
United States
Department of Agriculture
Forest Service
Northern Region
Idaho Panhandle National Forests
Bonners Ferry Ranger District
Myrtle-Cascade Final Environmental Impact Statement
Mike Stern
98

MYRTLE-CASCADE FINAL ENVIRONMENTAL IMPACT STATEMENT

Boundary County
U.S.D.A. Forest Service
Idaho Panhandle National Forests
Kaniksu Working Circle
Bonners Ferry Ranger District

TABLE OF CONTENTS

CHAPTER 3 - AFFECTED ENVIRONMENT

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

APPENDICES

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1 - PURPOSE AND NEED FOR ACTION

INTRODUCTION

The Bonners Ferry Ranger District, Idaho Panhandle National Forests (IPNF) proposes resource management activities for the Myrtle-Cascade project area. The IPNF Forest Plan (1987) provides direction for all resource management programs and resource activities on the Idaho Panhandle National Forests. The Forest Plan consists of Forest-wide and Management Area specific standards and guidelines that provide for land uses and resource outputs. Specific direction and decisions for implementing individual projects are determined following a site-specific environmental analysis. In compliance with National Environmental Policy Act (NEPA) requirements, this environmental impact statement (EIS) is the final site-specific NEPA documentation for proposed resource management activities in the Myrtle-Cascade project area.

Development of this EIS follows implementing regulations of the National Forest Management Act (NFMA); Title 36, Code of Federal Regulations, Part 219 (36 CFR 219); Council on Environmental Quality, Title 40; Code of Federal Regulations, Parts 1500-1508 (40 CFR 1500-1508); National Environmental Policy Act (NEPA); and is tiered to the Forest Plan Environmental Impact Statement (1987). This analysis incorporates direction provided in the Idaho Panhandle National Forests Plan EIS, Record of Decision, and Forest Plan (1987) as amended by INFISH (1995).

Desired Condition (Goals)

The IPNF Forest Plan states, "timber management practices will be the primary process used to minimize the hazards of insects and diseases and be accomplished primarily by maintaining stand vigor and diversity of plant communities and tree species." The Forest Plan also states, "silvicultural practices will promote stand structure and species mix which reduce susceptibility to insect and disease damage," and, "reforestation will normally feature seral species." The desired condition will be to move stands in the Myrtle-Cascade assessment area towards historic stocking levels and species composition, within the historic range of variability, and to reduce the risk of fire in the assessment area. Additional goals will be to meet or exceed State of Idaho water quality standards for the Myrtle Creek municipal watershed, provide for wildlife habitat diversity and security, and meet visual quality objectives.

Purpose and Need (Objectives)

There are many ecological factors that have combined to develop our forests and watersheds as we see them today. Fire is the primary ecological factor that influences their development. It stands to reason then that fire suppression by Federal and State agencies since the turn of the century has certainly changed the way these forests look and function today versus how they would have looked if humans had not been around to suppress fires. In the last 100 years forests in the interior Columbia River basin have become more densely stocked, developed increasing dominance of shade tolerant species (e.g., Douglas-fir, grand fir, subalpine fir) and become more susceptible to severe fire, insect, and disease disturbances (USDA-USDI 1996). This creates more competition for water and nutrients and stresses the trees. Ironically, our very actions to save these forests may be contributing to the decline in the health of these ecosystems that evolved over the time with fire. Consequently, this may limit the ability of these forests to provide the products, habitats, services, and recreation desired by society. In addition, forest composition and structures have become more homogeneous

(USDA-USDI 1996). In other words, forest diversity has declined. The IPNF North Zone Geographic Assessment (Zack et al, 1998) determined that similar changes in the forested landscape have occurred over this same time frame in the Kootenai River sub-basin (i.e, the Bonners Ferry Ranger District). In the Myrtle-Cascade assessment area western white pine, western larch, and ponderosa pine (seral species) are being replaced by Douglas-fir, grand fir, subalpine fir, western hemlock, and western red cedar (shade tolerant species). Furthermore, 55% of the landscape is composed mature and old growth forests, while forest openings and smaller tree size classes are near the lower end of their historical range. To determine potential treatment opportunities the existing condition of the forested vegetation in the project area will be compared to historic conditions. In the long-term, restoration of historic structure and composition will improve tree vigor and reduce vulnerability to insects, disease, severe fires, provide wildlife habitat that more closely resembles historic conditions, and maintain hydrologic function.

The Myrtle Creek portion of the project area has particular significance. The primary management objective for the Myrtle Creek watershed is to provide and maintain high quality drinking water for use by the City of Bonners Ferry. During our watershed and transportation analysis we learned that several road systems in the assessment area could be removed, or reconstructed, to improve overall watershed conditions throughout the area. Forested watersheds typically transport runoff below ground until it reaches a stream channel. As long as the water moves below ground, the rate of movement is slow compared to water moving on the surface. Roads intercept water flowing below the surface and transport it more efficiently to streams. Roads can also create or contribute to potential landslide occurrence; roads can increase sediment delivery from ditches and surfaces, and stream crossings can become increased sediment sources. Hydrologic function has likely been altered by fire suppression as well. As stated earlier, forested stands are now more densely stocked than they were historically, especially on dry forest types. Consequently, fires that burn on these sites now will likely be more severe and could result in increased water yield and sediment delivery

The purpose and need, or objective, for entering the Myrtle-Cascade project area is to:

1) Improve ecosystem composition, structure, and diversity of the landscape by providing for tree species and stocking levels similar to historic levels that better resist insects, diseases, and wildlfire, and that wildlife are adapted to. More specifically:

- Reduce the number of trees per acre, and favor the development of large diameter ponderosa pine and western larch on dry forest types.

- Reestablish western white pine as a significant component of its historic range.

- Reduce the overmature lodgepole pine component in stands where this species is currently susceptible to mountain pine beetle infestations.

- Improve the diversity of forest structures in the area, including larger patch sizes with less fragmentation. This will provide for wildlife, fish, and plant habitat diversity and security. The project area contains stands that are relatively similar in size and age, and therefore, not providing a wide range of wildlife habitats.

2) Restore normal slope hydrology where it has been altered by roads. This includes:

- Reducing the sediment risk associated with stream crossing failures.

- Reducing the potential for roads to create or contribute to landslide occurrence.

- Reducing the production and delivery of sediment from road surfaces and ditches.

3) The 1897 Organic Act states, "No national forest shall be established, except to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of the citizens of the United States." Therefore, one of the objectives for entering the Myrtle-Cascade assessment area will be to contribute to the short-term supply of timber to help meet the national demand for wood products and employment opportunities.

Items 1-3 will ultimately be used as the "Decision Criteria" for the selected alternative in the Record of Decision (ROD).

Scope of the Proposed Action

The Myrtle-Cascade project area is located on public lands administered by the Bonners Ferry Ranger District. The project area is located approximately ten air miles west of Bonners Ferry, Idaho. The area is bounded on the east by the Kootenai River, and on the west by the Selkirk Mountains crest. The southern boundary is the divide between the Myrtle and Snow Creek drainages. The northern boundary follows the divide between the Myrtle and Ball Creek drainages, until it hits Cascade Ridge; at this point the boundary follows Burton Creek to the northeast. The project area encompasses approximately 31,000 acres of which approximately 27,000 acres are National Forest Lands, while private landowners hold the remaining 4,000 acres (See Figure 1-1). Drainages within the project area include Myrtle-Cascade, Upper Curley Creek, and one unnamed drainage with its headwaters in the project area and flowing south off of National Forest Lands.

Proposed Action

The proposed action includes three separate concentrated treatment areas totaling roughly 3,700 acres. The concept with these proposed treatment areas would be to mimic the disturbance patterns that occurred historically. These "pulse" treatments would be designed to treat an area intensively for a short period of time and then leave the drainage alone for several decades. This is in sharp contrast to the more traditional style of management where treatment units and roads have been scattered across the landscape in a "shotgun" approach year after year. Timber harvest, prescribed burning, mechanical treatments, and precommercial thinning would be just some of the tools used to meet the stated purpose and need (reduce the number of trees per acre in ponderosa pine forests, re-establish white pine, improve wildlife habitat, etc.). Individual treatments areas (see Figures 1-2, 1-3, and 1-4) were identified based on their similar forested character and the need for similar treatments. The focus of each treatment would be based on the desired quality of each treatment area after management rather than the quantity of products removed from each area. In fact, in some cases there would be no removal of forest products. A brief description of the existing and desired condition of each treatment area follows:

- **Area 1**: Dry forest types where ponderosa pine and western larch are being overcrowded by Douglas-fir and grand fir. Treatments would be designed to favor the development of large, open grown stands of ponderosa pine and western larch.

- **Area 2**: Mixed conifer and subalpine forests of very similar size and age. Also, western white pine is gradually dying out because of white pine blister rust. Treatments would be designed to improve the size and age diversity of these forests and re-establish western white pine as a primary component.

- **Area 3**: This area contains high percentages of overmature lodgepole pine at high-risk to mountain pine beetle infestation. Treating these stands prior to a beetle epidemic would significantly reduce fuel loadings and therefore reduce the risk of severe fires in these forest types.

A legal description for the analysis area is T63N, R2W, sections 34-36; T62N, R2W, sections 1-24 and 27-30; T63N, R1W, sections 15-23 and 32-35; T62N, R1W, sections 2-11, 14-23, and 27-29, Boise Meridian, Boundary County, Idaho.

On the landscape level, Myrtle Creek is a tributary to the Kootenai River. The Kootenai River has its headwaters in British Columbia, Canada and it flows southwesterly through northwest Montana and northern Idaho before heading north, and back into Canada, where it joins the Columbia River. The Kootenai River is a major subdrainage of the Columbia River.

Scope of the Project Analysis

The Myrtle-Cascade EIS analyzes the environmental effects of the proposed action within the assessment area and the surrounding landscape. It is the site-specific documentation for Forest Plan implementation. The proposed action would provide the basis of a management strategy for the project area based upon the specific Forest-wide goals, objectives, and standards of the Forest Plan.

Forest Plan Management Area Goals, Standards and Guidelines

Management Areas described below are estimated amounts within each analysis area; this does not indicate acres of treatment. Treatment acres are discussed in alternative descriptions in Chapter 2.

- **Management Area 1** (1% of area) consists of lands designated for timber production.

- **Management Area 2** (23% of area): consists of lands designated for timber production within grizzly bear habitat.

- **Management Area 3** (1% of area) consists of lands designated for timber production within big game winter range and grizzly bear habitat.

- **Management Area 4** (<1% of area) consists of lands designated for timber production within big game winter range.

- **Management Area 7** (44% of area): consists of lands designated for timber production within woodland caribou habitat.

- **Management Area 9** (18% of area) consists of areas of non-forest lands, lands not capable of producing industrial products, lands physically unsuited for timber production, and lands capable of timber production but isolated by the above type lands or non-public ownership.

