the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags to firewood gathering and use temporary roads wherever possible.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads.
- Manage for higher timber retention in draws and ridgelines.

Literature Cited:

Aney, W. and R. McClelland. 1985. Pileated Woodpecker Habitat Relationships (revised). Pages 10-17 in Warren, N. eds. 1990. Old Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. USFS, Northern Region, Wildlife Habitat Relationships Program R1-90-42. 47pp.

Arjo, W. M., D. H. Pletscher, and R. R. Ream. 2002. Dietary overlap between wolves and coyotes in Northwestern Montana. Journal of Mammalogy. 83:754-766.

Bull, E. L., and J. A. Jackson. 1995. Pileated woodpecker: Dryocopus pileatus. American Ornithologists' Union. Washington DC. 24pp.

Bull, E.L., C. G. Parks, and T. R. Torgersen. 1997. Trees and Logs Important to Wildlife in the Interior Columbia River Basin. General Technical report PNW-391. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 55pp.

Buskirk, S.W., and R.A. Powell. 1994. Habitat ecology of fishers and American martens. Pages 283-296 *in* Buskirk, S.W., A. Harestad, M. Raphael, eds. Biology and conservation of martens, sables and fishers. Cornell University Press, Ithaca, NY.

Foresman, K.R.. 2001. The wild mammals of Montana. Special Publication 12. American Society of Mammalogists. Allen Press, Kansas. 278pp.

Fuller, T. K., W. E. Berg, G. L. Radde, M. S. Lenarz, and G. B. Joselyn. 1992. A history and current estimate of wolf distribution and numbers in Minnesota. Wildlife Society Bulletin 20:42-55.

Garrott, R., S. Creel, and K. Hamlin. 2006. Monitoring and assessment of wolf-ungulate interactions and population trends within the Greater Yellowstone Area, SW Montana and Montana Statewide. Unpublished report at http://www.homepage.montana.edu/~rgarrott/wolfungulate/index.htm.

Graham, R. T., A.E. Harvey, M. F. Jurgensen, T. B. Jain, J. R. Tonn, and D. S. Page-Dumroese. 1994. Managing Coarse Woody Debris in Forests of the Rocky Mountains. USDS Forest Service Research Paper. INT-RP-477. 13pp.

Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old-growth forest types of the northern region. USDA Forest Service, Northern Region, Missoula, MT.

Heinemeyer, K. S., and J. L. Jones. 1994. Fisher biology and management in the western United States: A literature review and adaptive management strategy. USDA Forest Service, Northern Region, Missoula, Montana. 108pp.

Jones, J.L. 1991. Habitat use of fisher in north-central Idaho. M.S. Thesis, University of Idaho, Moscow, Idaho. 147 pp.

Johnson, S. 1984. Home range, movements, and habitat use of fishers in Wisconsin. M.S. Thesis, University Wisconsin, Stevens Point. 78pp.

Kunkel, K., T.K. Ruth, D.H. Pletscher, and M.G. Hornocker. 1999. Winter prey selection by wolves and cougars in and near Glacier National Park, Montana. Journal of Wildlife Management 63:901-910.

Kunkel, K.E., D.H. Pletscher, D.K. Boyd, R.R. Ream, and M.W. Fairchild. 2004. Factors correlated with foraging behavior of wolves in and near Glacier National Park, Montana. Journal of Wildlife Management 68(1): 167-178.

Lenard, S; J. Carlson, J. Ellis, C. Jones, and C. Tilly. 2003. P.D. Skaar's Montana Bird Distribution, 6th Edition. Montana Audubon, Helena, Montana.

Maxell, B. A., J.K Werner, P. Hendricks, D.L. Flath. 2003. Herpetology in Montana: a history, status summary, checklists, dichotomous keys, accounts for native, potentially native, and exotic species, and indexed bibliography. Northwest Fauna Number 5. Society for Northwestern Vertebrate Biology. Olympia, Washington. 138pp.

McClelland, B.R. 1979. The pileated woodpecker in forests of the Northern Rocky Mountains. Pages 283-299 *in* Role of insectivorous birds in forest ecosystems. Academic Press.

Oakleaf, J.K., D. L. Murray, J. R. Oakleaf, E. E. Bangs, C. M. Mack, D. W. Smith, J. A. Fontaine, M. D. Jimenez, T. J. Meier, and C. C. Niemeyer. 2006. Habitat selection by recolonizing wolves in the northern Rocky Mountains of the United States. Journal of Wildlife Management 70:554-563.

Parks, C.G. and D.C. Shaw. 1996. Death and decay: A vital part of living canopies. Northwest science. Vol. 70, special issue: 46-53.

Patton , T. and R. Escano. Marten habitat relationships (revised). Pages 29-36 *in* Warren, N. eds. 1990. Old Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. USFS, Northern Region, Wildlife Habitat Relationships Program R1-90-42. 47pp.

Pfister, R., B. Kovalchik, S. Arno, and R. Presby. 1977. Forest habitat types of Montana. USDA For. Serv. Gen. Tech. Rep. INT-34. Intermountain Forest and Range Experiment Station Ogden, Utah. 174pp.