Figure 1-1 – Proposed Project Area Boundary

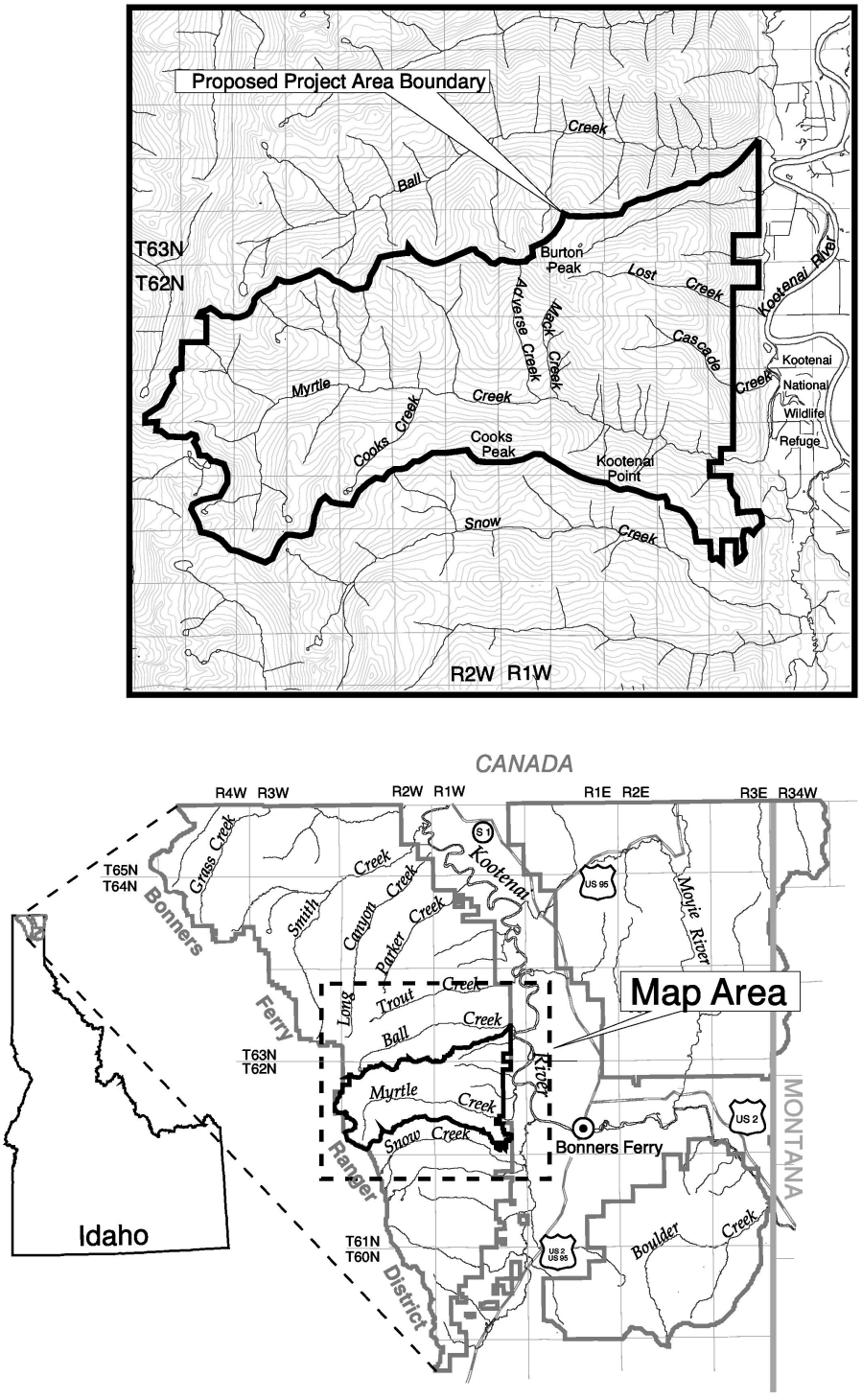


Figure 1-2 - Proposed Action – Area 1

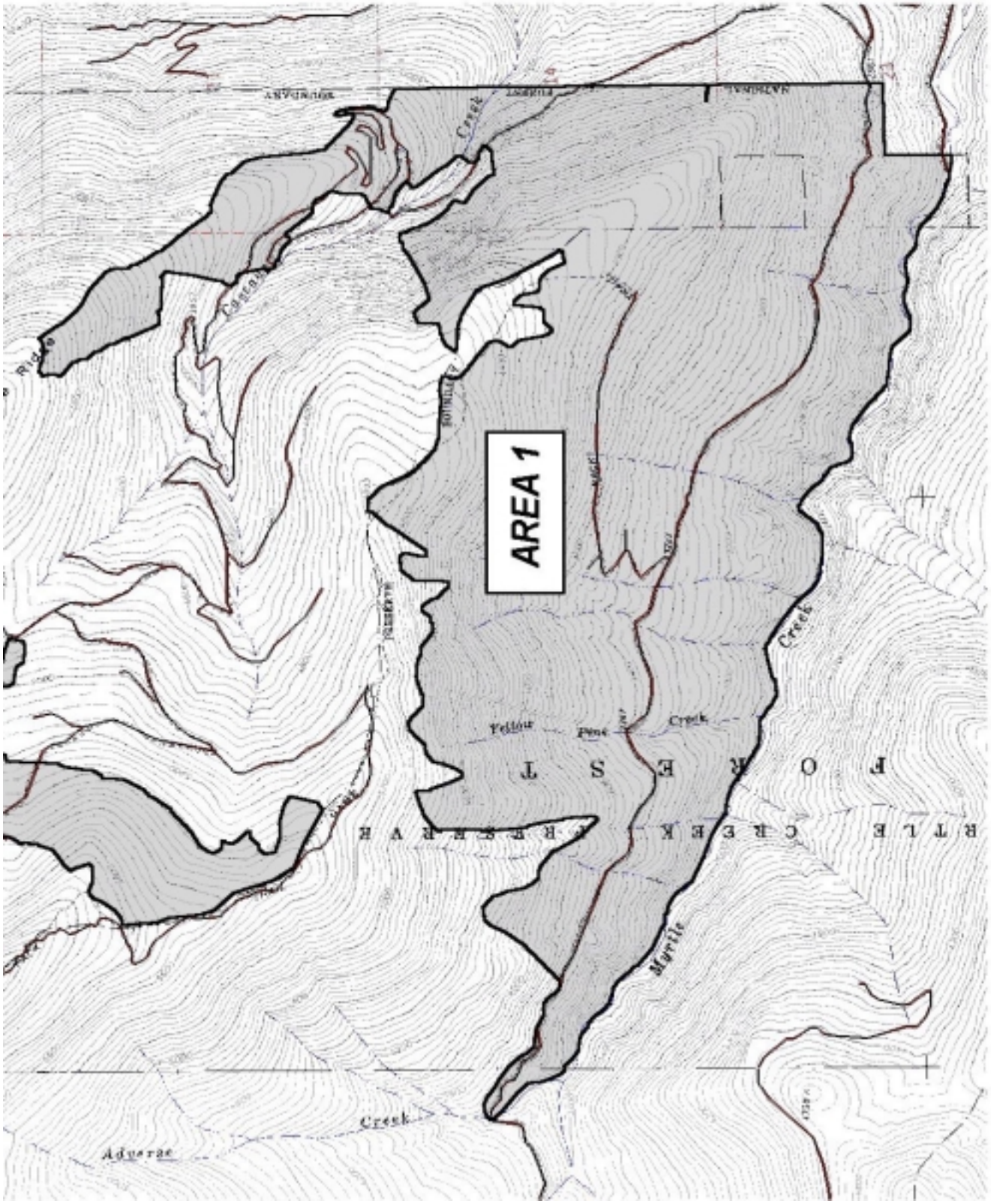


Figure 1-3 - Proposed Action – Area 2

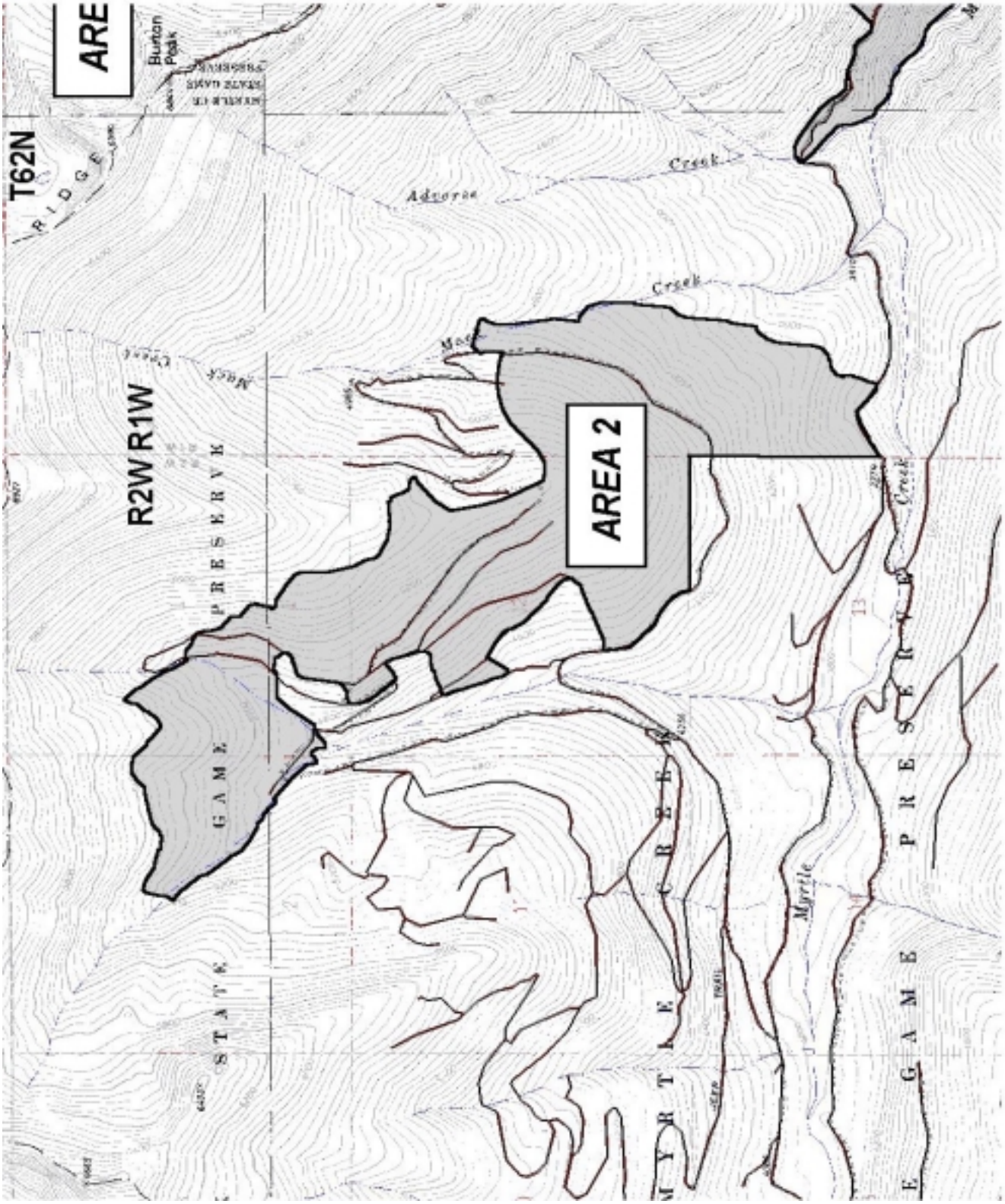
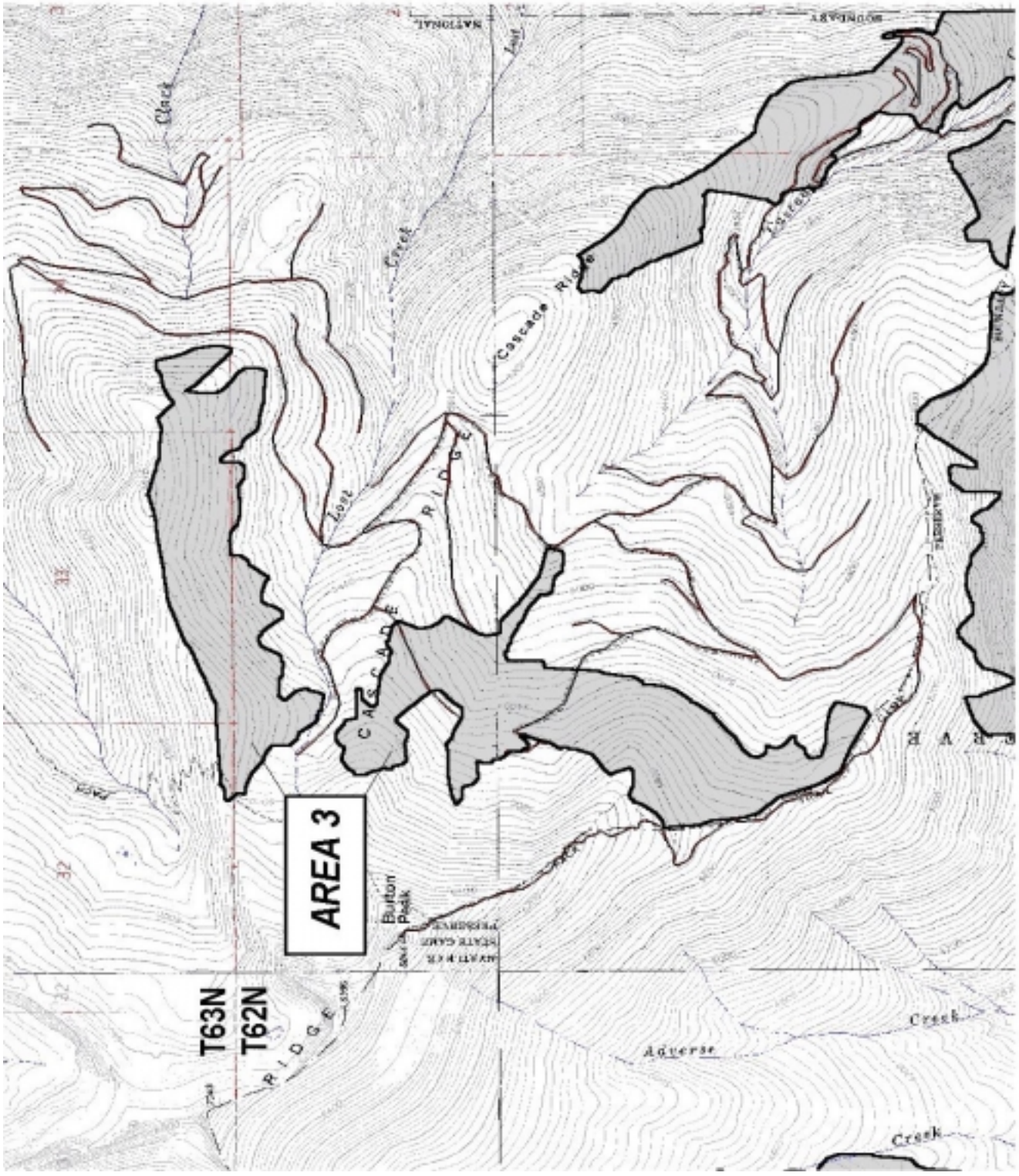


Figure 1-4 Proposed Action – Area 3



- **Management Area 10** (3% of area) consists of areas managed for a semi-primitive recreation experience.

- **Management Area 11** (8% of area) consists of existing and proposed wilderness areas managed to protect their wilderness character.

Ecosystem Management Principles

Analysis in the Myrtle-Cascade area will be conducted using an Ecosystem Management (EM) approach. EM is not a goal, but rather a process the Forest Service and other cooperating agencies will use to arrive at management decisions. Decisions will be used based on EM principles.

- Ecosystem management is not a preservation strategy, but a conservation strategy. "People must come to appreciate that preservation of the status quo is not an effective way of living within dynamic ecosystems for the long-term benefits of an integration of social values and natural processes (Pfister, 1993)."

- Ecosystems are dynamic. At all scales, living ecosystems are constantly changing. They have always changed and always will change - with or without human intervention. The more we attempt to maintain an ecosystem in static condition, the less likely we are to achieve what we intended (Averill, et al, 1989).

- Adaptive management is a part of ecosystem management. There are countless factors influencing organisms, we only know some, i.e., the science will not be done at decision time. Therefore, use the best available knowledge and act with good intentions (McMahon, 1994).

- Humans are part of the ecosystem. "The best of ecological approaches cannot sustain ecosystems unless they are integrated into the human context (Pfister, 1993)." That is, ecology is necessary, but not sufficient in and of itself. Society will determine what they want from their ecosystems. It is the responsibility of the scientific community to display the consequences of society's choices.

The Forest Service has defined EM as, "...the use of an ecological approach to achieve productive resource management by blending social, physical, economical and biological needs and values to provide healthy ecosystems. This type of analysis blends the needs of people within the environment in an effort to maintain a healthy, diverse, productive and sustainable forested ecosystem."

Historical Range of Variability

To accomplish an "ecosystem approach" and determine potential activities in the Myrtle-Cascade project area, this analysis will look at the historic conditions of the area, which will then be compared to the existing conditions. From this comparison, an historical range of variability (HRV), or ecological trends that have occurred over time will be determined, as well as the natural processes that maintained this range. An important point to remember about HRV is that is not a goal, but a measure of ecosystem changes and trends. When ecosystems are outside [the range], changes may occur dramatically and rapidly (e.g., dry-site old growth stands and wildlife habitat). Consequently, when ecosystems are outside their ranges this may limit their ability to provide the amenities and products desired by society. An investment of money, energy, or human effort may be required to counter processes that would change the desired state of the ecosystem (Morgan et al. 1994). The information on ecological trends was used to identify the desired condition for the

project area. Simply put, this information was used to tell us: 1) where we have been, 2) where we are now, and 3) where we are going in the future.

Decision to be Made

The purpose of this EIS is to compare the effects of various resource management alternatives and display their effects on resource values identified during the scoping process. Alternatives to the proposed action have been developed that address the issues and project objectives. The deciding official will select a course of action based on the display of effects of each alternative. The selected course of action will establish the site-specific location and timing for management activities; and provide the necessary implementation measures to meet the project objectives.

The decision will provide for an integrated approach to insure long-term diversity, productivity, and sustainability of the entire forest ecosystem.

Organization of the Document

Chapter 2 describes the issues identified through the scoping process and the alternatives that address the issues and project objectives. A comparison of the alternatives is displayed to help the deciding official make a reasonable choice between alternatives. Features common and specific to each alternative are also displayed.

Chapter 3 describes the existing condition of various resources potentially affected by the proposed action. The components of the biological, physical, social and economical resources are described, as well as, a historical overview of the project area.

Chapter 4 describes the expected environmental effects on the specific resources listed in Chapter 3. Direct and indirect effects and the cumulative effects of past, proposed, and foreseeable future actions are discussed.

Chapter 5 contains a listing of Forest Service personnel involved in the Interdisciplinary Team, and other Forest Service personnel consulted during the course of this project.

Chapter 6 summarizes the public involvement process undertaken by the Forest Service for this project.

Chapter 7 is the bibliography of literature cited and references used in the development of this document.

The Appendices contain analytical reports and summaries or supplementary information that clarify or support the narrative within the document.

Many more reports, analysis documents, internal memos, and maps have been referenced or developed during the course of this project. Where these items were not included due to their technical nature or their excessive length, they are included in a project file. The Myrtle-Cascade EIS project file at the Bonners Ferry Ranger District office contains this additional background information and analysis data relating to the resource discussions presented in this document.

CHAPTER 2 - ISSUES AND ALTERNATIVES

INTRODUCTION

This chapter discusses alternative driving issues and lists the other issues that were analyzed but did not warrant the development of separate alternatives. It also contains a description and general comparison of the alternatives considered in detail and a brief discussion of two other alternatives that were considered but eliminated from further study. The desired condition, purpose and need statements, and management area objectives identified in Chapter 1, in conjunction with the issues outlined in this chapter, provided the framework from which the alternatives were developed. All acres listed in the discussions, tables, and figures, for each of the alternatives in this chapter are approximate.

Alternative Driving Issues

This section describes the various alternative-driving issues that were analyzed in detail. These issues were identified through the scoping process, both internally and externally. Public scoping was conducted as detailed in Chapter 6. The issues are discussed in this chapter and were used to develop the action alternatives. The other resource concerns listed in this chapter were treated by changing the design of the alternatives, or by avoiding areas. They did not warrant development of a separate alternative. These other resource concerns are discussed in Appendix A.

1) Forest Composition and Structure

A short definition of a healthy forested ecosystem is one that retains the capacity to maintain structure and organization over time (Harvey et al 1994). This simply means that if we can maintain our forests in conditions that existed historically they would tend to be healthier.

Historically light understory fires burned about every 25 years on dry forests sites (Smith and Fischer 1997). These fires cleared understory vegetation and favored the development of open grown ponderosa pine and western larch stands. More than 70 years of fire suppression has allowed understory vegetation, primarily Douglas-fir, to dominate these sites. Consequently, the risk of stand-replacing fire on these forest types is continually increasing over time.

Subalpine and mixed conifer forests lack diversity of forest structure throughout the project area. Also, western white pine is gradually dying out because of white pine blister rust.

Some stands in the project area contain high percentages of lodgepole pine at high-risk to mountain pine beetle infestation. Treating these stands prior to a beetle epidemic would significantly reduce fuel loadings and therefore reduce the risk of severe fires in these forest types.

Table 2.1. Principle Issues and Indicators: Forest Composition and Structure	
Principle Issue	**Principle Issue Indicators**
Restoration of Dry Forest Types	Acres of dry forest types trended towards historic composition and structure (long-lived seral ponderosa pine and western larch) would be the featured species in regeneration harvests, or where they are currently significant components of the overstory. Changes in the risk of stand-replacing fire in dry forest types relative to no action. This would be estimated using the SIMPPLLE Model (SIMulating vegetative Patterns and Processes at the Landscape Level).
Old Growth Forests	Acres of old growth lost and acres dry forest old growth restored.
Fragmentation	Changes in average patch size
Loss of Western White Pine	Acres regenerated with rust-resistant western white pine
Mountain Pine Beetle in Lodgepole Pine	Acres treated where mountain pine beetle could cause significant mortality in lodgepole pine components of proposed treatment units. These stands would have a moderate to high hazard rating for mountain pine beetle based on the system developed by Randall and Tensmeyer (2000)

2) Woodland Caribou

Woodland caribou habitat is characterized as mature and old growth stands of spruce/subalpine fir associated old growth cedar/hemlock stands. Past timber harvest, fire suppression, and road building in the project area have fragmented or reduced the capability of the remaining habitat to be used by caribou. Of paramount concern is the limited amount and location of early winter habitat available in the project area. The analysis would focus on the potential or improving overall habitat quality.

Table 2.2. Principle Issues and Indicators - Woodland Caribou	
Principle Issue	**Principle Issue Indicators**
Distribution of Key Suitable Habitat	Acres of key suitable habitat harvested or fragmented
Maintenance Of Suitable Seasonal Habitats (Especially Early Winter)	Acres of suitable habitat improvement or habitat loss
Improvement of Capable Habitat	Acres of capable habitat managed for long-term improvement

3) Water Resources and Aquatics Habitat

Myrtle Creek is the municipal water supply for the city of Bonners Ferry. Residents of Bonners Ferry are concerned about the quality and quantity of their domestic water obtained from Myrtle Creek and its tributaries. The municipal water supply is the primary beneficial use for the Myrtle Creek drainage.

Streams within or near the project area support populations of westslope cutthroat trout, redband trout, and bull trout that depend upon high quality habitat to complete their life cycles. Further road building and timber harvest could increase sediment and water yields to streams. Such increases may adversely affect fisheries habitat. Cold water biota is another beneficial use for the streams in the Myrtle Creek drainage.

Table 2.3 contains the indicators that would be used to measure the response and expected changes to the water resources and aquatic habitat related to this project. The relationship between the principle issues and the values-at-risk is presented in the Table 2-4.

Table 2.3. Principle Issues and Indicators: Water Resources and Aquatics Habitat

Principle Issue	Principle Issue Indicators
Stream Crossing Risk	Calculated sediment risk in tons per year and potential escape on inventoried crossings. Total number of stream crossings and barriers to fish migration.
Sediment Production and Delivery	WATSED modeling results. The amount, type, and location of road construction, reconstruction, and obliteration; and timber harvesting. The amount of activity and reduction of risks on sensitive landtypes.
Wildfire Risk	Simulated risk of stand replacing fire on the dry sites using the SIMPPLLE model. The method and intensity of timber harvesting, slash treatment, and prescribed burning within high-risk dry site units. The resulting tree density, composition, and structure of high risk dry site stands.

4) Roadless

Portions of the Myrtle-Cascade project area are contained within the Selkirk Mountain Roadless Area (SMRA). Some of the alternatives include proposed timber harvest and road obliteration in the roadless area. None of the alternatives analyzed in detail include new road construction or reconstruction within the roadless area. The following is a list of roadless area characteristics included in the Forest Service Roadless Area Conservation Project (RACP).

- Soil, water, and air
- Sources of public drinking water
- Diversity of plant and animal communities
- Habitat for threatened, endangered, proposed, candidate, and sensitive species, and for those species dependent on large, undisturbed areas of land
- Primitive, Semi-Primitive Non-Motorized, and Semi-primitive Motorized classes of recreation opportunities
- Landscape character and scenic integrity
- Traditional cultural properties and sacred sites
- Other locally identified unique characteristics

For the most part the potential effects each alternative could have on the resources in the SMRA would be the same as described for the project area as whole, unless otherwise noted in Chapter 4.

Table 2-4: Principle Issue Descriptions: Water Resources and Aquatics Habitat		
Values-at-Risk	**Principle Issues**	**Issue Descriptions**
Municipal Water Quality	Stream Crossing Risk & Sediment Production and Delivery	When stream crossings fail they can deliver large volumes of sediment because of their location over and adjacent to running water. Slopes that are or have been disturbed by roads or harvesting can increase the potential for production and delivery of sediment to streams. Nutrients, minerals, and other organic and inorganic materials attached to or transported with eroded sediments can create water quality concerns. High volumes of sediment and other deleterious materials can clog filtering systems, increase water treatment duration and costs, and can make the water undrinkable.
	Wildfire Risk	In the Inland Northwest, the rate of tree biomass accumulation is typically much greater than the rate of decay. The combination of fire, insects, and disease play important roles in helping to maintain nutrient cycling. Unfortunately, fire suppression has allowed greater accumulations of biomass and debris over larger areas than was typical before fires were suppressed. On dryer sites, these conditions can result in more intense and severe wildfire than was common historically. Increased fire severity results in greater nutrient losses, less protection of the surface soil from erosion, and can cause the soil to repel water. The south facing dry site areas in the Myrtle Creek watershed have relatively thin organic soil layers to protect the soil and are located in close proximity to the water diversion for the City water system. Therefore, it is desirable to reduce the risk of high severity fires on these sites.
Salmonid Spawning and & Cold Water Organisms	Stream Crossing Risk & Sediment Production and Delivery	Stream crossings can introduce large volumes of sediment to streams in a very short period of time when they fail. This can degrade habitat for fish and other aquatic organisms, and can negatively affect channel stability. Stream crossings can also act as barriers to fish migration, reducing available habitat and isolating populations. Similarly, delivery of sediment to streams from crossings and other sources can fill in salmonid spawning and rearing habitat (i.e. pools), and can fill in the spaces between gravels, cobbles, and boulders on the streambed, which are used by a variety of aquatic organisms and rearing juvenile salmonids.
Wetlands	Stream Crossing Risk & Sediment Production and Delivery & Wildfire Risk	Wetlands are typically sensitive to changing nutrient levels. Stream crossings failures, erosion from other upland sources, and severe wildfire can significantly alter nutrient levels of wetlands by delivering large amounts of sediment and debris (either chronically or for a short period of time during landslide and mass failure events).

Other Resource Concerns

The potential effects of the proposed action to other resource concerns were analyzed and evaluated, but the ID team and District Ranger did not feel that any of these issues warranted a separate alternative. These other resource concerns are listed below and discussed further in Appendix A.

Biodiversity

A. Biological Factors
1. Noxious Weeds
2. Wildlife
    a) Threatened or Endangered Species
    b) Sensitive Species
    c) Management Indicator Species
    d) Snag Dependent Species
3. Fish
    a) Threatened or Endangered Species
4. Plants
5. Native Plant Species
6. Neotropical Migrant Birds
7. Linkages
8. Range

Social/Economic Factors

A. Cultural Resources
B. Economics/Community Stability
C. Visual Quality
D. Recreation
E. Public Health and Safety
1. Air Quality
2. Effects on Minority Populations and Low-income Populations

F. Roadless Area
G. Minerals
H. Water Resources And Aquatics
1. Microbial Contaminants
2. Inorganic Contaminants
3. Pesticides and Herbicides
4. Organic Chemical Contaminants
5. Radioactive Contaminants
6. Harvest Related Increases in Landslide Potential
7. Changes in Stream Dynamic Equilibrium
8. Stream Survey Data
9. Increases in Water Yield
10. Increased rain-on-snow risk

Forest composition and structure, woodland caribou, and water resources and aquatics habitat are alternative driving issues that are also part of the biodiversity discussion, but these issues are described in chapters 2, 3, and 4.

Alternatives Considered But Eliminated From Further Study

Based on the Alternative Driving Issues and Other Resource Concerns as described above three alternatives, including the Proposed Action, were eliminated from further study.

Under the Proposed Action about 3,700 acres would have been treated. Timber harvest, prescribed burning, mechanical treatments, and precommercial thinning would have been some of the tools used to meet the stated purpose and need. However, this alternative was eliminated from further study because it was determined early in the process that this alternative would not meet Inland Native Fish Strategy (INFISH) standards and potentially jeopardize water quality standards in Myrtle Creek. Also, because of road building and some types of timber harvest, this alternative would not meet standards for woodland caribou, which is listed as endangered under the Endangered Species Act (ESA). Alternative 2, a modification of the proposed action, was developed and analyzed in detailed study.

The Maximum Timber alternative was based on the IPNF's Forest Plan that emphasizes regeneration type harvesting. A silvicultural diagnosis was conducted for the entire 30,000-acre analysis area and nearly 6,000 acres were identified as needing some sort of treatment. An alternative was developed to treat roughly 2,500 acres. Under this alternative the treatments would be a combination of regeneration harvests (clearcut, seed tree and shelterwood), thinnings and salvage. Extensive road building would have been required, including roaded entry into the Selkirk Roadless Area. From an overall multiple resource perspective, and based new roadless area policy, this did not appear to be a reasonable alternative. For this reason it was dropped from further consideration and was eliminated from further study. Alternative 3, a modification of this alternative, was developed and analyzed in detailed study.

The purpose of the "Other Than Timber Harvest" alternative was to evaluate the potential of alternative treatments, other than timber harvest, that could be employed on the site that would meet the stated goals and objectives. Two methods were considered to accomplish this, both of which introduced fire back into these stands. The first one involved prescribed burning the stands, without any site preparation work at temperatures hot enough to kill the majority of the seedling and sapling sized trees and about a quarter of the pole and sawlog sized trees. For a burn like this to be effective the weather and fuel conditions would have to be very dry. The second method would have included some felling of the unwanted trees, followed up with prescribed burning. This could be done under moister conditions than the first method, however, with the acres involved and the proximity to private lands, this would still be very risky. Both of these methods, regardless of success rates, would produce smoke well in excess of any of the timber harvest alternatives, would risk losing the entire organic layer, which as mentioned previously is relatively shallow on the south-facing dry-site stands, and would waste usable and highly demanded wood fiber that could just as easily be utilized as products. Without a timber sale it is unlikely that we would receive funding for these activities based on budget projections, for these reasons this alternative was dropped from further consideration and was eliminated from further study.

Alternatives Considered in Detail

Following is a listing of the features that are common to all of the "action" alternatives and descriptions of the "no action" and the three "action" alternatives. These alternatives were developed to address the significant issues that were outlined previously in this chapter.

Changes Between the Draft and Final EIS

Appendix C (Glossary of Silvicultural Prescriptions) of the DEIS has been changed to Site Specific Best Management Practices (BMPs) for the FEIS. To better describe the proposed silvicultural prescriptions for each of the action alternatives Tables 2-6, 2-8, and 2-10 have been added to the FEIS. "Required Design Criteria For All Action Alternatives" (DEIS, Watershed and Fisheries, pages 4-15 through 4-18) has been incorporated into Chapter 2 under "Features Common to All Action Alternatives." Finally, Alternatives 4 and 5 were added in response to public comments. These alternatives specifically address old growth, roadless, and timber management issues. These new alternatives are described below.

Alternative 1 - No Action

Implementation of this alternative would defer all treatment activities at this time. Other activities such as fire suppression and routine road maintenance would continue. Under the no action alternative none of the proposed road reconstruction and road obliteration would occur. No silvicultural treatments, prescribed burning, or other mechanical treatments would be implemented to restore vegetative composition and structure, improve wildlife habitat, or maintain hydrologic function. Stands would naturally thin themselves out as the competition for water and soil nutrients continues and natural fuels would continue to build up with continued fire suppression, leading to increased risk of stand replacing fire over time.

Alternative 2 - Modified Proposed Action

This alternative represents a modification of the Proposed Action. Portions of the original three treatment areas still remain and a fourth treatment area was added (Kootenai Point units). However, each of these areas was changed from the original proposal based on watershed and woodland caribou habitat concerns. One of the significant features of this alternative is that there would be no regeneration harvesting proposed in early winter caribou habitat. The District hydrologist used a combination of INFISH standards and landtype hazard ratings to develop Riparian Conservation Areas (RCAs) where no treatments would be allowed. In addition, some treatments in caribou habitat were either altered or dropped, and all new road construction in caribou habitat was eliminated from this alternative. After these modifications were made the original proposed action had be reduced from nearly 3,700 acres to 1,818 acres.

The total area treated in ***dry forest*** types (KP01, MC01-03 and MC05-22) would be 868 acres. Timber harvest would be followed up by prescribed burning, mechanical treatments (e.g., grapple piling), and precommercial thinning. The percent of tree canopy cover retained would vary from 20-60%. The objective would be to convert as many acres of dry forest types as possible to open grown stands of large diameter ponderosa pine and western larch. Forest openings would be created using irregular shelterwood (198 acres) and group selection (530 acres) treatments. Included in these treatments would be 230 acres of harvest in dry forest old growth (MC05-MC11, MC18 and MC19), allocated to the Forest Plan strategy, and 45 acres (MC22) of harvest in non-allocated dry forest old growth. The primary focus of these treatments would be to remove the small-diameter trees, mostly Douglas-fir and grand fir, while retaining the large-diameter old growth ponderosa pine

and larch that are providing the old growth structure. Where openings are created ponderosa pine and larch would be regenerated. Partial cutting (commercial thin and sanitation salvage harvests) would be applied on another 140 acres.

The total area treated in ***moist forest*** (mixed conifer) types (KP02-08, M02, M05, M19, and MC04) would be 435 acres. Timber harvest, prescribed burning, mechanical treatments, and precommercial thinning would be used to meet the purpose and need. Under this alternative approximately 243 acres would be regenerated using shelterwood harvests. These treatments would be designed to improve the size and age diversity of these forests and re-establish western white pine and western larch as primary components. Units M02 and M05 are adjacent to high quality early winter cedar/hemlock and early winter spruce/fir woodland caribou habitat. The proposed harvest units contain extremely heavy fuel loadings of dead and live materials, that if allowed to burn would put thousands of acres of critical, high quality, spruce and fir, caribou habitat stands at risk. Partial overstory removals (i.e., enough overstory would be retained to meet long-term needs for wildlife) would be applied on an estimated 107 acres and partial cutting (commercial thin and sanitation salvage harvests) would be applied on another 85 acres.

The total area treated in ***cool/moist forest*** (subalpine forests) types (MC23-26) would be 515 acres. Timber harvest, mechanical treatments, and precommercial thinning would be used to meet the purpose and need. Under this alternative 407 acres would be treated using group selection harvests (MC23 and MC24). An estimated 200 acres in MC23 and MC24 meet the minimum old growth standards, however, these stands were not included in the IPNF's old growth allocation. These treatments would be designed to reduce the component of overmature lodgepole pine in treated stands. Older larch, spruce, and subalpine fir, which are providing the old growth characteristics in these stands, would not be harvested. Removing lodgepole pine would greatly reduce the risk of mountain pine beetle epidemic in these forest types, while leading to long-term improvements in woodland caribou habitat. Partial overstory removals would also be applied on roughly 108 acres

Under this alternative 32.7 miles of existing system roads would be reconstructed and 36.1 miles of road would be obliterated. However, none of this work is mitigation for the proposed activities. None of the proposed road obliteration is currently open to motorized access. Approximately 0.5 miles of temporary road would be constructed to access proposed timber harvest units. This temporary road, located outside any undeveloped roadless area, would be obliterated upon completion of timber harvest activities. Figures 2-1, 2-2, and 2-3 display the treatment units for this alternative and the treatments are outlined in Table 2-5 and Table 2-6.

Road obliteration would be designed to restore stream crossings and road prisms to their natural conditions as a much as possible. Restoring stream crossings would include restoring channels to their natural grade and floodplain width of bankfull discharge revegetating and restoring side slopes to their natural contour. Funding would be sought from a variety of sources including appropriated cost-share and KV-other for roads within the sale area.

Alternative 3

This alternative represents a modification of the Maximum Timber alternative. Modifications were made primarily for watershed RCAs; however, Alternative 3 does include regeneration harvesting in early winter caribou habitat (M05-M07). After these modifications were made the Maximum Timber alternative had been reduced from 2,500 acres to 1,375 acres. Alternative 3 represents a more traditional approach to forest management where specific treatments are prescribed for relatively small harvest units.

The total area treated in ***dry forest*** types (MC01, MC02, MC05, MC06 and MC18-22). Timber harvest would occur on roughly 427 acres and be followed up by prescribed burning, mechanical treatments (e.g., grapple piling), and precommercial thinning. The percent of tree canopy cover retained would vary from 20-60%. The objective would be to convert as many acres of dry forest types as possible to open grown stands of large diameter ponderosa pine and western larch. Forest openings would be created on 387 acres using irregular shelterwood treatments. Alternative 3 includes 163 acres (MC05, MC06, MC18 and MC19) of harvest in allocated dry forest old growth and 45 acres (MC22) of harvest in non-allocated dry forest old growth. The primary focus of these treatments would be to remove the small-diameter trees, mostly Douglas-fir and grand fir, while retaining the large-diameter old growth ponderosa pine and larch that are providing the old growth structure. Where openings are created ponderosa pine and larch would be regenerated. Partial cutting (commercial thin and sanitation salvage harvests) would be applied on another 40 acres.

The total area treated in ***moist forest*** types (M01-M03, M06-M16, and MC26) would be an estimated 541 acres. Timber harvest, prescribed burning, mechanical treatments, and precommercial thinning would be used to meet the purpose and need. Under this alternative 193 acres would be regenerated using shelterwood harvests. These treatments would be designed to improve the size and age diversity of these forests and re-establish western white pine and western larch as primary components. Partial cutting (commercial thin and sanitation salvage harvests) would be applied on another 348 acres.

Under this alternative 407 acres in ***cool/moist forest*** types would be treated using group selection harvests (MC23 and MC24). An estimated 200 acres in MC23 and MC24 meet the minimum old growth standards, however, these stands were not included in the IPNF's old growth allocation. These treatments would be designed to reduce the component of overmature lodgepole pine in treated stands. Older larch, spruce, and subalpine fir, which are providing the old growth characteristics in these stands, would not be harvested. Removing lodgepole pine would greatly reduce the risk of mountain pine beetle epidemic in these forest types, while leading to long-term improvements in woodland caribou habitat.

Under this alternative 23.4 miles of existing system roads would be reconstructed and 36.1 miles of road would be obliterated. None of the proposed road obliteration is currently open to motorized access. Reconstruction would be a critical part of all alternatives in order to comply with BMP's and the Forest Plan related to road maintenance and water quality protection. However, none of this work is mitigation for the proposed activities. Figures 2-4 and 2-5 display the treatment units for this alternative and the treatments are outlined in Table 2-7 and Table 2-8.

Alternative 4

This alternative is a modification of Alternative 2. This alternative was added because a portion of the public expressed concerned about entry into old growth and designated roadless areas. The primary feature of this alternative is that it includes no harvest in old growth and no entry into designated roadless areas.

The total area harvested in ***dry forest*** types (KP01, MC01-03, MC12-17, and MC20 and MC21) would be 455 acres. Prescribed burning would occur on 315 acres. The percent of tree canopy cover retained would vary from 30-60%. The objective would be to convert the areas treated to open grown stands of large diameter ponderosa pine and western larch. Three hundred-fifteen acres would be regenerated using shelterwood and group selection treatments. In these treatment areas adequate forest openings would be created where ponderosa pine and western larch could be regenerated. Partial cutting (commercial thin and sanitation salvage harvests) would be applied on another 140 acres.

The total area treated in ***moist forest*** (mixed conifer) types (KP02-08, M05, M19, and MC04) would be about 388 acres. Timber harvest, prescribed burning, mechanical treatments, and precommercial thinning would be used to meet the purpose and need. Under this alternative 196 acres would be regenerated using shelterwood harvests. These treatments would be designed to improve the size and age diversity of these forests and re-establish western white pine and western larch as primary components. Partial overstory removals (i.e., enough overstory would be retained to meet long-term needs for wildlife) would be applied on 107 acres and partial cutting (commercial thin and sanitation salvage harvests) would be applied on another 85 acres.

The total area treated in ***cool/moist forest*** (subalpine forests) types (MC25 and MC26) would be 108 acres partial overstory removals.

Under this alternative 32.7 miles of existing system roads would be reconstructed and 36.1 miles of road would be obliterated. None of the proposed road obliteration is currently open to motorized access. None of this work is mitigation for the proposed activities. Approximately 0.5 miles of temporary road would be constructed to access proposed timber harvest units. This temporary road, located outside any undeveloped roadless area, would be obliterated upon completion of timber harvest activities. Figures 2-6, 2-7, and 2-8 display the treatment units for this alternative and the treatments are outlined in Table 2-9 and Table 2-10.

Alternative 5

This alternative was developed in response to members of the public who wish to see an alternative that includes no timber harvest. This alternative would include only the road reconstruction (32.7 miles) and road obliteration (36.1 miles) listed in Alternative 2. Funding that would be available as part of a timber sale package under the other action alternatives would not be available under Alternative 5. This roadwork would only be completed if funding became available. Vegetative treatments that are a significant part of beginning the ecosystem restoration process would not be included.

The following summarizes the highlights of the alternatives analyzed in detail:

- Alternatives 1 and 5 include no timber harvest
- Uneven-aged management: Alternative 2 includes 937 acres, Alternative 3 includes 407 acres, and Alternative 4 includes 288 acres.
- Alternatives 2 and 4 include 215 acres of partial overstory removal units. Alternative 3 includes no overstory removal units
- Alternatives 2 and 4 include no regeneration harvests in currently suitable early winter caribou habitat. Alternative 3 includes nearly 200 acres of regeneration harvests in currently suitable early winter caribou habitat.
- Alternative 2 includes over 400 acres of dry-site old growth restoration. Alternative 3 includes over 200 acres of dry-site old growth restoration. Alternatives 1, 4, and 5 include no dry-site old growth restoration.
- Alternatives 2, 4, and 5 include 32.7 miles of road reconstruction. Alternative 3 includes 23.4 miles of road reconstruction.
- All alternatives, except Alternative 1, include 36.1 miles or road obliteration.