Powell, R. 1982. The fisher: National history, ecology, and behavior. University of Minnesota Press, Minneapolis, Minnesota. 217pp.

Ruediger, B., J. Claar, S. Mighton, B. Nanaey, T. Tinaldi, F. Wahl, N. Warren, D. Wenger, A. Williamson, L. Lewis, B. Holt, G. Patton, J. Trick, A. Vandehey, and S. Gniadek, 2000. Canada Lynx Conservation Assessment (2nd Edition). USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Missoula, Montana. 122 pp.

Schepps, J., S. Lohr, and T. Martin. 1999. Does Tree Hardness Influence Nest-Tree Selection by Primary Cavity Nesters? The Auk 116: 658-665.

Sime, Carolyn A., V. Asher, L. Bradley, K. Laudon, M. Ross, J. Trapp, M. Atkinson, and J. Steuber. 2008. Montana gray wolf conservation and management 2007 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 137 pp.

Squires, J. R., N. J. DeCesare, J. A. Kolbe, and L. F. Ruggiero. 2008. Hierarchical den selection of Canada lynx in western Montana. Journal of Wildlife Management 72:1497-1506.

USFWS. 1987. Northern Rocky Mountain wolf recovery plan. USFWS, Denver, Colorado. 119pp.

USFWS, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Idaho Fish and Game, and USDA Wildlife Services. 2008. Rocky Mountain Wolf Recovery 2007 Interagency Annual Report. C.A. Sime and E. E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601. 275pp.

3.7 AIR QUALITY

Road dust created from hauling logs across native surface or gravel roads may affect air quality. Air quality could be affected by smoke produced from burning slash created from timber harvesting and related activities.

3.7.1 Analysis Area

The analysis area for air quality includes Flathead County of Montana Airshed 2 as defined by the Montana Airshed Group. The methodologies used to analyze effects to air quality include estimating the location, amount, and timing of dust or smoke generated by project –related activities.

3.7.2 Existing Conditions

Air quality for the project area is considered good. Currently, the project area contributes very low levels of air pollution into the analysis area or local population centers. Temporary and localized reductions to air quality within the project area may occur in the summer and fall. These reductions are due mostly to road dust generated by non-motorized residential and recreational traffic on native surface roads and occasionally from smoke produced from burning slash piles. Some illegal motorized use of the area may also contribute to some road dust. None of the air-quality reductions affect local population centers at levels beyond Environmental Protection Agency (EPA) standards. All burning activities conducted by primary local entities that burn (which includes DNRC, USFS, and private landowners) comply with emission levels authorized by the Montana/Idaho Airshed Group. The project area is located inside the Kalispell impact zone where additional restrictions may be imposed to protect air quality. The proximity of the project area to numerous residential areas may also warrant additional restrictions when is comes to the creation of road dust and smoke from burning.

3.7.3 Environmental Consequences

No Action Alternative – Direct, Indirect, and Cumulative Effects

The existing condition would not change under the No Action Alternative in the project area or in Airshed 2.

Action Alternative - Direct and Indirect Effects

Log hauling and other project related traffic on native surface or gravel roads would increase the amount of road dust produced during dry periods. Post harvest burning associated with slash disposal or site preparation would produce smoke emissions. The increased dust and smoke emissions are not expected to exceed air quality standards, and would be temporary, localized reductions to air quality such as currently occurs. Burning would be

accomplished within the requirements imposed by the Montana/Idaho Airshed Group. Non-burning methods such as trampling slash, whole tree skidding in areas immediately adjacent to private property, and removing wood material as pulp would limit the amount of burning that would occur near homes, as well as reducing the amount of slash to be burned. Dust production would be limited or controlled by limiting the amount of hauling that occurs during dry periods, maintaining low speeds, and applying dust abatement to roads during dry periods. It is likely that this sale would be winter logged and therefore mitigate much of the dust created from log hauling and harvest operations.

Action Alternative - Cumulative Effects

Dust and smoke produced from implementing the Action Alternative would be in addition to smoke and dust associated with development activities on private lands, recreational use of federal and state lands, and prescribed burning on federal or industrial private lands. All major burners operate under the requirements of the Montana Airshed Group that regulates the amount of emissions produced cumulatively to avoid exceeding air quality standards. Cumulative effects during peak burning periods may affect nearby residents for short durations. Project related traffic during dry periods in addition to current road users may affect nearby residents for short durations, as well.

3.8 AESTHETICS

3.8.1 Existing Conditions

The majority of the Boorman Peak Timber Sale project area isn't visible to the general public due to the area's remote location, broken terrain and distance to public roads. The lone county road that passes in the general vicinity of the project area does not afford views into the project area except for the extreme southwest portion of the project area (about 50 acres).

3.8.2 Environmental Consequences

No Action Alternative – Direct, Indirect, and Cumulative Effects

In the short term, there would be little change to the current views of the project area. No indirect effects to aesthetics were determined as a result of the No Action Alternative. No other major projects are planned within the project area in the next 5 years.