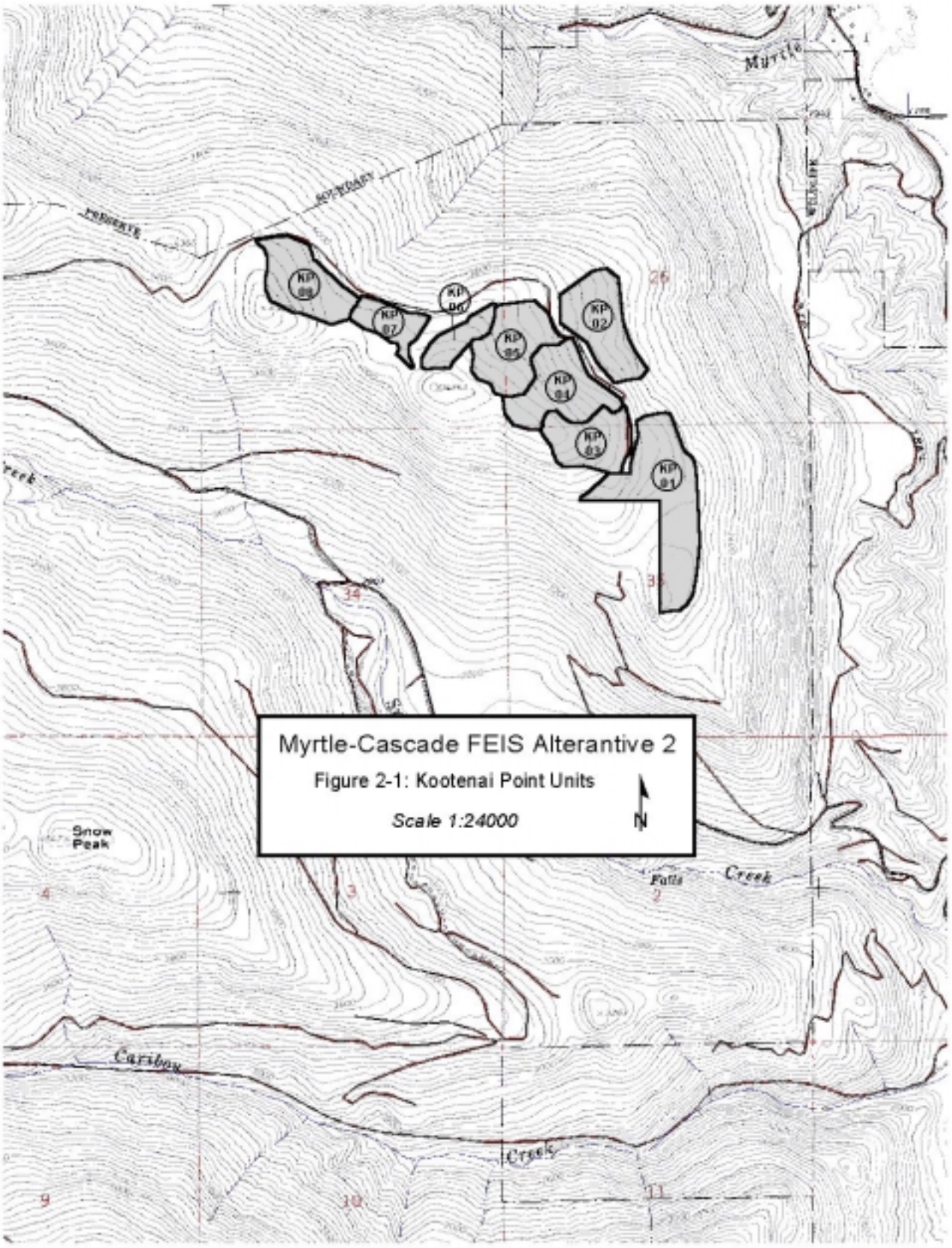
Table 2-5- Alternative 2 Treatments						
Unit	**Acres**	**Rx**	**Logging System**	**Fuels Treatment**	**PCC Before Harvest**	**PCC After Harvest**
KP01	66	CT/SS	S	LS	60	40-50
KP02	36	CT/SS	S	LS	65	40-50
KP03	29	OSR	G	LS	30	0-10
KP04	39	ISW	G	UB	70	20-30
KP05	37	OSR	G	LS	30	0-10
KP06	14	CT/SS	G	LS	75	40-50
KP07	17	OSR	G	LS	30	0-10
KP08	35	CT/SS	G	LS	70	40-50
M02	47	ISW	G (winter)	UB	65	20-30
M05	135	ISW	G (winter)	UB	70	20-30
M19	24	OSR	S	LS	20	0-10
MC01	50	GS	S	UB	65	20-50
MC02	83	GS	G (winter)	UB	70	20-50
MC03	29	GS	S	UB	60	20-50
MC04	22	ISW	S	UB	65	20-30
MC05	24	GS	S	UB	65	20-50
MC06	30	GS	G (winter)	UB	65	20-50
MC07	15	ISW	S	UB	65	30-40
MC08	28	ISW	H	UB	60	30-40
MC09	8	ISW	H	UB	65	30-40
MC10	34	ISW	H	UB	65	30-40
MC11	10	ISW	S	UB	65	30-40
MC12	9	CT	S	LS	65	50-60
MC13	34	CT	G (winter)	LS	65	50-60
MC14	16	CT	S	LS	65	50-60
MC15	35	GS	S	UB	60	30-40
MC16	15	CT	S	LS	65	50-60
MC17	54	GS	G (winter)	UB	65	30-40
MC18	159	GS	H	UB	65	30-40
MC19	29	GS	H	UB	75	30-40
MC20	27	ISW	S	UB	70	30-40
MC21	37	GS	G	UB	65	20-50
MC22	76	ISW	H	GP	70	20-30
MC23	192	GS	H	GP	85	40-50
MC24	215	GS	H	GP	85	40-50
MC25	29	OSR	S	LS	30	0-10
MC26	79	OSR	S	LS	30	0-10
TOTAL	1818					

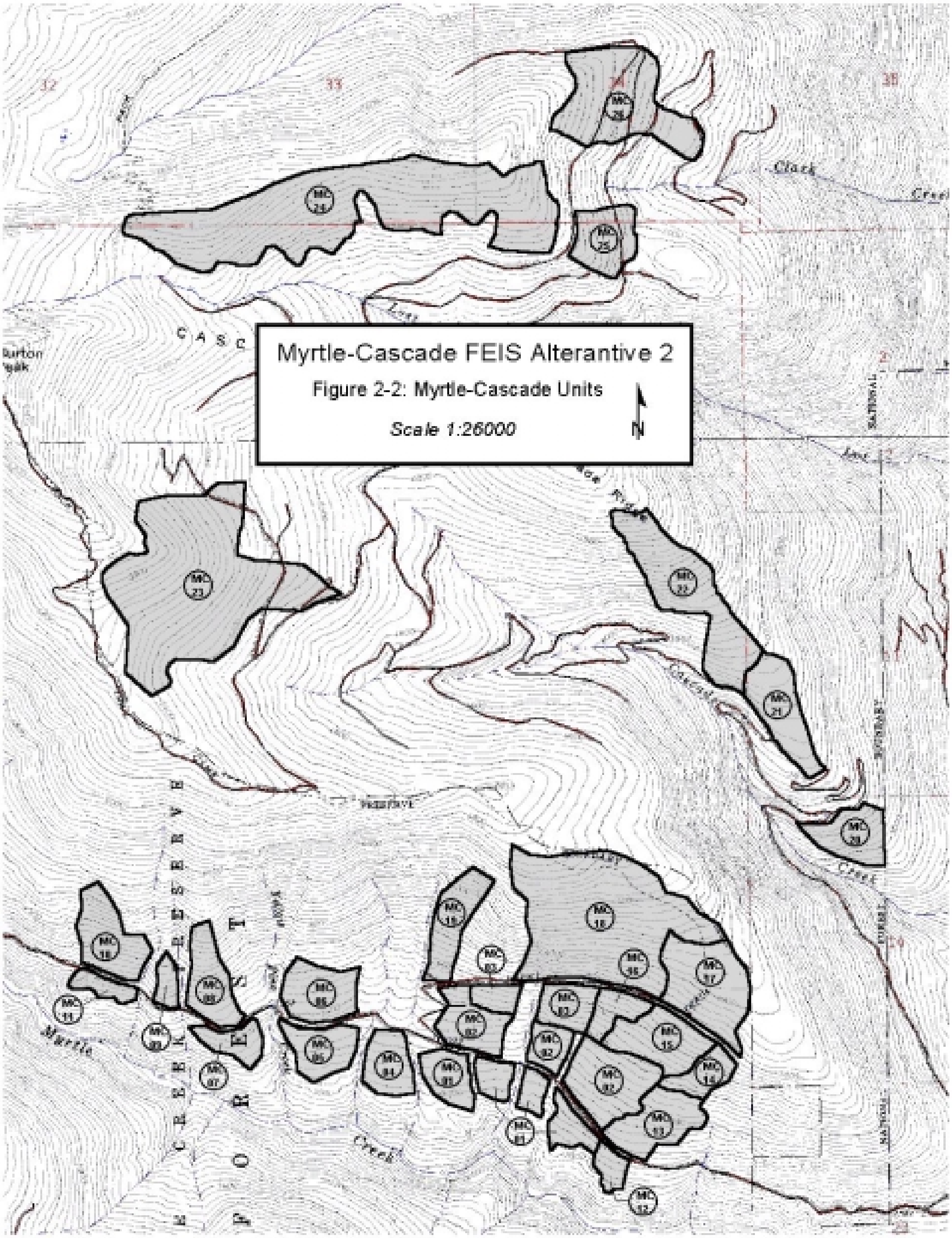
Rx = Silvicultural prescription
PCC = Percent canopy closure
CT = Commercial thin
OSR = Partial overstory removal
GS = Group selection
ISW = Irregular Shelterwood
G = Ground-based skidding (Tractor)
S = Skyline yarding
H = Helicopter logging
GP = Grapple pile UB = Underburn
LS = Lop and scatter

Table 2-6: Silvicultural Treatment Summary (Alternative 2)			
Treatment	**Acres**	**General Stand Conditions**	**Description of Treatment**
Commercial Thin and Sanitation Salvage (CT/SS) Units KP01, KP02, KP06, and KP08	151	Generally healthy, 70-90 year old mixed conifer stands. Primary species is Douglas-fir with lesser amounts of lodgepole pine, larch. Grand fir, cedar, and hemlock are generally minor components. These stands are overstocked and growth is declining.	A combination of commercial thinning and sanitation-salvage would be prescribed to maintain the health and vigor of these stands. Generally, the larger-diameter trees with full live crowns would be retained. Poor quality trees would be targeted for removal. These would mostly be suppressed trees with very little live crown. Dead and dying trees not needed to meet snag management requirements would also be removed.
Commercial Thin (CT) Units MC12, MC13, MC14, and MC16	74	Generally healthy, 70-90 year-old dry forest stands, dominated by Douglas-fir. These stands are overstocked and ponderosa pine and larch are being crowded out.	A commercial thinning would be prescribed to maintain the health and vigor of these stands. Generally, the larger-diameter trees with full live crowns would be retained. Poor quality trees would be targeted for removal. These would mostly be suppressed trees with very little live crown. In particular, the best quality ponderosa pine and western larch would be retained in order to diversify species composition.
Irregular Shelterwood (ISW) Units KP04, M02, M05, and MC04	243	These are overmature moist forest stands that are dominated by Douglas-fir, grand fir, cedar, and hemlock. Larch and white pine are either declining in health, or being replaced as significant components of these stands. In the case of white pine, blister rust has almost completely eliminated this species.	These would be regeneration harvests designed to open up the stands enough to allow for the restoration of larch and white pine as significant components of the stand. On average about 20-30 percent of the forested canopy would be retained. Preference would be to leave the largest and healthiest larch, white pine and Douglas-fir as seed trees.
Irregular Shelterwood (ISW) Units MC07, *MC08, MC09, *MC10, *MC11, and *MC22	171	These units include dry forest old growth that historically was characterized by open-grown large-diameter ponderosa pine and western larch. Prior to successful 20th century fire suppression efforts these types of stands contained about 27large trees per acre. The total density of trees greater than 3 inches in diameter averaged about 43 per acre. These same forests now contain more than 200 trees per acre greater than 3 inches in diameter, with Douglas-fir as the dominant species.	Removing the small-diameter Douglas-fir and grand fir that have taken over after more than 70 years of fire suppression would restore the old growth character of these stands. The large-diameter ponderosa pine and western larch that are providing the old growth character of these stands would be retained indefinitely, i.e., no subsequent overstory removals would be scheduled. Created openings would allow for regeneration of pine and larch that would not occur under existing stand conditions.
Irregular Shelterwood (ISW) Units MC20	27	These are dry forest stands that contain large-diameter ponderosa pine and western larch; however, these stands do not meet the IPNF minimum criteria to be classified as old growth. Densely stocked, small-diameter Douglas-fir and grand fir dominate these stands.	The objective would be to favor the development of the larger-diameter ponderosa pine and larch as future old growth. Focus would be on the removal of the smaller diameter Douglas-fir and grand fir.

Table 2-6: Silvicultural Treatment Summary (Alternative 2)			
Treatment	**Acres**	**General Stand Conditions**	**Description of Treatment**
Group Selection (SS) Units *MC23 and *MC24	407	These are high elevation (above 5000 feet), mature subalpine fir and spruce stands with a mixture of larch and lodgepole pine. Portions these units meet minimum old growth standards, but were not included in the IPNF's old growth allocation. The lodgepole pine component is reaching the size and age where it is becoming susceptible to mountain pine infestation and other causes of mortality.	Only lodgepole pine would be removed from these units. In general, forested canopy cover would be greater than 50% after logging throughout the majority of these units. However, on about 20% of the acres removal of all the lodgepole pine would create forested openings up to three acres. In these openings the remaining forested canopy would be less than 20%. Subalpine fir, spruce, and larch would be retained in these openings.
Group Selection (GS) Units MC05, *MC06, *MC18, and *MC19	242	These units include dry forest old growth that historically was characterized by open-grown large-diameter ponderosa pine and western larch. The age of the trees in these stands range from 70-350 years. The older age classes are dominated by ponderosa pine and western larch that were able to survive frequent low-intensity fires. The youngest 70-year old age classes are dominated by Douglas-fir and grand fir that have taken over due to fire suppression.	Removing the small-diameter Douglas-fir and grand fir that have taken over after more than 70 years of fire suppression would restore the old growth character of these stands. The large-diameter ponderosa pine and western larch that are providing the old growth character of these stands would be retained. Removing the small diameter firs would create openings up to three acres in size. These openings would be regenerated with ponderosa pine and larch. Portions of these stands that contain smaller-diameter, dense pine and larch would be thinned to improve their health and vigor.
Group Selection (GS) Units MC01, MC02, MC03, MC15, MC17, and MC21	288	These are dry forest stands that contain large-diameter ponderosa pine and western larch; however, these stands do not meet the IPNF minimum criteria to be classified as old growth. Densely stocked, small-diameter Douglas-fir and grand fir dominate these stands.	The objective would be to favor the development of the larger-diameter ponderosa pine and larch as future old growth. Focus would be on the removal of the smaller diameter Douglas-fir and grand fir. Removing the small diameter firs would create openings up to three acres in size. These openings would be regenerated with ponderosa pine and larch. Portions of these stands that contain smaller-diameter, dense pine and larch would be thinned to improve their health and vigor.
Overstory Removal (OSR) KP03, KP05, KP07, M19, MC25, and MC26	215	These are units that were regenerated within the past ten years using either seed tree or shelterwood methods. A typical stand would have less than 15 large-diameter trees per acre remaining that were originally left for seed and shade. Regeneration has been certified as established.	The objective of this harvest would be to remove enough overstory to allow the established regeneration to grow under optimum conditions, while meeting other resource objectives. Improving tree growth would speed up hydrologic recovery and establishment of wildlife habitat, in particular pre-foraging habitat for Canada lynx. Enough overstory trees would be retained to meet Forest Plan standards for snags and snag replacements. The goal would be to leave these trees in scattered clumps instead of evenly spaced individuals. This would be the final overstory removal for these stands
TOTAL	1818		

**Less than 100% of the acreage in these units is considered old growth*


Myrtle-Cascade FEIS Alterantive 2
Figure 2-1: Kootenai Point Units
Scale 1:24000
N
KP 08
KP 07
KP 06
KP 05
KP 04
KP 03
KP 02
KP 01
Snow Peak
Falls Creek
Caribou
Creek
Myrtle
26
34
35
4
3
2
9
10
11


Myrtle-Cascade FEIS Alterantive 2
Figure 2-2: Myrtle-Cascade Units
Scale 1:26000
N

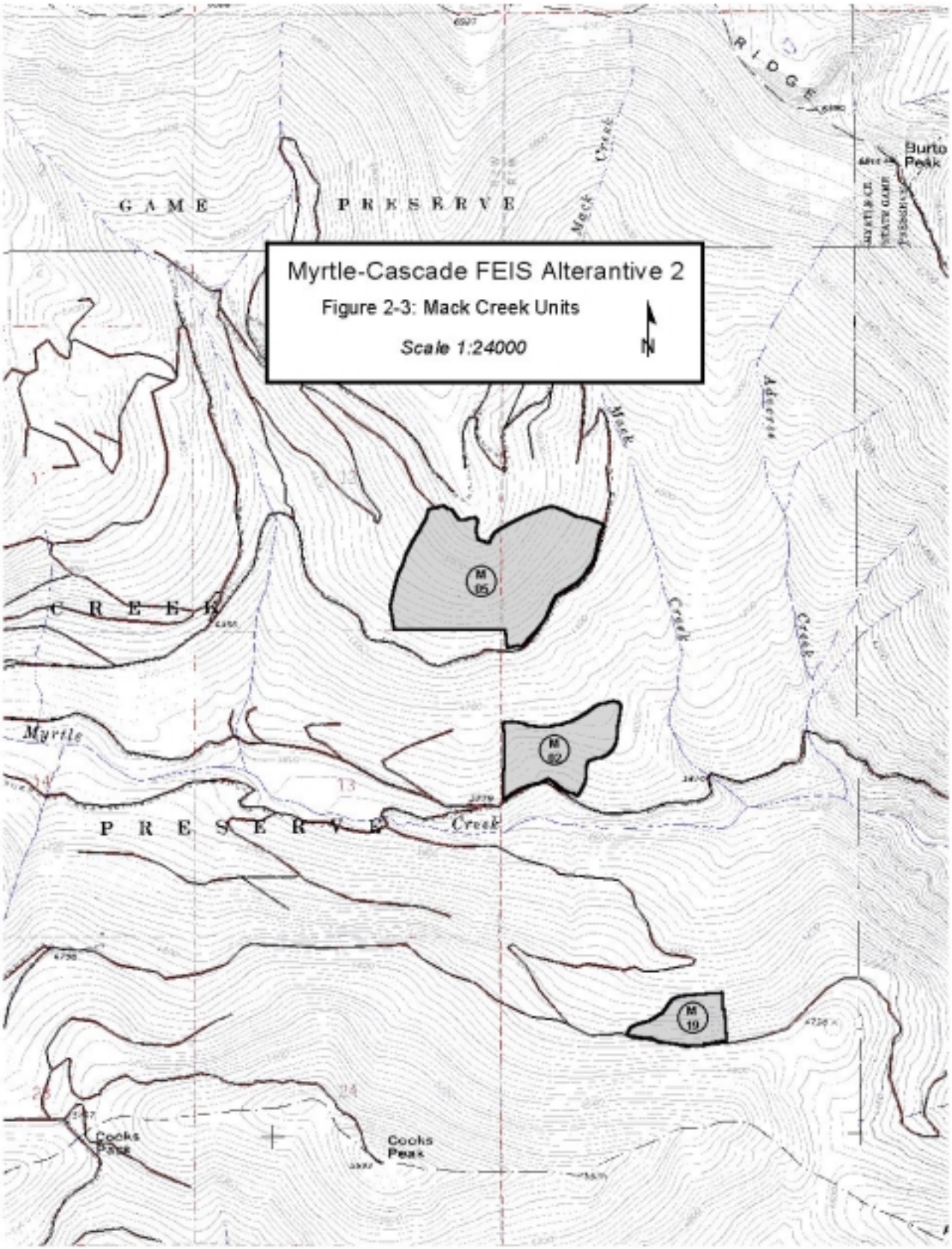

Myrtle-Cascade FEIS Alterantive 2
Figure 2-3: Mack Creek Units
Scale 1:24000
N
GAME
PRESERVE
Mack Creek
RIDGE
Burto
Peak
Adverse
Creek
Creek
CREEK
Myrtle
Creek
PRESERVE
M 05
M 02
M 19
Cooks
Peak
Cooks

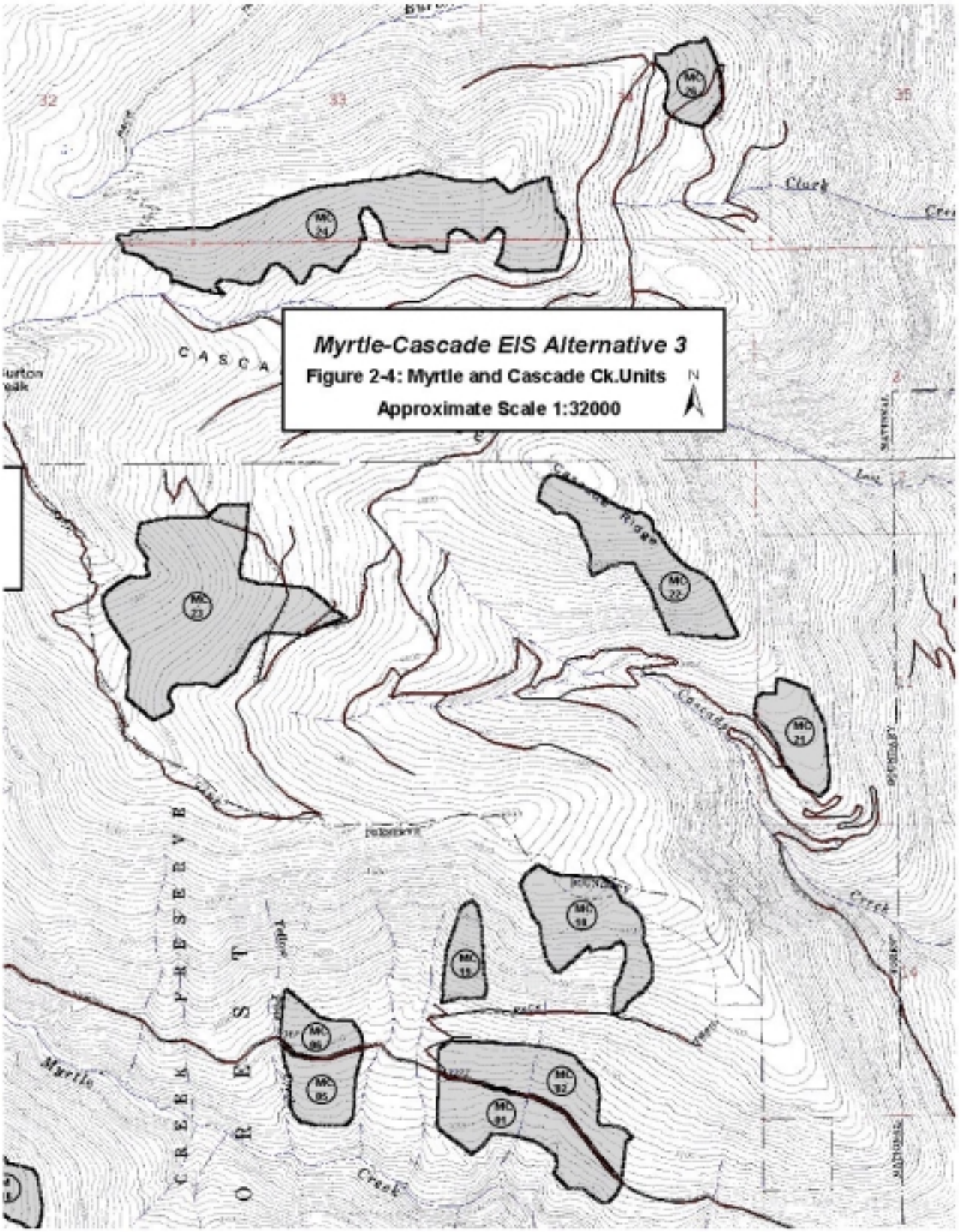
Table 2-7- Alternative 3 Treatments						
Unit	**Acres**	**Rx**	**Logging System**	**Fuels Treatment**	**PCC Before Harvest**	**PCC After Harvest**
M01	37	SS	S	LS	80	50-60
M02	49	CT/SS	G (winter)	LS	75	50-60
M03	24	CT/SS	S	LS	75	50-60
M06	100	ISW	G (winter)	UB	75	20-30
M07	64	ISW	G (winter)	UB	80	20-30
M08	27	CT/SS	G (winter)	LS	85	50-60
M09	29	ISW	G (winter)	UB	85	20-30
M10	38	CT/SS	G (winter)	LS	75	50-60
M11	10	SS	S	LS	80	50-60
M12	41	SS	S	LS	75	50-60
M13	15	SS	S	LS	75	50-60
M14	20	CT/SS	S	LS	85	50-60
M15	29	CT/SS	S	LS	80	40-50
M16	27	CT/SS	S	LS	65	40-50
MC01	71	ISW	S	UB	65	30-40
MC02	69	ISW	G (winter)	UB	65	30-40
MC05	40	ISW	S	GP	65	30-40
MC06	25	ISW	G (winter)	UB	65	30-40
MC18	73	ISW	H	UB	60	30-40
MC19	25	ISW	H	UB	60	30-40
MC21	40	CT/SS	S	LS	65	50-60
MC22	84	ISW	H	UB	70	30-40
MC23	192	GS	H	GP	85	40-50
MC24	215	GS	H	GP	85	40-50
MC26	31	CT/SS	G	LS	65	50-60
TOTAL	1375					

Rx = Silvicultural prescription
PCC = Percent canopy closure
CT = Commercial thin
OSR = Partial overstory removal
GS = Group selection
ISW = Irregular Shelterwood
G = Ground-based skidding (Tractor)
S = Skyline yarding
H = Helicopter logging
GP = Grapple pile UB = Underburn
LS = Lop and scatter

Table 2-8: Silvicultural Treatment Summary (Alternative 3)			
Treatment	**Acres**	**General Stand Conditions**	**Description of Treatment**
Group Selection (GS) Units *MC23 and *MC24	407	Same as Alternative 2.	Same as Alternative.
Sanitation Salvage (SS) Units M01, M11, M12, and M13	103	All of these units are located in mature to overmature moist forest stands. Species composition is a typical north Idaho conifer mixture of Douglas-fir, larch, lodgepole pine, grand fir, hemlock, and cedar. White pine is also found in these stands, but at much lower levels than were found historically due to white pine blister rust.	The optimal treatment for these stands would be a regeneration harvest that would convert these stands to young larch and white pine. However, because of other resource considerations a sanitation-salvage would be prescribed. This treatment would somewhat maintain the health and improve the vigor of these stands until they can be regenerated. Dead and dying trees (mostly lodgepole pine and white pine) not needed to meet snag management requirements would be removed.
Commercial Thin and Sanitation Salvage (CT/SS) Units M02, M03, M08, M10, M14, M15, M16, MC21, and MC26	285	All of these units are located in mature to overmature forest stands. All of the units except MC21, which is located in a dry forest type, are located in moist forests types. Species composition in all of the units, except for MC21, is a typical north Idaho conifer mixture of Douglas-fir, larch, lodgepole pine, grand fir, hemlock, and cedar. White pine is also found in these stands, but at much lower levels than were found historically due to white pine blister rust. MC21 is mostly Douglas-fir, lodgepole pine, western larch, and ponderosa pine.	The optimal treatment for these stands would be a regeneration harvest that would convert these stands to young larch and white pine. However, because of other resource considerations a combination of commercial thinning and sanitation-salvage would be prescribed. This treatment would somewhat maintain the health and improve the vigor of these stands until they can be regenerated. Generally, the larger-diameter trees with full live crowns would be retained. Poor quality trees would be targeted for removal. These would mostly be suppressed trees with very little live crown. Dead and dying trees not needed to meet snag management requirements would also be removed.
Irregular Shelterwood (ISW) Units M06, M07, and M09	193	These are overmature moist forest stands that are dominated by Douglas-fir, grand fir, cedar, and hemlock. Larch and white pine are either declining in health, or being replaced as significant components of these stands. In the case of white pine, blister rust has almost completely this species.	These would be regeneration harvests designed to open up the stands enough to allow for the restoration of larch and white pine as significant components of the stand. On average about 20-30 percent of the forested canopy would be retained. Preference would be to leave the largest and healthiest larch, white pine and Douglas-fir as seed trees.
Irregular Shelterwood (ISW) Units MC05, MC06, MC18, MC19, and *MC22	247	These units include dry forest old growth that historically was characterized by open-grown large-diameter ponderosa pine and western larch. The age of the trees in these stands range from 70-350 years. The older age classes are dominated by ponderosa pine and western larch that were able to survive frequent low-intensity fires. The youngest 70-year old age classes are dominated by Douglas-fir and grand fir that have taken over due to fire suppression.	Removing the small-diameter Douglas-fir and grand fir that have taken over after more than 70 years of fire suppression would restore the old growth character of these stands. The large-diameter ponderosa pine and western larch that are providing the old growth character of these stands would be retained indefinitely, i.e., no subsequent overstory removals would be scheduled. Created openings would allow for regeneration of pine and larch that would not occur under existing stand conditions.

Table 2-8: Silvicultural Treatment Summary (Alternative 3)			
Treatment	**Acres**	**General Stand Conditions**	**Description of Treatment**
Irregular Shelterwood (ISW) Units MC01 and MC02	140	These are dry forest stands that contain large-diameter ponderosa pine and western larch; however, these stands do not meet the IPNF minimum criteria to be classified as old growth. Densely stocked, small-diameter Douglas-fir and grand fir dominate these stands.	The objective would be to favor the development of the larger-diameter ponderosa pine and larch as future old growth. Focus would be on the removal of the smaller diameter Douglas-fir and grand fir.
TOTAL	1375		

**Less than 100% of the acreage in these units is considered old growth*


Myrtle-Cascade EIS Alternative 3
Figure 2-4: Myrtle and Cascade Ck.Units
Approximate Scale 1:32000
N
MC 24
MC 23
MC 22
MC 21
MC 19
MC 15
MC 95
MC 92
MC 91
Clark
Cascade Ridge
Cascade
Myrtle
Creek
CREEK PRESERVE
FOREST

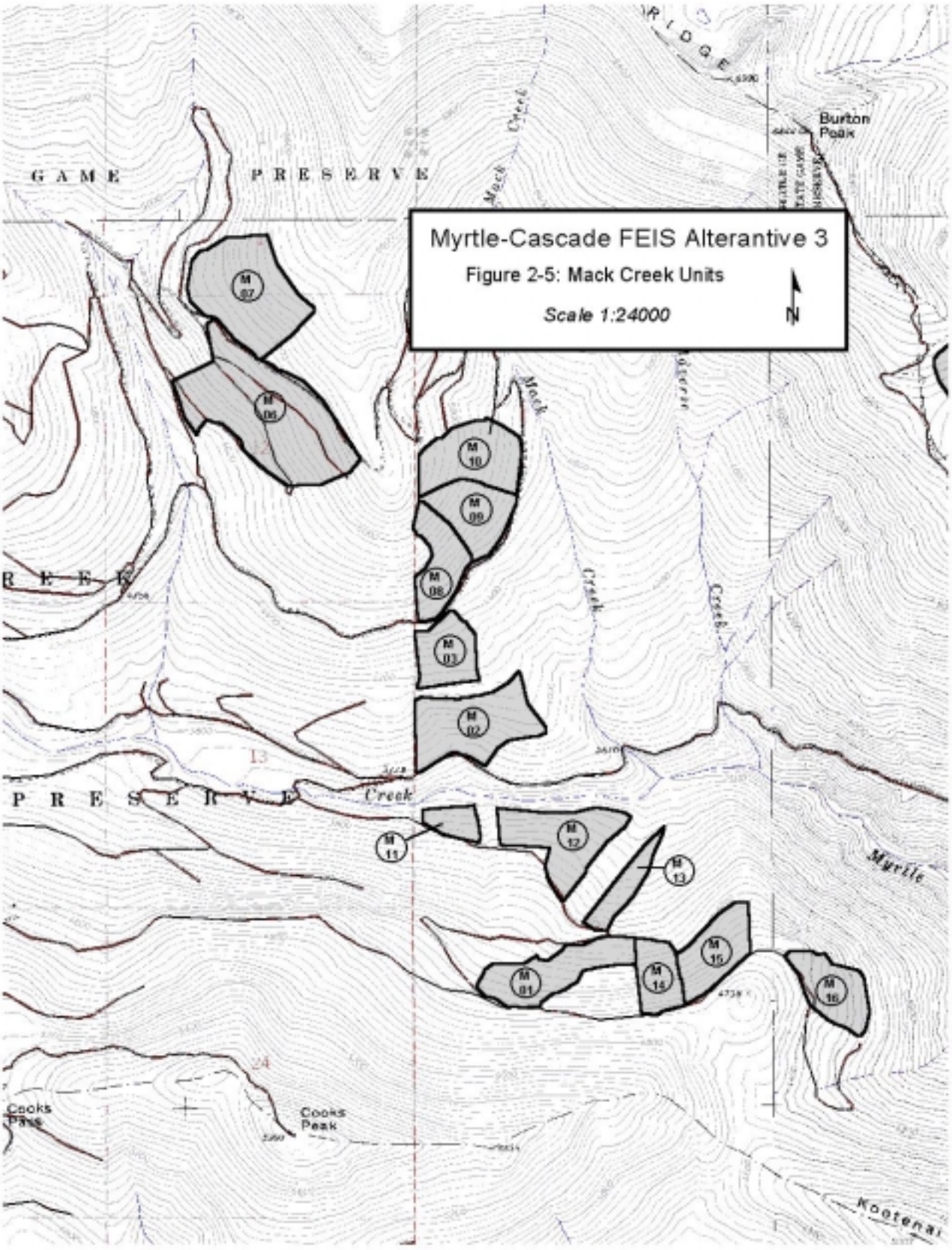
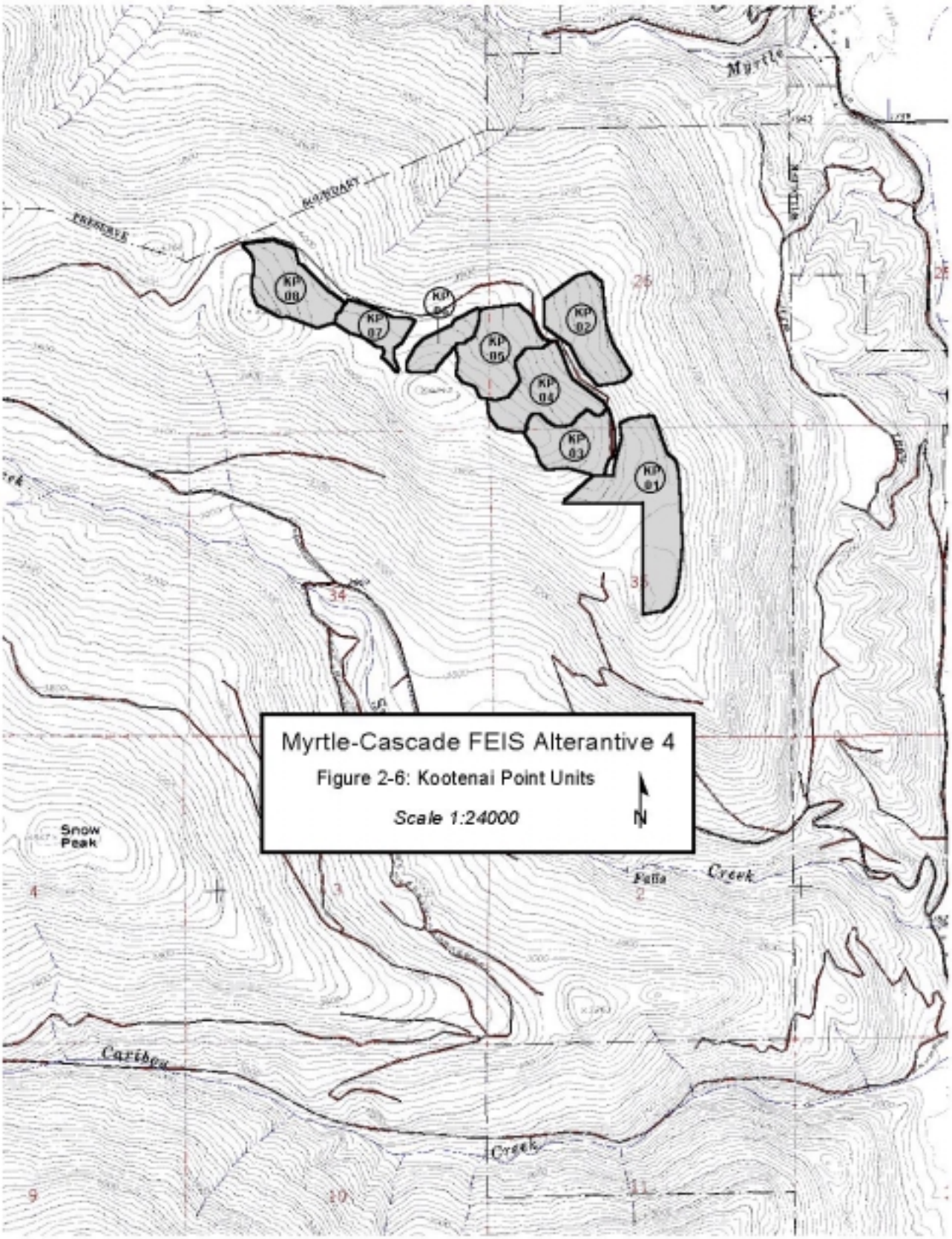
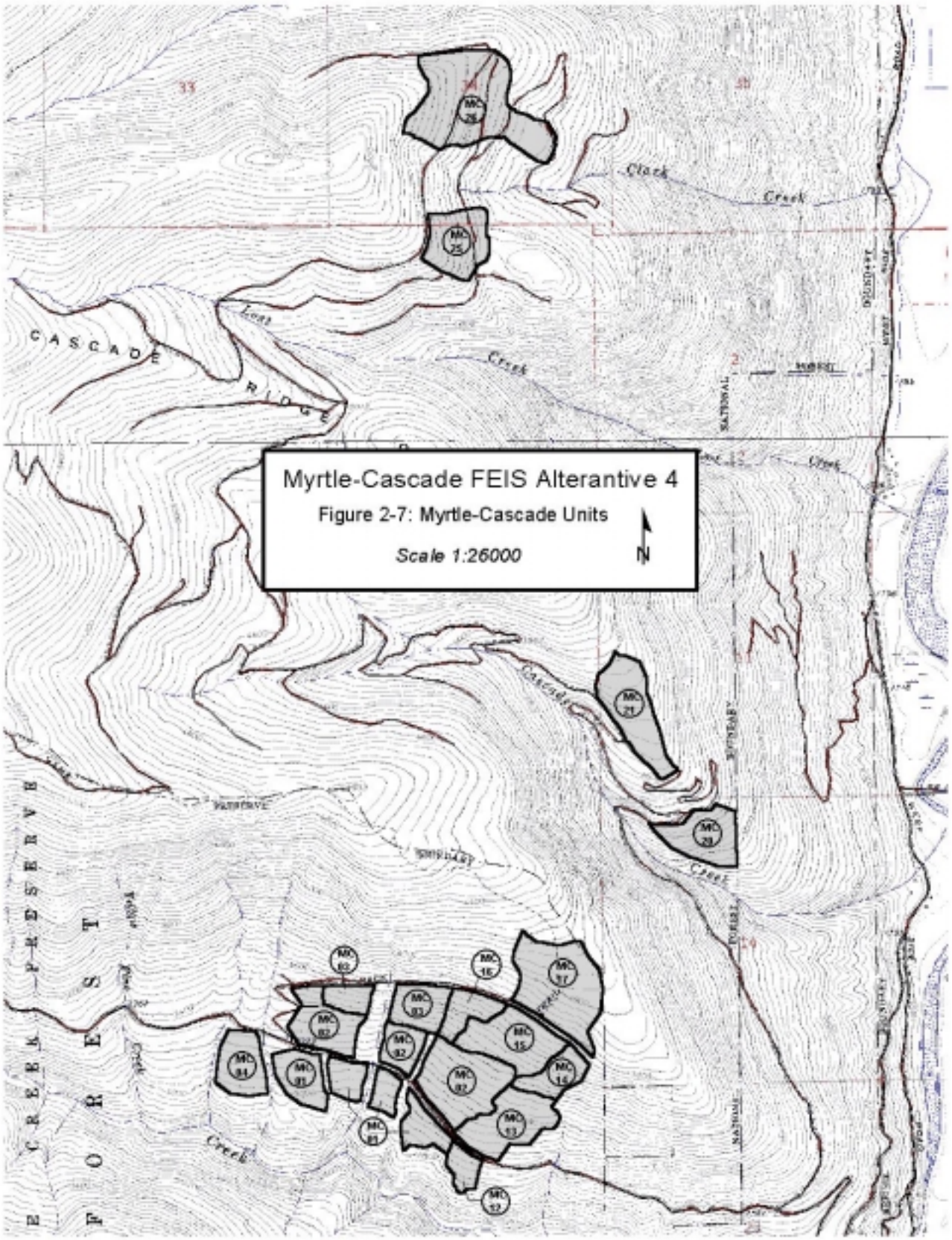