Action Alternative – Direct and Indirect Effects

This alternative would harvest approximately 582 acres and change the current view on these acres. Of the 582 acres, only about 50 acres would be visible to the general public. Old-growth maintenance treatments would minimize any visual impact since the overstory would remain generally intact. Approximately 7 miles of new road would be constructed (with 0.8 miles visible to the general public). New road construction would be at least partially visible and would remain visible until the regeneration became established and tall enough to obstruct the view of the new roads.

3.9 RECREATION

The Boorman Peak Timber Sale project area currently experiences light recreational use by the general public during hunting season. The main issue expressed by the public and internally are:

- Skid trails and roads associated with timber management activities in conjunction with more open timber stands may increase the number of violations of general recreational use rules for state land.

3.9.1 Analysis Methods

Methods used to describe the existing condition and determine recreational impacts of the project include determining recreational uses and approximate revenue, and potential conflict between project activities and recreational uses. State Trust Lands that are legally accessible and have not been closed or restricted by rule or DNRC to recreational use are open to recreational use. Recreational use of Trust Lands is divided into three categories:

- General Recreational Use: trust lands are available for mostly non-motorized recreational activities such as hiking, biking, skiing, snowmobiling, and horseback riding to anyone purchasing a General Recreational Use License for State Lands.
- Montana Conservation License Holders: persons possessing valid licenses from DFWP are authorized to engage in hunting or fishing activities on state trust lands open to recreational use.
- Special Recreational Use: under site specific licenses purchased from DNRC commercial or concentrated (group) recreational use may be permitted on trust lands

3.9.2 Analysis Area

The analysis area includes all legally accessible lands within the Boorman Peak Timber Sale project area.

3.9.3 Existing Conditions

The Boorman Peak project area is used primarily for hunting. There are no open roads in the vicinity of the project area so hunters must use non-motorized travel for access. Revenue generated for state trusts from general recreational use licenses varies by fiscal year and is generated on a statewide basis. In 2004 the total gross revenue from General Recreational Use Licenses was $801,980, from approximately 5.1 million acres of trust land (DNRC, 2004). Average gross revenue per acre, calculated from the figures above is approximately $0.15/acre or approximately $96 per year for the 640-acre Boorman Peak Project Area.

3.9.4 Environmental Consequences

No Action Alternative – Direct, Indirect, and Cumulative Effects

Current types of general recreational use would continue in the Boorman Peak Timber Sale project area. Amount of use would continue at the same level or slightly increase as the population in close proximity to the project area grows. Revenue may increase from this use, but is expected to be slight.

Action Alternative – Direct and Indirect Effects

Silvicultural treatments would be applied to 80% of the Boorman Peak project area under the Action Alternative. Recreational use in the Boorman Peak Timber Sale project area may increase slightly due to better accessibility within the project area.

Action Alternative – Cumulative Effects

Implementation of the action alternatives may result in slightly increased levels of recreational use and may result in slightly higher trust revenue from recreational use fees.

3.10 ECONOMICS

The project may affect revenue to the trust beneficiaries, local employment and income, and other uses of the area.

3.10.1 Existing Conditions

The economic region surrounding Flathead and Missoula Counties has historically supported a mining, timber and recreational sector. The recreation economy in this region is steadily growing due to factors such as population growth and increased travel to Glacier National Park and surrounding areas. Mining in the area has declined in recent years while timber has remained comparatively steady or declined slightly. Specifically, Flathead County has a large wood products sector producing a variety of products including dimensional lumber, plywood, and molding. Recently, these timber industry activities have been maintained through a period of decreased timber harvest from federal public lands by the substitution of private timber sources.

Demographic information on Flathead County and the entire state is shown in Table 3.10-1. Located within Flathead County, the Cliff Lake Timber Sale will be an accessible sale for firms operating in the region, however there is a potential for bidders from other areas including counties west of Flathead.

Table 3.10- 1. Demographic information for Flathead County and Montana.

	Flathead County	Montana
Population 1990	59,218	799,065
Population 2000	74,471	902,195
Population 2007	86,844	944,632
Growth Rate ('00-'07)	2.60%	1.03%
School Enrolment	13,000	157,560

The data in Table 3.10-2 shows employment and income in selected industry categories for Flathead County. Economic activity within the Flathead County varies substantially, although a substantial timber related industry is still present.

Table 3.10- 2. Employment and income in selected industry categories for Flathead County**.**

Flathead County (2009)			
Industry	**# of Establishments**	**Annual Employment**	**Annual Wages per Job**
Forestry & Logging	49	198	$38,062
Agriculture & Forestry Support	17	54	$25,227
Wood Product Manufacturing	41	1526	$46,134

The average timber industry wage is 48% higher than the overall average wage in Flathead County. Service industry wages are lower than the overall average wage, however, the service industries provide employment for over eight times as many workers as the timber industry in Flathead County. The average wage in the service industry is almost one-half of the average wage in the timber industry in Flathead County.