Myrtle-Cascade FEIS Alterantive 3
Figure 2-5: Mack Creek Units
Scale 1:24000
N
GAME
PRESERVE
Mack Creek
Burton Peak
RIDGE
Myrtle
Cooks Peak
Kootenai
M 07
M 06
M 10
M 09
M 08
M 03
M 02
M 11
M 12
M 13
M 01
M 14
M 15
M 16

Table 2-9: Alternative 4 Treatments						
Unit	**Acres**	**Rx**	**Logging System**	**Fuels Treatment**	**PCC Before Harvest**	**PCC After Harvest**
KP01	66	CT/SS	S	LS	60	40-50
KP02	36	CT/SS	S	LS	65	40-50
KP03	29	OSR	G	LS	30	0-10
KP04	39	ISW	G	UB	70	20-30
KP05	37	OSR	G	LS	30	0-10
KP06	14	CT/SS	G	LS	75	40-50
KP07	17	OSR	G	LS	30	0-10
KP08	35	CT/SS	G	LS	70	40-50
M05	135	ISW	G (winter)	UB	70	20-30
M19	24	OSR	S	LS	20	0-10
MC01	50	GS	S	UB	65	30-40
MC02	83	GS	G (winter)	UB	70	30-40
MC03	29	GS	S	UB	60	30-40
MC04	22	ISW	S	UB	65	20-30
MC12	9	CT	S	LS	65	50-60
MC13	34	CT	G (winter)	LS	65	50-60
MC14	16	CT	S	LS	65	50-60
MC15	35	GS	S	UB	60	30-40
MC16	15	CT	S	LS	65	50-60
MC17	54	GS	H	UB	65	30-40
MC20	27	ISW	S	UB	70	20-30
MC21	37	GS	G	UB	65	30-40
MC25	29	OSR	S	LS	30	0-10
MC26	79	OSR	S	LS	30	0-10
TOTAL	951					

Table 2-10: Silvicultural Treatment Summary (Alternative 4)			
Treatment	**Acres**	**General Stand Conditions**	**Description of Treatment**
Commercial Thin and Sanitation Salvage (CT/SS) Units KP01, KP02, KP06, and KP08	151	Generally healthy, 70-90 year old mixed conifer stands. Primary species is Douglas-fir with lesser amounts of lodgepole pine, larch. Grand fir, cedar, and hemlock are generally minor components. These stands are overstocked and growth is declining.	A combination of commercial thinning and sanitation-salvage would be prescribed to maintain the health and vigor of these stands. Generally, the larger-diameter trees with full live crowns would be retained. Poor quality trees would be targeted for removal. These would mostly be suppressed trees with very little live crown. Dead and dying trees not needed to meet snag management requirements would also be removed.
Commercial Thin (CT) Units MC12, MC13, MC14, and MC16	74	Generally healthy, 70-90 year-old dry forest stands, dominated by Douglas-fir. These stands are overstocked and ponderosa pine and larch are being crowded out.	A commercial thinning would be prescribed to maintain the health and vigor of these stands. Generally, the larger-diameter trees with full live crowns would be retained. Poor quality trees would be targeted for removal. These would mostly be suppressed trees with very little live crown. In particular, the best quality ponderosa pine and western larch would be retained in order to diversify species composition.
Irregular Shelterwood (ISW) Units KP04, M05, and MC04	196	These are overmature moist forest stands that are dominated by Douglas-fir, grand fir, cedar, and hemlock. Larch and white pine are either declining in health, or being replaced as significant components of these stands. In the case of white pine, blister rust has almost completely this species.	These would be regeneration harvests designed to open up the stands enough to allow for the restoration of larch and white pine as significant components of the stand. On average about 20-30 percent of the forested canopy would be retained. Preference would be to leave the largest and healthiest larch, white pine and Douglas-fir as seed trees.
Irregular Shelterwood (ISW) Units MC20	27	These are dry forest stands that contain large-diameter ponderosa pine and western larch; however, these stands do not meet the IPNF minimum criteria to be classified as old growth. Densely stocked, small-diameter Douglas-fir and grand fir dominate these stands.	The objective would be to favor the development of the larger-diameter ponderosa pine and larch as future old growth. Focus would be on the removal of the smaller diameter Douglas-fir and grand fir.
Group Selection (GS) Units MC01, MC02, MC03, MC15, MC17, and MC21	288	These are dry forest stands that contain large-diameter ponderosa pine and western larch; however, these stands do not meet the IPNF minimum criteria to be classified as old growth. Densely stocked, small-diameter Douglas-fir and grand fir dominate these stands.	The objective would be to favor the development of the larger-diameter ponderosa pine and larch as future old growth. Focus would be on the removal of the smaller diameter Douglas-fir and grand fir. Removing the small diameter firs would create openings up to three acres in size. These openings would be regenerated with ponderosa pine and larch. Portions of these stands that contain smaller-diameter, dense pine and larch would be thinned to improve their health and vigor.

Table 2-10: Silvicultural Treatment Summary (Alternative 4)			
Treatment	**Acres**	**General Stand Conditions**	**Description of Treatment**
Overstory Removal (OSR) KP03, KP05, KP07, M19, MC25, and MC26	215	These are units that were regenerated within the past ten years using either seed tree or shelterwood methods. A typical stand would have less than 15 large-diameter trees per acre remaining that were originally left for seed and shade. Regeneration has been certified as established.	The objective of this harvest would be to remove enough overstory to allow the established regeneration to grow under optimum conditions, while meeting other resource objectives. Improving tree growth would speed up hydrologic recovery and establishment of wildlife habitat, in particular pre-foraging habitat for Canada lynx. Enough overstory trees would be retained to meet Forest Plan standards for snags and snag replacements. The goal would be to leave these trees in scattered clumps instead of evenly spaced individuals. This would be the final overstory removal for these stands
TOTAL	951		


Myrtle-Cascade FEIS Alterantive 4
Figure 2-6: Kootenai Point Units
Scale 1:24000
N
KP 08
KP 07
KP 06
KP 05
KP 04
KP 03
KP 02
KP 01
Myrtle
Snow Peak
Falls Creek
Caribou
Creek


Myrtle-Cascade FEIS Alterantive 4
Figure 2-7: Myrtle-Cascade Units
Scale 1:26000
N
Clark Creek
CASCADE RIDGE
Lost Creek
Cascade Creek
Creek
FOREST RESERVE

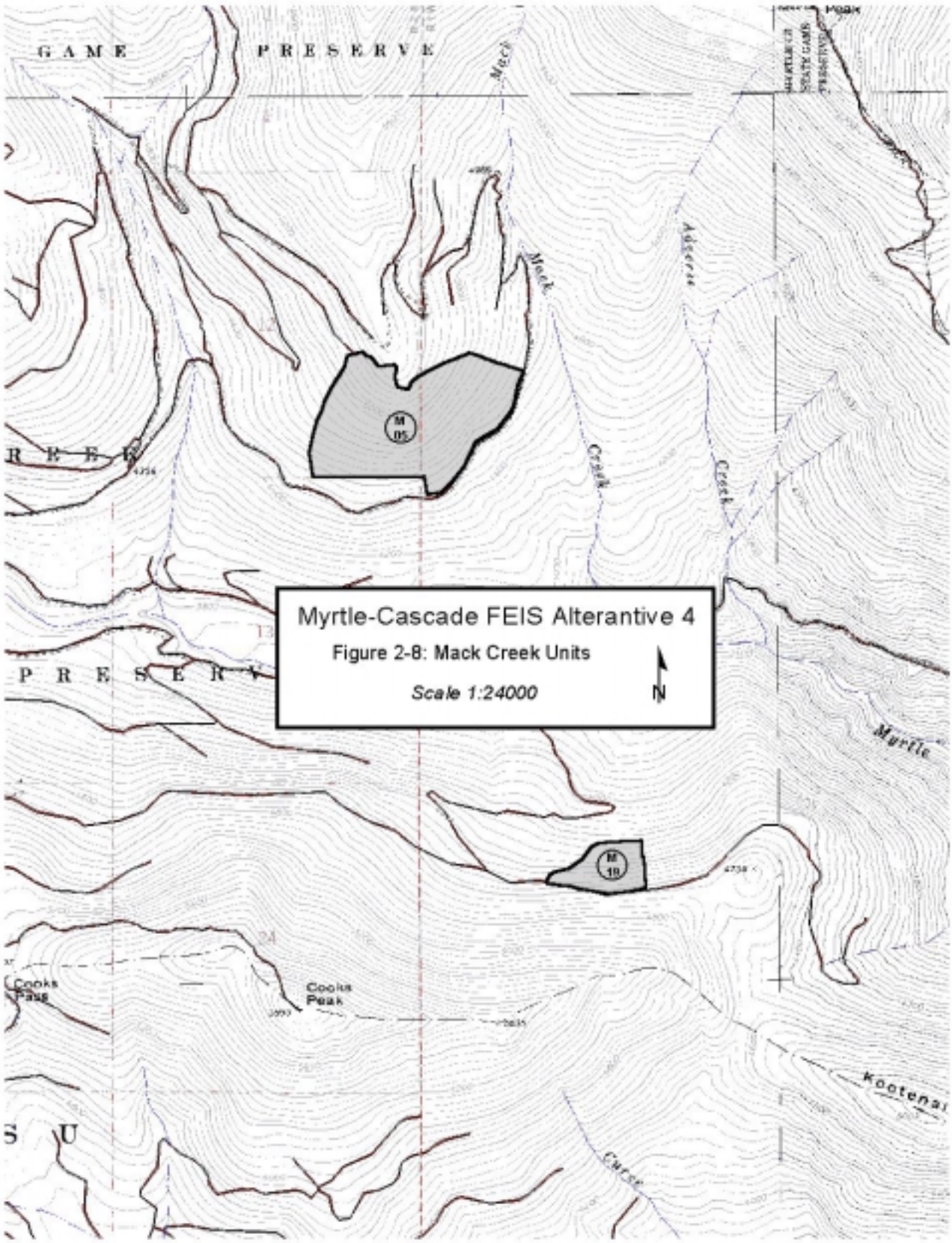

GAME
PRESERVE
Mack
Creek
Myrtle-Cascade FEIS Alterantive 4
Figure 2-8: Mack Creek Units
Scale 1:24000
N
Myrtle
Cooks Peak
Kootenai

Table 2-11 provides a summary of the proposed treatments for the alternatives that were analyzed in detail. A summary comparison of issues and alternatives is provided in Table 2-12.

Table 2-11. Summary of Proposed Treatments for each Alternative					
Treatment Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**
Regeneration Cuts					
Irregular Shelterwood (even-aged)	0	441	580	223	0
Group Selection (uneven-aged)	0	937	407	288	0
TOTAL Regeneration Cuts	0	1378	987	511	0
Partial Cuts					
Commercial Thin/Sanitation Salvage	0	151	285	151	0
Commercial Thin	0	74	0	74	0
Sanitation Salvage	0	0	103	0	0
TOTAL Partial Cuts	0	225	388	225	0
Removal Cuts					
Partial Overstory Removal	0	215	0	215	0
Total Acres Harvested	0	1818	1375	951	0
Logging System					
Ground-based	0	767	472	646	0
Skyline	0	354	314	0	0
Helicopter	0	741	589	305	0
Fuels Treatment					
Underburn	0	895	540	511	0
Grapple Pile	0	483	447	0	0
Lop and scatter	0	440	388	440	0
Total Acres Treated	0	1818	1375	951	0
Transportation Miles					
New Construction – Temporary Road	0	0.2	0	0.2	0
Reconstruction	0	32.7	23.4	32.7	32.7
Obliterated	0	36.1	36.1	36.1	36.1

Table 2-12: Summary Comparison of Issues and Alternatives					
Issue	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Forest Composition and Structure	Acres of dry forest composition and structure improved (0) Acres of old growth lost (0). Acres of dry forest old growth restored (0) Acres regenerated with rust-resistant western white pine (0) Acres of high-risk lodgepole pine treated (0) No reduction in risk of stand-replacing fire on dry forests No change in average patch size	Acres of dry-forest composition and structure restoration (868) Acres of old growth lost (0). Acres of dry forest old growth restored (275) Acres regenerated with rust-resistant western white pine (243) Acres of high-risk lodgepole pine treated (407) Risk of stand-replacing fire on dry forests reduced by 34% on Average patch size reduced by less than 1 acre.	Acres of dry-forest composition and structure restoration (427) Acres of old growth lost (0). Acres of dry forest old growth restored (208) Acres regenerated with rust-resistant western white pine (193) Acres of high-risk lodgepole pine treated (407) Risk of stand-replacing fire on dry forests reduced by 28% Average patch size reduced by 4 acres.	Acres of dry-forest composition and structure restoration (455) Acres of old growth lost (0). Acres of dry forest old growth restored (0) Acres regenerated with rust-resistant western white pine (196) Acres of high-risk lodgepole pine treated (0) Risk of stand-replacing fire on dry forests reduced by 25% Average patch size reduced by less than 1 acre.	Acres dry forest composition and structure improved (0) Acres of old growth lost (0). Acres of dry forest old growth restored (0) Acres regenerated with rust-resistant western white pine (0) Acres of high-risk lodgepole pine treated (0) No reduction in risk of stand-replacing fire on dry forests No change in average patch size
Woodland Caribou	Acres of suitable habitat harvested (0) Acres of suitable habitat improved or lost (0) Acres of capable habitat managed for long-term improvement (0)	Acres of suitable habitat harvested (68) Acres of suitable habitat improved (68). Acres of suitable habitat lost (0) Acres of capable habitat managed for long-term improvement (681)	Acres of suitable habitat harvested (373) Acres of suitable habitat improved (68). Acres of suitable habitat lost (191) Acres of capable habitat managed for long-term improvement (1,207)	Acres of suitable habitat harvested (0) Acres of suitable habitat improved or lost (0) Acres of capable habitat managed for long-term improvement (301)	Acres of suitable habitat harvested (0) Acres of suitable habitat improved or lost (0) Acres of capable habitat managed for long-term improvement (0)
Watershed and Aquatics Habitat	Inventoried USGS stream crossings (41) Inventoried stream crossing sediment risk (166 tons/year) Inventoried stream crossings that can divert streamflow onto the road prism (9) Inventoried migration barriers (7) Miles of road on sensitive landtypes (39.1) Acres of dry sites at risk from severe fire (2559)	Inventoried USGS stream crossings (30 to 41) Inventoried stream crossing sediment risk (42 tons/year) Inventoried stream crossings that can divert streamflow onto the road prism (0) Inventoried migration barriers (0 to 2) Miles of road on sensitive landtypes (29.1 to 39.1) Acres of dry sites at risk from severe fire (1802)	Inventoried USGS stream crossings (30 to 41) Inventoried stream crossing sediment risk (42 tons/year) Inventoried stream crossings that can divert streamflow onto the road prism (0) Inventoried migration barriers (0 to 2) Miles of road on sensitive landtypes (29.1 to 39.1) Acres of dry sites at risk from severe fire (2221)	Inventoried USGS stream crossings (30 to 41) Inventoried stream crossing sediment risk (42 tons/year) Inventoried stream crossings that can divert streamflow onto the road prism (0) Inventoried migration barriers (0 to 2) Miles of road on sensitive landtypes (29.1 to 39.1) Acres of dry sites at risk from severe fire (2215)	Inventoried USGS stream crossings (30 to 41) Inventoried stream crossing sediment risk (42 tons/year) Inventoried stream crossings that can divert streamflow onto the road prism (0) Inventoried migration barriers (0 to 2) Miles of road on sensitive landtypes (29.1 to 39.1) Acres of dry sites at risk from severe fire (2559)
Roadless	No Roadless Entry	Miles of road obliterated in roadless (0.75). Acres of timber harvest in roadless (355)	Miles of road obliterated in roadless (0.75). Acres of timber harvest in roadless (380)	No Roadless Entry	Miles of road obliterated in roadless (0.75). Acres of timber harvest in roadless (0)

Watershed and Fisheries Improvement Opportunities

Figure 2-9 and Figure 2-10 display the proposed type and location of road treatments that would be used to reduce risks and restore normal slope hydrology within the project area. The following section contains descriptions of the road reconstruction items that are included in the action alternatives. These items are only considered certain to occur if an action alternative is chosen and the work can be included in the timber sale road package. All mileposts were measured using an odometer, but are approximate in spite of the implied precision. A description of the proposed road obliteration work is described later in Chapter 2 under "Features Common to All Action Alternatives".

The following reconstruction items are proposed for Road 633:

Myrtle Creek

1. Redesigning and Upgrading Existing Stream Crossings: The most important action is to replace and redesign existing channel crossings so that they can safely pass 100 year return interval floods (Q100). This includes using bypass dips to eliminate the potential for the ditchline or road prism to capture streamflow. The outfalls of the bypass dips would be armored so that if the road does intercept streamflow then the water can safely be returned to the channel. The amount of rock in the fill would be increased to increase the strength of the throughfill and to reduce the amount of fine material that could be delivered if the crossing did fail. Rock would be placed below the culvert outlet to reduce erosion caused by increased velocities of water flowing through the crossing. The crossings at mileposts 3.5, 3.5+, 3.55, 3.55+, 3.6+, 3.65, 3.7+, 3.8, 3.85, 4.0+, 4.15, 4.25, 4.65 (Yellow Pine Creek), 4.95, 6.05 (Adverse Creek), 6.5 (Mack Creek), and 8.25 (White Pine Creek), and, on Cooks Creek would be replaced and redesigned as described above. An ephemeral draw at milepost 0.75 needs a culvert installed to prevent saturation of the road fill (currently there is no pipe). White Pine Creek would be designed to provide for fish passage because of the potential for fish presence, unless surveys can otherwise confirm that fish are not present and cannot access this stream from Myrtle Creek. The Cooks Creek crossings must be designed to provide for fish passage.

2. Strengthening Unstable Cut and Fill Slopes: Yellow Pine, Adverse, and Mack Creek each have bin walls that need maintenance, partial replacement, and extensions. Mack Creek has unstable road fill along the western approach that should be strengthened with geogrid or rock fill.

3. Increasing the Frequency of Ditch Drainage: Excess water from Road 633 created one gully and one slope failure in the spring of 1997 at each of the switchbacks first encountered coming up from the valley. Specifically at these sites, additional relief culverts would installed at mileposts 1.2, 1.4, 1.65, 1.9, and 2.0 to prevent future occurrences of the same types of events. However, additional relief culverts are warranted at several other locations as well (not all locations are currently mileposted). Mack, Adverse, and White Pine Creeks all have ditchlines that drain directly to the stream, which is a violation of State BMPs and needs to be remedied. In addition, some of the existing relief pipes would replaced because of damage to the inlet and/or age.

4. Rolling the Road Grade: The intent of this work is to prevent water from flowing over long distances of the road prism down wheel ruts. As an example, between mileposts 0.0 and 3.4 graded rolling dips (or bypass dips) are needed at mileposts 0.3, 1.9, 2.1, 3.1, 3.2, 3.3, and 3.4. Other rolling dips would be placed where the

road grade is sustained for several hundred feet. Crowning of the road surface may also be used to reduce concentration of water on the road surface.

5. ***Surfacing***: A minimum 4-inch lift of gravel would be placed on native road surfaces, especially near channel crossings to reduce surface erosion.

Road 661: The 36 inch culvert on Cooks Creek is undersized relative to Forest Plan Standards and has a moderate to high risk because of the probability of failure and the large amount of fill over the crossing. This culvert needs to be replaced with a crossing that can safely pass the flow and debris associated with a 100-year return interval flood and allow fish passage since this stream is fish bearing.

Road 1309: This road needs additional relief culverts to cross drain the ditchline and rolling of the road grade to prevent water from running down wheel ruts.

Road 2400: This road has a 36-inch culvert that is undersized and the inlet side of the fill is eroding. This crossing either needs to be removed (in cooperation with the adjacent private forest land) or replaced with a culvert that can safely pass the flow and debris associated with a 100-year return interval flood and allow fish passage.

Road 2405: The most important reconstruction item for this road is to replace the existing undersized aluminum culvert on White Pine Creek with permanent bridge abuttments that can be used with a temporary bridge whenever access is needed. The distance between the bridge abuttments would be spaced far enough apart that they do not constrict the channel during bankfull flows and would be built high enough to permit passage of water and debris during 100-year return interval floods. The second reconstruction item is to add additional ditch relief and to roll the road grade. The remainder of this road system would be obliterated as shown on Figure 2-9.

Cascade – Lost – Burton – Clark Creeks

The following reconstruction items are proposed for Road 2411:

1. Redesigning and Upgrading Existing Stream Crossings: The most important action is to replace and redesign existing channel crossings so that they can safely pass the streamflow and debris associated with a 100-year return interval flood. The southern road approach to the lower Cascade Creek crossing has the potential to capture a small portion of streamflow in the road prism and ditch line. The road geometry is not conducive to putting in a taller squash culvert or a bridge (a wider squash culvert would be considered if the end area of the pipe can be increased over the existing size (e.g. 57"x83") or an arch pipe). Therefore, this crossing would be designed so that it can safely be overtopped during 100-year return interval floods. This would include the use of more rock in the fill, and possibly geotextiles. This crossing also needs to be placed at grade with the stream. Three other existing 48-inch metal culverts on the middle and upper crossings of Cascade Creek and on Lost Creek would upgraded. Two ephemeral channels on the north side of the middle Cascade Creek crossing would upsized. The Cascade Creek crossings would be designed to provide for fish passage because of the potential for fish presence, unless surveys can otherwise confirm that fish are not present.

2. Strengthening Unstable Cut and Fill Slopes: The main Cascade Creek crossing has bin and gabion walls that need maintenance, partial replacement, and extensions. The portion of road built within the inner

gorge of Cascade Creek has additional road sections where the road fill needs to be strengthened and better drained.

3. Increasing the Frequency of Ditch Drainage: Opportunities to increase ditch drainage were identified at mileposts 0.1, 0.2, 0.6, 0.8, 1.4, 1.5, @1.55, @1.6, and @ 1.65. The remainder of this road needs much more frequent cross drainage, but locations are not yet mileposted. Cascade and Lost Creeks both have ditchlines that drain directly to the stream. In addition, some of the existing relief pipes would be replaced because of damage to the inlet and/or age.

4. Rolling the Road Grade: The intent of this work is to prevent water from flowing over long distances of the road prism down wheel ruts. The rolling dips would be placed where the road grade is sustained for a few hundred feet. Currently rill and small gully erosion of the tread are common for extended lengths of this road system.

5. Surfacing: A minimum 4-inch lift of gravel would be placed on native road surfaces. The highest priority for surfacing is near crossings and other portions of road within RHCAs, and in areas where the road ditch or cutslope intercept groundwater flow.

Snow Creek

Road 402: The primary reconstruction item for this haul route is to increase the frequency of ditch relief and to put in rolling dips where the road grade is sustained for several hundred feet.

Road 2190: The primary reconstruction items for this haul route are to increase the frequency of ditch relief, put in frequent rolling dips where the road grade is sustained, and spot gravel near stream crossings and poorly drained sites.

Figure 2-9 - Proposed Type And Location Of Road Treatments

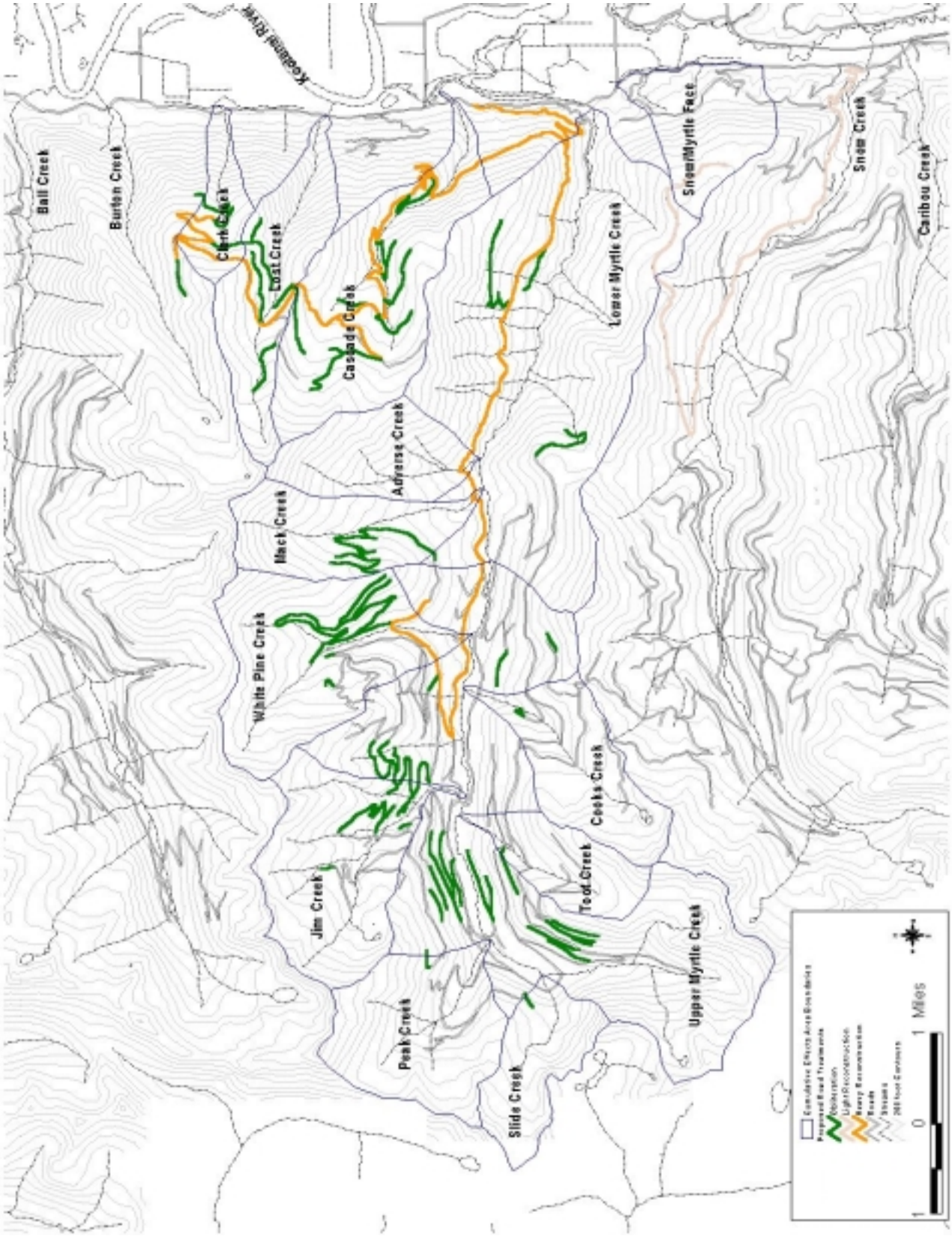
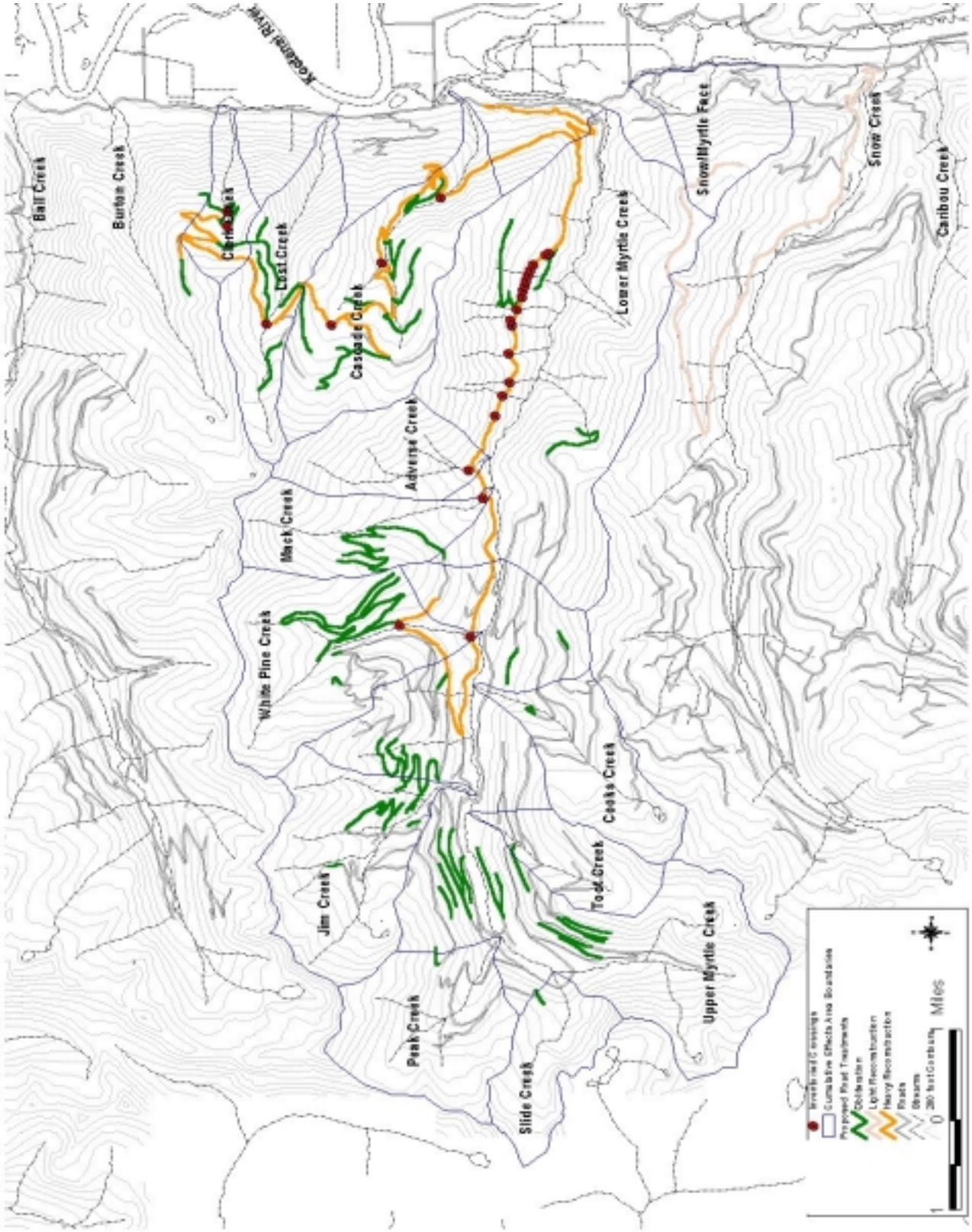


Figure 2-10: Proposed Stream Crossing Upgrades



Required Design Criteria For All Action Alternatives

The following specific criteria must be applied during project implementation if an action alternative is selected. These requirements also apply to all activities associated with this project. The purpose of these measures is to completely avoid, or to the fullest extent possible, minimize the potential for adverse effects to the resources discussed below. The effects analysis assumes their implementation.

Cultural Resources

1) Assure protection of any encountered cultural sites, survey monuments, landlines, and all other improvements by buffering or appropriate C-clauses in the timber sale contract, or both.

Hazardous Materials

1) Petroleum and chemical products storage containers with capacities of more than 200 gallons, stationary or mobile, would be stored far enough away to prevent leakage from reaching live water, a minimum of 300 feet [modified Garten (1991) from 200 foot to 300 foot buffer to reflect INFISH requirements]. Dikes, berms or embankments would be constructed to contain the volume of petroleum and/or chemical products stored within the tanks. Diked areas would be sufficiently impervious and of adequate capacity to contain spilled petroleum and/or chemical products. In the event that any leakage or spillage enters any live water, the operator would immediately notify the director. The storage site would be determined during the pre-operational meeting (Garten 1991). This measure is intended to minimize the potential for hazardous material spills, and infiltration into the soil or delivery to streams if a spill occurs.

2) A petroleum and chemical products spill protection plan would be required as outlined according to EPA (Garten 1991). This intent of this requirement is to minimize the response time to and potential consequences from accidental spills and is a standard component of the timber sale contract.

3) Transportation of fuel would be during daylight hours only, except for quantities of 200 gallons or less (Garten 1991) in order to reduce the likelihood for and consequences of a potential accidental spill.

4) Any changing of hoses, parts, or refueling would be conducted 300 feet away from streams and tributaries. A pre-operational inspection would be conducted by the Forest Service contract inspector for signs of leakage on machines that would be used to reconstruct stream crossings. The inspector and operator would inspect hoses daily for signs of wear. In the event any leakage or spillage enters any stream or open water, the operator would immediately notify the Contracting Officer Representative (COR) or the timber sale administrator who would be required to follow the actions to be taken in case of hazardous spill, as outlined in the spill protection plan. A possible effect would be the damage to water quality should a leak of petroleum products or hydraulic fluid occurs. As long as the above BMP is followed, impacts to downstream water quality, fish habitat and/or aquatic organisms from contaminants are not likely.

5) All waste oil and lubricants would be collected and transported to proper disposal areas outside of the Myrtle Creek watershed. In case of unauthorized release of hazard materials, and petroleum products to State waters or to land such that there is a likelihood that it would enter State waters, the responsible person in charge must (Reference – Idaho Water Quality Standards, 01.2850 Hazardous Material and Petroleum Products Spills):

a) Stop continuing spills
b) Contain material
c) Department notification required
d) Collect, remove and dispose of the spilled material.

6) For construction of timber bridges or retaining walls, only cromated copper arsenate (CCA) treated wood would be accepted. No creosote or penta treated timber would be allowed (Garten 1991). This would prevent leaching of chemical contaminants.

7) Woods crews would be expected to follow normal backcountry protocol for disposal of human waste. This includes burying fecal matter in a 6 to 8 inch deep hole that is no closer than 300 feet from ephemeral, intermittent, or perennial stream channels. This would prevent the delivery of fecal material to the stream network.

8) Magnesium chloride or calcium chloride for road dust abatement would only be applied under the following conditions to prevent delivery to stream channels:

a) Only the road prism would be treated, **not** the ditchline.
b) The abatement product would **not** be applied within 100 feet of stream crossings.
c) The abatement product would not be applied if rainstorms are occurring or are expected within 24 hours.
d) The manufacturers recommendations for application would be followed.

9) Machinery used for logging and road reconstruction would be steam cleaned and inspected before being hauled to the project area. This would aid in equipment inspections and prevent new infestations of noxious weeds.

Noxious Weeds

1) Purchaser would ensure that prior to moving on to the sale area and between all subsequent moves, all off-road equipment, which last operated in areas with noxious weeds is free of soil, seeds, vegetative matter, or other debris that could contain seeds (CT6.36).