3.10.2 Environmental Consequences

Two options are being analyzed in this Environmental Assessment: No Action Alternative and the Action Alternative which includes a harvest of an estimated 6 MMBF (the actual range may vary between 5-8 MMBF). The following estimates are intended for relative comparison of alternatives and not intended to be absolute estimates of returns, taxes, employment or wages.

No Action Alternative – Direct Effects to Economics

If the No Action Alternative were followed, none of the estimated employment, income, or Trust Fund effects that result from the Action Alternative would occur.

No Action Alternative – Cumulative Effects to Economics

The DNRC has a statewide sustained-yield annual harvest goal of 53.2 million board feet. If timber from this project is not sold this volume could come from sales elsewhere, however, the timber may be from other areas and not benefit this region of the state. Long-term deferral of harvest from this forest will impact harvest patterns, changing both the region in which the trees are harvested and the volumes taken. This will impact other areas of the state where these changes occur.

Action Alternative - Direct and Indirect Effects

Timber Sale Effects

The estimated revenues associated with the Boorman Peak timber sale are shown in Table 3.10-3.

Table 3.10- 3. Estimated revenues and expenditures from the Cliff Lake timber sale*.

	Action Alternative
Harvest Volume	6,000 MBF
Stumpage price $/MBF	$120.00
Forest improvement Fee	$235,440 ($39.24/MBF)
Stumpage Revenue	$720,000
Trust Income	$720,000

Source: Montana Department of Natural Resources and Conservation, Trust Land Management.
* The State does not identify expenses for individual timber sales. The estimates used here are based on area/state-wide averages.

The School Trust income from a sale under the Action Alternative is estimated to be $720,000 enough to fund the education of 102 students for 1 year based on an average cost of $7,080 per Student per year as determined from information provided by the Montana Office of Public Instruction. If the sale does not take place, no students are benefited. Thus, one of the "costs" of not harvesting the timber compared to harvesting under the Action Alternative is the loss of revenue that could support 102 Kindergarten through grade 12 students for a year. If the Trust does not fund these students through the sale of timber, funding must come from other sources, primarily property taxes.

Timber Related Employment

Timber harvesting generates employment. On average, 11 jobs are maintained annually for every million board feet of timber harvested, depending on the species and dimension of trees harvested (Morgan 2009).

The amount of timber being harvested in Montana has declined since 1987. The decrease in the harvest since the peak of 1,411 million board feet in 1987 has dropped over 65% to 516 million board feet in 2007. Wood products manufacturers in Montana have expressed concerns over timber availability, and this has been cited as a significant factor in some mill closures over the past decade (Spoelma 2008). As the industry declines in size, State sold timber becomes more critical for the support of jobs and resource supply for the remaining wood processing establishments.

A ratio of 11 jobs per million board feet of wood harvested implies the direct support of 66 jobs and about $2.6 million in wages for the Action Alternative. These are the estimated wages that directly result from the timber harvest. Without this timber harvest, or a comparable substitute occurring somewhere else on Montana State Trust Lands, income will be lost to the State and communities.

In addition to these jobs, additional employment is created when the income earned within the timber industry is spent out to purchase goods and services elsewhere in the economy. There are also impacts from the logging companies and timber mills when they purchase goods and services from the local economy. Both of these effects are important since they support other community businesses such as grocery stores, clothing stores, gas stations, etc. The loss of the income from this sale would mean not only the loss of the direct income but the loss of any indirect income as well.

Non-market Issue

Quantitative analysis of the economic value of non-market benefits and costs will not be part of this analysis because they do not generate income for the trust, although they do affect the well being of Montana residents. Because of their effects, a short qualitative discussion of non-market issues follows:

A brief description of the biological impacts is included in order to identify areas where economic values might be affected. A more detailed discussion of the biological impacts is found in other sections of the report.

Environmental modifications - The harvest of the timber would modify the undisturbed development of the forest and as a result will affect both the short and long term habitat and wildlife regimes. How individuals value these modifications is an empirical question whose net value may be viewed either positively or negatively by different individuals. Modifying the undisturbed development of the areas will likely limit the use of the area by some species of wildlife in the short run and potentially limit the use by other species in the longer term. Wildlife impacts from the logging activities are expected to be temporary and comparatively small. The estimation of the net social benefit or loss of these impacts is an empirical issue that does not directly affect the School Trust Fund.

Human use – While the use of these areas is likely to decline or change during the period of logging, long term overall use of the area is expected to remain high. Some non-market uses are unlikely to change. Fishing, for example, should not be severely affected by the logging since SMZ laws protect streams. The aesthetics will be modified and some individuals will view this as a loss, others may prefer the more open forest that will result from the harvest. Visual changes are minimized to the extent practicable by limiting the trees harvested in some areas and by “sculpting cuts” to avoid “unnatural” visual lines. Some activities may be enhanced. For instance the logged area may enhance the habitat of some game species and the increased use of areas by those game species may make the area more attractive to hunters. As in the case of the environmental modifications, the net social benefit or loss is an empirical issue dependent on individual values.

Social Impact – The area has a substantial presence in the wood processing industry and as a result has institutions established to handle the social requirements associated with this industry. The timber sale is unlikely to add sufficient pressures to these institutions to require their modification. A high rate of employment (low rate of unemployment) is associated with lower rates of crime, domestic violence, alcohol/drug problems and a healthier, more satisfied community. To the extent that the no action alternative might contribute to unemployment, the social impact of the harvest might be a short-term negative social impact on the community. Conversely, to the extent that the sale provides employment the short-term impact will be positive.

Population Impacts – Logging and milling activities associated with the timber sale are not anticipated to have any long-term impact on the population of the region or the State of Montana.

Underlying Assumptions – Project impact estimation and analysis assumes that most of the economic impact associated with the sales will take place in Flathead County area. The estimates are intended for comparative purposes and do not purport to be the value of the impacts in any absolute sense. Stumpage prices were determined using the current transaction equation modified by professional judgment to reflect current and local market conditions as much as possible.

Forest Improvement Fee – The Forest Improvement fee is for a program to provide funding for forest development and improvement and is collected from the logging company as part of their bid. Activities funded

under this program include site preparation, tree planting, thinning, roadwork, right-of-way acquisition, etc. The current Forest Improvement fee for the Northwest Land Office area is $39.24 per mbf.

Most of the economic impacts associated with this sale are short term. If no other trees were available for harvest after this sale, the tendency would be to return to a lower level of economic activity. A short-term impact that might occur as the local economy contracts might be an increase in unemployment as local employers adjust to the lowered production levels.

Action Alternative - Cumulative Effects to Economics

This sale will be part of the annual harvest of timber from the State of Montana Forest Trust Lands. The net revenue from this sale will add to the trust fund. Annual Trust Fund contributions have varied widely over the years, because the actual contribution to the trust is more a function of harvest than of sales. Harvest levels can vary substantially over time; sales tend to be more consistent. The net contribution to the trust fund is also affected by the annual costs experienced by the DNRC for program management, which varies year to year. The DNRC should continue to make net annual contributions to the trust from its forest management program.

3.12 SHORT TERM VERSUS LONG TERM PRODUCTIVITY

Short term productivity normally refers to an annual yield of resources. It could also refer to the productivity of a particular resource over a specified time (e.g. 1 to 3 years). Long term productivity generally refers to a piece of land's ability to produce resources in perpetuity.

The proposed Action Alternative is designed to promote the long term productivity of the treated stands. Growth, vigor, and health of residual stands would be improved and increase stand productivity in the short term and long term. Post harvest stands would provide future opportunities for timber harvest and other uses.

4.0 CHAPTER 4: LIST OF PREPARERS

Mark Slaten – Project Leader, Management Forester, DNRC Kalispell Unit

Jeff Schmalenberg – Soil Scientist/Hydrologist, DNRC Forest Management Bureau

Katie Mally – Wildlife Biologist, DNRC Northwestern Land Office

Sonya Germann – Forest Management Planner, DNRC Forest Management Bureau

Tim Spoelma – Silviculturist/Forest Ecologist; DNRC, Forest Management Bureau

5.0 CHAPTER 5: LIST OF AGENCIES AND PERSONS CONSULTED

Jim Bower – Fisheries Biologist, DNRC Forest Management Bureau

Ross Baty – Wildlife Biologist, DNRC Forest Management Bureau

APPENDIX A: REFERENCES

Allen, M.M., Taratoot, M. and Adams, P.W., 1999. Soil Compaction and Disturbance from Skyline and Mechanized Partial Cuttings for Multiple Resource Objectives in Western and Northeastern Oregon, U.S.A. In: J.S.a.W. Chung (Editor), International Mountain Logging and 10th Pacific Northwest Skyline Symposium, Corvallis, OR, pp. 107-117.

Aney, W. and R. McClelland. 1985. Pileated Woodpecker Habitat Relationships (revised). Pages 10-17 in Warren, N. eds. 1990. Old Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. USFS, Northern Region, Wildlife Habitat Relationships Program R1-90-42. 47pp.

Arjo, W. M., D. H. Pletscher, and R. R. Ream. 2002. Dietary overlap between wolves and coyotes in Northwestern Montana. Journal of Mammalogy. 83:754-766.

Bull, E. L., and J. A. Jackson. 1995. Pileated woodpecker: Dryocopus pileatus. American Ornithologists' Union. Washington DC. 24pp.

Bull, E.L., C. G. Parks, and T. R. Torgersen. 1997. Trees and Logs Important to Wildlife in the Interior Columbia River Basin. General Technical report PNW-391. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 55pp.

Buskirk, S.W., and R.A. Powell. 1994. Habitat ecology of fishers and American martens. Pages 283-296 *in* Buskirk, S.W., A. Harestad, M. Raphael, eds. Biology and conservation of martens, sables and fishers. Cornell University Press, Ithaca, NY.

DNRC (Montana Department of Natural Resources and Conservation). 1996a. State forest land management plan: final environmental impact statement. DNRC Forest Management Bureau , Missoula, Montana.

DNRC, 1996. State Forest Land Management Plan. Department of Natural Resources and Conservation, Forest Management Bureau. Missoula, MT. 1996.

DNRC. 1996. State forest land management plan: final environmental impact statement – record of decision. DNRC Forest Management Bureau , Missoula, Montana.

DNRC. 2003. Montana administrative rules for forest management. DNRC Forest Management Bureau, Missoula, Montana.

DNRC, 2005. DNRC compiled soils monitoring report on timber harvest projects. Missoula, MT.

DNRC. 2008. Bald Hill timber sale: final environmental assessment. DNRC Kalispell Unit, Kalispell, Montana.

DNRC. 2008. Cliff Lake timber sale: final environmental assessment. DNRC Kalispell Unit, Kalispell, Montana.

Foresman, K.R.. 2001. The wild mammals of Montana. Special Publication 12. American Society of Mammalogists. Allen Press, Kansas. 278pp.

Froehlich, H.A., 1979. Soil compaction from logging equipment: Effects on growth of young ponderosa pine. Journal of Soil and Water Conservation: 276-278.

Froehlich, H.A., Azevedo, J., Cafferata, P. and Lysne, D., 1980. Predicting Soil Compaction on Forested Land. In: F.E. Department (Editor). USFS.

Fuller, T. K., W. E. Berg, G. L. Radde, M. S. Lenarz, and G. B. Joselyn. 1992. A history and current estimate of wolf distribution and numbers in Minnesota. Wildlife Society Bulletin 20:42-55.

Garrott, R., S. Creel, and K. Hamlin. 2006. Monitoring and assessment of wolf-ungulate interactions and population trends within the Greater Yellowstone Area, SW Montana and Montana Statewide. Unpublished report at http://www.homepage.montana.edu/~rgarrott/wolfungulate/index.htm.

Graham, R. T., A.E. Harvey, M. F. Jurgensen, T. B. Jain, J. R. Tonn, and D. S. Page-Dumroese. 1994. Managing Coarse Woody Debris in Forests of the Rocky Mountains. USDS Forest Service Research Paper. INT-RP-477. 13pp.

Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old-growth forest types of the Northern Region. R-1 SES. Unpublished report on file at U.S. Forest Service, Northern Region, Missoula, Montana.

Harrison, J.E., Cressman, E.R., Whipple, J.W., Kayser, H.Z., Derkey, P.D., and EROS Data Center, 2000. Geologic map of the Kalispell 1° x 2° quadrangle, Montana, and Alberta and British Columbia: a digital database. U.S. Geological Survey Miscellaneous Investigations Series Map I-2267, version 1.0, 24 p., scale 1:250,000.

Heinemeyer, K. S., and J. L. Jones. 1994. Fisher biology and management in the western United States: A literature review and adaptive management strategy. USDA Forest Service, Northern Region, Missoula, Montana. 108pp.

Jones, J.L. 1991. Habitat use of fisher in north-central Idaho. M.S. Thesis, University of Idaho, Moscow, Idaho. 147 pp.

Johnson, S. 1984. Home range, movements, and habitat use of fishers in Wisconsin. M.S. Thesis, University Wisconsin, Stevens Point. 78pp.

Kunkel, K., T.K. Ruth, D.H. Pletscher, and M.G. Hornocker. 1999. Winter prey selection by wolves and cougars in and near Glacier National Park, Montana. Journal of Wildlife Management 63:901-910.

Kunkel, K.E., D.H. Pletscher, D.K. Boyd, R.R. Ream, and M.W. Fairchild. 2004. Factors correlated with foraging behavior of wolves in and near Glacier National Park, Montana. Journal of Wildlife Management 68(1): 167-178.

Lenard, S; J. Carlson, J. Ellis, C. Jones, and C. Tilly. 2003. P.D. Skaar's Montana Bird Distribution, 6th Edition. Montana Audubon, Helena, Montana.

Losensky, B.J. 1997. Historical vegetation of Montana. *Prepared for* DNRC. Unpublished report on file at DNRC Forest Management Bureau, Missoula, Montana.

Martinson, A. H., and W. J. Basko, 1998. Soil survey of Flathead National Forest area, Montana. USDA Forest Service, Flathead National Forest, Kalispell, MT.

Maxell, B. A., J.K Werner, P. Hendricks, D.L. Flath. 2003. Herpetology in Montana: a history, status summary, checklists, dichotomous keys, accounts for native, potentially native, and exotic species, and indexed bibliography. Northwest Fauna Number 5. Society for Northwestern Vertebrate Biology. Olympia, Washington. 138pp.

McClelland, B.R. 1979. The pileated woodpecker in forests of the Northern Rocky Mountains. Pages 283-299 *in* Role of insectivorous birds in forest ecosystems. Academic Press.

Morgan, T.A. 2009. Personal communication. Director of Forest Industry Research, Bureau of Business and Economic Research, School of Business Administration, The University of Montana-Missoula, 32 Campus Drive, Missoula, MT.

Oakleaf, J.K., D. L. Murray, J. R. Oakleaf, E. E. Bangs, C. M. Mack, D. W. Smith, J. A. Fontaine, M. D. Jimenez, T. J. Meier, and C. C. Niemeyer. 2006. Habitat selection by recolonizing wolves in the northern Rocky Mountains of the United States. Journal of Wildlife Management 70:554-563.

Parks, C.G. and D.C. Shaw. 1996. Death and decay: A vital part of living canopies. Northwest science. Vol. 70, special issue: 46-53.

Patton , T. and R. Escano. Marten habitat relationships (revised). Pages 29-36 *in* Warren, N. eds. 1990. Old Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. USFS, Northern Region, Wildlife Habitat Relationships Program R1-90-42. 47pp.

Pfister, R.D, B.L. Kovalchik, S.F. Arno, and R.C. Presby. 1977. Forest habitat types of Montana. U.S. Forest Service, Intermountain Forest and Range Experimental Station, General Technical Report, GTR-INT-34, Ogden, Utah.

Powell, R. 1982. The fisher: National history, ecology, and behavior. University of Minnesota Press, Minneapolis, Minnesota. 217pp.

Ruediger, B., J. Claar, S. Mighton, B. Nanaey, T. Tinaldi, F. Wahl, N. Warren, D. Wenger, A. Williamson, L. Lewis, B. Holt, G. Patton, J. Trick, A. Vandehey, and S. Gniadek, 2000. Canada Lynx Conservation Assessment (2nd Edition). USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Missoula, Montana. 122 pp.

Schepps, J., S. Lohr, and T. Martin. 1999. Does Tree Hardness Influence Nest-Tree Selection by Primary Cavity Nesters? The Auk 116: 658-665.

Sime, Carolyn A., V. Asher, L. Bradley, K. Laudon, M. Ross, J. Trapp, M. Atkinson, and J. Steuber. 2008. Montana gray wolf conservation and management 2007 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 137 pp.

Spoelma, T.P., T.A. Morgan, T. Dillon, A.L. Chase, C.E. Keegan, and L.T. DeBlander. 2008. Montana's forest products industry and timber harvest, 2004. Resour. Bull. RMRS-RB-8. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 36 p.

Squires, J. R., N. J. DeCesare, J. A. Kolbe, and L. F. Ruggiero. 2008. Hierarchical den selection of Canada lynx in western Montana. Journal of Wildlife Management 72:1497-1506.

USDA, NRCS, 2007. Soil Survey Geographic (SSURGO) database for Flathead National Forest Area, Montana. USDA, NRCS. Fort Worth, TX.

USFWS. 1987. Northern Rocky Mountain wolf recovery plan. USFWS, Denver, Colorado. 119pp.

USFWS, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Idaho Fish and Game, and USDA Wildlife Services. 2008. Rocky Mountain Wolf Recovery 2007 Interagency Annual Report. C.A. Sime and E. E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601. 275pp.

APPENDIX B: INITIAL PROPOSAL

Initial Boorman Peak Public Scoping Letter

April 29, 2008

Dear Adjacent Landowner or Interested Party,

The Department of Natural Resources and Conservation, Kalispell Unit, is proposing a timber harvest from State Trust land located in Section 16, T28N, R23W (Boorman Peak Section) approximately 10 air miles west of Kalispell, Montana. Work on sale layout is scheduled to begin this spring (2008), with sale activities potentially starting in the summer or fall of 2009. We are currently in the process of identifying issues and concerns regarding the harvest proposal for this area. We would like your input regarding this proposal.

The objectives of this timber sale are to:

1) Sell timber to generate revenue for the Common School Trust and contribute to the sustained yield for the DNRC.

2) Use silvicultural treatments to promote biologically diverse and healthy forests and the development of historic stand conditions.

Based on preliminary information, the volume of timber to be harvested is estimated to be between 4 MMBF (million board feet) and 8 MMBF from a gross sale area of 640 acres. Up to 640 acres would be treated using a combination of ground based and cable based skidding systems. New road construction (up to 6 miles) would be required to access the majority of the project area. The attached vicinity map is for general project area location. Please address written comments to Mark Slaten, Department of Natural Resources and Conservation, 2250 Highway 93 North, Kalispell, Montana 59901. **Written comments regarding the Boorman Peak Timber Sale proposal need to be received by May 30, 2008.** If you have questions or desire more information, please call me at 751-2264.

Sincerely,

Mark Slaten, Forester, Kalispell Unit
Northwestern Land Office
Department of Natural Resources and Conservation

enclosures: vicinity map

Revised Boorman Peak Public Scoping Letter

July 17, 2008

Dear Adjacent Landowner or Interested Party,

The Department of Natural Resources and Conservation, Kalispell Unit, is proposing a timber harvest from State Trust land located in Section 16, T28N, R23W (Boorman Peak Section) approximately 10 air miles west of Kalispell, Montana. Work on sale layout is scheduled to begin this spring (2008), with sale activities potentially starting in the summer or fall of 2009. We are currently in the process of identifying issues and concerns regarding the harvest proposal for this area. We would like your input regarding this proposal.

The objectives of this timber sale are to:

1) Use silvicultural treatments to promote biologically diverse and healthy forests and the development of historic stand conditions.

2) Sell timber to generate revenue for the Common School Trust and contribute to the sustained yield for the DNRC.

Based on preliminary information, the volume of timber to be harvested is estimated to be between 6 MMBF (million board feet) and 12 MMBF from a gross sale area of 640 acres. Up to 640 acres would be treated using a combination of ground based and cable based skidding systems. New road construction (up to 8 miles) would be required to access the majority of the project area. A significant portion of this sale would involve harvesting old-growth timber.

The attached vicinity map is for general project area location. Please address written comments to Mark Slaten, Department of Natural Resources and Conservation, 2250 Highway 93 North, Kalispell, Montana 59901. **Written comments regarding the Boorman Peak Timber Sale proposal need to be received by August 18, 2008.** If you have questions or desire more information, please call me at 751-2264.

Sincerely,

Mark Slaten, Forester, Kalispell Unit
Northwestern Land Office
Department of Natural Resources and Conservation

enclosures: vicinity map

APPENDIX C: COMMENTS RECEIVED

F. H. STOLTZE LAND & LUMBER COMPANY

Lumber Manufacturers

Box 1429 • Columbia Falls, Montana 59912
Phone (406) 892-7000 • FAX (406) 892-1612
E mail info@stoltzelumber.com
www.stoltzelumber.com

Established in 1912
Affiliations:

MONTANA Wood Products ASSOCIATION
Charter Member

Flathead Valley
FAMILY FORESTRY EXPO

WILDLIFE RECREATION CERTIFIED TREE FARM WATER WOOD
Member Since 1960

May 5, 2008

Mark Slaten
Department of Natural Resources
2250 Highway 93 N
Kalispell, MT. 59901

RE: Comments on Boorman Peak Timber Sale Proposal

Mark:

I support this project and I am in favor of active forest management as a means of returning revenue to the school trust, improving forest health, increasing growth for the future benefit of the trust, and providing jobs, income, and products for the local economy.

Please keep me on the mailing list for this project and thank you for the opportunity to comment.

Sincerely,

Chris Damrow
Forester

RECEIVED
MAY 06 2008
NW Land Office
DNRC
KALISPELL MT

F. H. STOLTZE LAND & LUMBER COMPANY
Lumber Manufacturers
Box 1429 • Columbia Falls, Montana 59912
Phone (406) 892-7000 • FAX (406) 892-1612
E mail info@stoltzelumber.com
www.stoltzelumber.com

Established in 1912
Affiliations:

MONTANA Wood Products ASSOCIATION
Charter Member

Flathead Valley
FAMILY FORESTRY EXPO

WILDLIFE RECREATION CERTIFIED TREE FARM WATER WOOD
Member Since 1960

October 17, 2008

Mark Slaten
Department of Natural Resources
2250 Highway 93 N
Kalispell, MT. 59901

RE: Comments on Boorman Peak Timber Sale Proposal

Mark:

I support this project and I am in favor of active forest management as a means of returning revenue to the school trust, improving forest health, increasing growth for the future benefit of the trust, and providing jobs, income, and products for the local economy.

I would advocate using a more open seed tree type prescription with some prescribed burning to encourage regeneration of Western Larch. With the current trend of warmer winters and less precipitation I have witnessed increased mortality in the shade tolerant true firs in the Ashley Lake area regardless of whether the stand has been thinned or not so I would recommend removing them as well as flat topped and decadent Douglas Firs. More than likely a fire in this area would be a stand replacing event because of the dense stocking and mortality creating high fuel loads. A seed tree prescription would be more representative of that effect and would also be a better benefit to the School Trust by capturing more present value and increasing growth from new fast growing Western Larch for the future.

Please keep me on the mailing list for this project and thank you for the opportunity to comment.

Sincerely,

Chris Damrow
Forester

Trace Woodring (neighboring landowner) visited my office in July of 2008 to express concern that if DNRC were to build roads and create more open timber stands that illegal ATV activity could occur. He suggested that we leave no easy access points that would allow ATVs to utilize the newly constructed road system. He also stated that he did not want this parcel to resemble the neighboring Plum Creek lands (regeneration harvests). I told him that we would take his suggestions into consideration in project design.

From: Rennie, Patrick
Sent: Tuesday, May 06, 2008 8:37 AM
To: Slaten, Mark
Subject: Boorman Peak Timber Sale

Hi Mark:

I see no cultural resource concerns for the proposed timber sale. The project area was inventoried for cultural resources in 1990, with negative results, as part of a proposed Plum Creek Land Exchange.

Patrick

From: Bower, Jim
Sent: Monday, May 12, 2008 3:20 PM
To: Slaten, Mark
Subject: FW: SCOPING - KU Boorman Peak TS
Mark,

I have reviewed the scoping information for the proposed Boorman Peak TS, and I do not have any fisheries-related internal comments.

Thanks,
Jim

Jim Bower - Fisheries Program Specialist
MT DNRC Forest Management Bureau
2705 Spurgin Road
Missoula, MT 59804
T: (406) 542-4232
F: (406) 542-4274