2) Contract provisions would be used to treat haul routes and landings in the project area for noxious weeds.

3) When existing weed infestations are treated within the project area they would be treated according to guidelines established in the Bonners Ferry Weed Control Projects EIS (USDA 1995).

4) All reconstructed roads, and other areas of ground disturbance such as landings and skid trails, would be seeded with a weed free native and desired non-native seed mix and fertilized as necessary as soon after site disturbance as is practical.

Public Health and Safety

1) No burning would be done that is not needed to meet silvicultural, fuel management, or wildlife habitat objectives.

2) Broadcast burning would be done in the spring if possible.

3) Restrictions on prescribed burning for local air quality reasons may be implemented by the Bonners Ferry Ranger District in addition to those imposed by the smoke management monitoring unit.

4) Roads may be watered or otherwise treated to reduce fugitive emissions.

5) During logging activities signs would be posted to inform the public of log truck traffic. This requirement is automatically included in all timber sale contracts.

Road Construction, Reconstruction, Maintenance, and Obliteration

1) A road package would be included with this project for road construction, reconstruction, maintenance, and obliteration. The specific criteria that follows must be applied during project implementation.

2) Reconstruction would be a critical part of all alternatives in order to comply with BMP's and the Forest Plan related to road maintenance and water quality protection. The reconstruction would include increasing pipe sizes or changing design on many of the stream crossings (to safely pass 100 year flood discharges and prevent streamflow diversion), installation of additional relief culverts (to more frequently cross drain the road), bypass dips to prevent streamflow from traveling down road prisms and ditchlines, gabion or bin walls (to stabilize road cutslopes), spot gravelling (to reduce surface erosion - especially near stream crossings), installing graded rolling dips, drivable dips, or drivable waterbars (to cross drain surface water), brushing, blading, shaping, ditch cleaning (to maintain drainage)

3) No new borrow pits would be constructed above the point where the City withdraws water from Myrtle Creek. There are nearby sources of gravel available outside of Myrtle Creek. Within the municipal watershed, there is no need to unnecessarily create new areas of concentrated use by people and equipment.

4) For the purposes of effects analyses, the road obliteration work was not considered to be certain to occur, but would conform to the following criteria if implemented:

   During road obliteration, ***stream crossings*** would be restored using the following design criteria:

   - The width of the excavated channel must include the natural channel bankfull width and floodplain features as indicated above and below the crossing. This restores the natural stream hydraulics and reduces the potential for eroding and rejuvenating the channel side slopes.

   - The slope of the channel must match the original stream grade that existed prior to road construction. The stream grade above and below the crossing, old soil organic layers and stumps, and the presence of streambed materials that are courser than the road fill can be used as indicators (to supplement topographic cues) of the original terrain. Restoring the channel gradient reduces the potential for channel downcutting (scouring) and rejuvenation of channel side slopes.

   - The channel side slopes (breaklands) to the crossing must be returned to natural contour. This helps

promote revegetation and minimizes the potential for sediment production and delivery to the channel.

- As much fill as possible would be removed before displacing and removing or replacing the crossing structure (this applies to reconstruction and obliteration). This reduces the volume of fine sediment that can be entrained by the stream.

- Silt fences, straw bales, and stream diversion/dewatering techniques would be used to minimize turbidity increases. Sediment captured by the traps would be removed before dismantling the traps (this applies to reconstruction and obliteration). This reduces the volume of sediment delivered downstream.

- Uprooted vegetation, logs, straw, seeding and fertilization, plantings, and geotextiles (as needed) would be used to reduce surface erosion and promote revegetation on the recontoured slopes.

- Rock or log grade control structures would be used if desired for fisheries enhancement or to prevent downcutting in situations where the original stream gradient is difficult to determine or re-establish. Log and rock structures must be keyed into the banks a minimum of 3 feet. Logs would be at least 14 inches in diameter. The top of the grade control structures would be the same elevation as the bottom of the restored channel. For log structures on perennial streams, a 3-foot wide piece of filter cloth would be placed and nailed to the upstream side of the log and sealed with bed material.

Road obliteration ***between stream crossings*** would be done using the following criteria:

- The brushing of roads that are grown in with vegetation would avoid cutting below the road surface and would be the minimum width necessary for safe passage of support vehicles. If a dozer is used, the brush would be pushed for at least 200 feet before sidecasting to prevent creating a continuous windrow or berm of slash on the outside edge of the road.

- Natural contours would be restored on all road segments that have unstable fill or cutslopes. The bench portion of the road (usually the inner-half of the total road width including the ditch if present) would be de-compacted by ripping to a minimum depth of 18 inches before placing excavated fill against the cutslope and on the prism. Fill material would not be stacked against seeps that are still present during the summer and fall. If end hauling of material is needed, the Forest Service would approve safe disposal sites. The topographic features of swales and draws would be reestablished if crossed by the existing road prism. This would reduce the potential for road related mass erosion.

- The ditchline would be drained across the road by waterbars that would be no further than 45 feet apart on road segments where the road cut and fill slopes are stable (which is the case more than 95 percent of the road miles). The waterbars would be constructed so that they drain the water off of the road at roughly the same grade as the ditchline and the prism. This often requires that the skew of the waterbar be greater than 30 degrees relative to a direction perpendicular to the direction of travel. The depth between the top of the berm and the bottom of the waterbar would be about 3 feet. The intent of this measure is to assure that the down slope drainage is restored and that the waterbars are self-maintaining.

- Uprooted vegetation, and existing available logs and slash would be scattered on the road prism to reduce surface erosion and promote revegetation, but would not be placed so that it slows the drainage of waterbars.

5) The temporary road would be constructed as an outsloped road that follows the natural terrain. Following use, the purchaser would obliterate this road by restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding if needed. The purpose of this requirement is to minimize potential for increasing sediment production and delivery.

Soils

1) To reduce soil compaction and displacement and to protect residual crop trees, designated skid trails would be required for all ground-based and cable yarding operations (Froehlich, Aulerich, and Curtis, 1981). For watershed protection, no new stream crossings would be constructed.

2) Skid trail distance would average 100 feet or greater on ground skidded units, except where the trails converge to landings and as terrain dictates otherwise. This measure would help assure that no more than 15 percent of the activity area would be detrimentally disturbed per Region-1 soil standards.

3) All skid trail and landing locations would be approved by the Forest Service prior to harvesting and would be rehabilitated as necessary to assure that normal drainage patterns are maintained, and that exposed soil surfaces are seeded or covered with slash. This would minimize the potential for sediment production and delivery.

4) In units KP03, KP05, KP07, MC01, MC02, MC03, MC15, MC17, MC18, MC19, MC24, MC25, and MC26, only existing skid trails would be used or the units would be winter logged to prevent new soil compaction above existing levels.

5) Unit design and location would facilitate logging with a minimum amount of excavated skid trails. Where excavated trails are constructed they would be kept to a minimum and would be obliterated by the purchaser following completion of logging activities. Debris would be placed on top of the obliterated prism.

6) Implement site-specific soil and water conservation BMPs (Appendix C) for units and roads to meet or surpass the level of Idaho State Best Management Practices for watershed protection (all action alternatives). Site-specific practices that meet or exceed Clean Water Act standards would be incorporated into the timber sale contract.

7) To the fullest extent possible, implement restoration or maintenance that improves and enhances resource conditions for soil and water resources (all alternatives).

8) On the dry sites, prescribed burning for slash treatment would only be done during the spring. If fall season prescribed burns are used on the wet sites, the soil moisture must be a minimum of 25 percent. The purpose of this requirement is to avoid creating hydrophobic soils and to maintain the productive and protective soil organic layers.

9) All firelines would be waterbarred with a maximum 50-foot spacing to minimize the potential for erosion and concentration of water.

10) A variety of slash disposal methods would be utilized (underburning, grapple piling, yarding tops, and lop and scatter). To provide for soil nutrients enough slash would be left, in various sizes, to meet coarse woody debris guidelines established by Graham et al (1994) for each given habitat type. Optimally, the slash, except for landing slash would be allowed to cure for at least six months, prior to any mechanical disposal activities, to allow enough time for the bulk of nutrients to leach from the foliage into the soil (Bruna 1994). The decision to use a particular method would be based on individual stand objectives.

11) All landing slash and any scattered grapple piles would be burned after completion of all sale related activities to reduce the risk of accidental ignition during dry periods of the year. They would be burned in the late fall when the risk of escape into adjoining stands and damage to the residual timber is reduced.

Timber Harvesting

1) A variety of ground-based, cable, and aerial yarding systems are used. The system chosen was based on a variety of factors including, but not limited to, resource protection, economics, and current and future access needs. Any on-site changes in logging systems would be made to protect resources.

2) If excavated trails are constructed, they would be kept to a minimum and must be obliterated by the purchaser following completion of the logging activities. The obliteration would include restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding where needed. The purpose of this requirement is to minimize potential for increasing sediment production and delivery.

3) Riparian area protection listed in Practice 14.03 of Appendix C of this document must be implemented. These practices comply with the standards and guidelines in the Inland Native Fish Strategy (INFISH). At present, riparian management objectives would best be met by avoiding harvesting in riparian zones. All alternatives have protection zones that meet or surpass those required by INFISH. Stream protection zones have been shown to be effective in moderating cumulative watershed effects (Belt et al. 1992).

4) There would be no harvesting or ground skidding within the inner gorge of the ephemeral channel dissections within units M02, M04, M06, M07, MC02, MC03, MC06, MC10, MC11, MC13, MC14, MC15, MC16, MC17, MC18, MC22, MC23, MC26, that do not show up well or at all on 1:24000 topologic maps. The hydrologist and fisheries biologist would assist the project forester and marking crew with on the ground identification of the channels that need protected. This would reduce the potential for production and delivery of sediment to the channel network and helps assure consistency with INFISH standards.

5) Ground skidding in units M02, M05, MC02, MC06, MC13, and MC21 would be restricted to winter operating seasons on frozen ground or a minimum of 18 inches of snow. This would minimize ground disturbance and compaction, which could lead to increased sediment production and delivery within the municipal watershed.

6) Mechanical fellers would only be allowed off skidtrails if they travel on 18 inches of snow, frozen ground, or a slash mat (to avoid soil compaction levels that exceed Region 1 standards).

7) Tops would not be yarded. The purpose of the measure is to avoid removing important soil nutrients from the harvested site.

8) A Forest Service representative on all logging operations would conduct a pre-operational meeting. Special conditions of the work would thereby be established in advance (Garten 1991). The purpose of this measure is to make sure that resource protection objectives are clearly communicated and understood by all parties responsible for project implementation.

9) Site-specific practices in Appendix C of this document would be incorporated into the timber sale contract. Specific soil and water conservation BMPs for units, roads, and landings are designed to meet or surpass the level of Idaho State Best Management Practices for watershed protection (based on Forest Plan Monitoring, a review by Seyedbagheri (1996) and the other references cited in this document, and the site-specific knowledge and professional judgment of the district hydrologist).

Vegetation

1) To maintain more open western larch and ponderosa pine forests containing larger trees that were historically associated with these sites, longer rotation ages of at least 150 years would be implemented when even-aged harvest systems are applied. Rotation ages would be documented in the silvicultural prescriptions for each of the stands.

2) Weed and release or slashing treatments would be used in specific units to reduce stocking levels of existing regeneration. No cutting would be conducted within Riparian Habitat Conservation Areas (RHCAs). All slash would be removed from road ditch lines.

3) Any sensitive plant populations identified during project implementation would be protected by modifying the activities.

Watershed and Fisheries

1) Management measures listed under Alternative D of the Inland Native Fish Strategy (INFISH) are applied to all proposed or new projects and activities. This strategy is intended to reduce the risk of population loss and potential negative impacts to aquatic habitat. All of the proposed INFISH standards would be applied to all activities within the project area.

2) No chemical foaming agents would be used in Myrtle Creek above the City water diversion. These agents are often used for controlling prescribed burns, but would be a water quality concern if they were delivered to the stream network.

Wildlife

1) A snag analysis for the Myrtle-Cascade area was conducted and it was determined that as a whole the area exceeds standards in the "Regional Snag Management Protocol" (January 2000) for snags. The District would maintain snag densities by following the guidelines listed Table 2-13.

Table 2-13 – Snag Management Guidelines	
Vegetation Response Unit	**Snags/Acre**
Cool Douglas-fir, warm grand fir types on gentle slopes	4 > 20" dbh
Cool Douglas-fir, warm grand fir types on steep slopes	6-12 total, with 2-4 > 20" dbh
Cool, wet, and dry spruce, grand fir, hemlock and subalpine fir	6-12 total, with 2 > 20" dbh
Low elevation cedar, hemlock	12 total, with 4 > 20" dbh
High elevation spruce, subalpine fir, lodgepole	5-10 total > 10" dbh

This feature has a high probability of being implemented (e.g. contract provisions, administration of contract provision, compliance monitoring), and a moderate to high effectiveness of avoiding and reducing adverse effects on snag dependent wildlife. The Myrtle-Cascade project is expected to maintain more than the minimum number of snags because existing snags would be retained and silvicultural prescriptions would feature retention of large-diameter live trees, especially ponderosa pine and western larch, which can be managed as future replacement snags.

MONITORING

Introduction

The following monitoring would be conducted if any of the action alternatives were implemented. This monitoring is designed to verify that the projects are implemented as designed, and are effective and efficient in meeting project and Forest Plan objectives.

The IPNF has developed a plan to monitor Forest Plan implementation, monitor the effectiveness of management practices implemented under the Forest Plan, and validate the assumptions and models used in planning. The IPNF prepares an annual Monitoring and Evaluation Report to document the results of this monitoring. For activities related to this project, all alternatives would comply with specific monitoring requirements identified by the IPNF Forest Plan.

The length of time that monitoring is needed would be determined by the results and evaluation of what is being monitored. When it is certain that regulations and standards are being met, monitoring of a particular element would cease. If monitoring evaluations show that regulations or standards are not being achieved at the desired level, management intervention would occur.

Monitoring encompasses many activities and administrative processes. The monitoring identified in the monitoring and evaluation chapter of the IPNF Forest Plan does not include all of the monitoring done by the Forest. Monitoring to address other laws, policies and site-specific decisions are part of forest-wide monitoring programs.

Forest Plan monitoring is not designed to validate our effects procedures. It is used principally to monitor changes that affect outcomes and outputs. Predicting the effects from our land management activities depends on research information. A large number of research findings were used for this project (see the List of References in the FEIS, Chapter 7).

IPNF Forest Plan Monitoring

The 1987 IPNF Forest Plan identified twenty-two monitoring items. Because of the nature of some of the monitoring items and the diversity of forest management projects, all these items are rarely monitored on any one project. For Myrtle-Cascade EIS the following IPNF Forest Plan items would be monitored: timber management, wildlife, watershed and fisheries, threatened and endangered plants, soil productivity, and visual quality objectives. The methods used to monitor these are briefly summarized below.

Timber Management: Forest level monitoring to track implementation for the Forest-wide timber management program includes:

- Tracking the status of regeneration on harvested lands to determine if restocking is completed within five years.
- Surveying to determine insect and disease levels and potential for major outbreaks.
- Accumulating and maintaining data on timberland suitability changes recommended by project level planning.
- Accumulating and maintaining data on timber sell levels (actual area and volume sold compared to Forest Plan predicted levels).

Wildlife: Big game management indicator species population trends are determined by using information from the Idaho Department of Fish and Game. Hunter success rates and visual counts of animals are used to determine these population levels.

Northern goshawk nesting sites are currently being monitored. Known nesting sites are being visually inspected to determine occupancy. The monitoring frequency varies based on funding. Surveys are conducted for additional nesting sites during project planning or implementation if nests are sighted.

Grizzly bear and caribou recovery objectives - The purpose is to monitor population changes and habitat effectiveness of grizzly bear and mountain caribou and to determine if recovery objectives are being met. Information on populations is collected from state fish and game departments and from the U.S. Fish and Wildlife Service. This information includes population estimates and mortality data. Records of habitat effectiveness as calculated through biological evaluations or assessments are maintained. The square miles of secure habitat in each bear unit is tracked annually.

Threatened, Endangered and Sensitive Plants: IPNF direction is to inventory and manage sensitive plants so that no new species have to be listed as threatened or endangered. Suitable sensitive plant habitat in project areas is surveyed and projects are modified to attain this objective. Sensitive plants are protected according to site-specific management plans developed by the Forest or District Botanists.

Soils: IPNF standard is to maintain 80 percent of an activity area in a productive condition for growing trees and other managed vegetation. To assist in meeting this direction, one timber sale per year on each district is monitored. Recommendations stemming from this monitoring and evaluations are made for the project being monitored and for forest wide practices in general.

Water Quality: Forest Plan Appendix JJ established the IPNF water quality monitoring program. The water quality monitoring program is the result of a Memorandum of Understanding with the State of Idaho dated September 19, 1988. The agreement also replaced Forest Plan Appendix S (Best Management Practices) with Forest Service Handbook 2509.22 (Soil and Water Conservation Practice Handbook).

According to Appendix JJ of the Forest Plan, in order to demonstrate water quality protection, monitoring plans would address three primary questions:

1. Are BMPs implemented as designed?
2. Are the BMPs effective in controlling non-point sources of pollution?
3. Are beneficial uses of water protected?

To provide answers to these questions, the following monitoring categories would be utilized:

Baseline monitoring characterizes existing water quality conditions and long-term trends of stream systems. It also provides a control for monitoring and assessing activities. Baseline monitoring sites throughout the Forest have been identified and established to representatively sample conditions on the Forest.

Implementation monitoring shows whether or not prescribed BMPs were implemented as designed and in accordance with Forest/Project Plan standards and guidelines. In addition to specific project monitoring discussed in this document, supplemental implementation monitoring would include internal field reviews by interdisciplinary teams using a procedure similar to State audits.

Specific projects to be monitored would be selected based on local issues and BMPs used. Projects involving each type of land management activity and a target of 10 percent of timber sales would be evaluated per year. The primary objective would be to determine if BMPs identified in the Forest/Project plan were implemented and correctly applied in a timely fashion. During the review, visual observations would be made to see if BMPs and Forest/Project plan standards and guidelines are effective.

In the event of incorrect or inappropriate application of BMPs, or omission of prescribed BMPs, causes would be identified along with corrective or preventive actions to be taken. Corrective measures would be incorporated into:

1. modification of and adjustment to contracts;
2. administrative procedures; and
3. long-range plans as necessary to ensure BMPs are both properly designed and implemented.

Effectiveness monitoring demonstrates if BMPs were effective in controlling pollutants to meet planned levels or resource management objectives. The intent is to focus on cause and effect relationships between land management activities and water quality. Effectiveness monitoring would be done on a sample basis to characterize typical conditions so that results can be extrapolated. Emphasis would be on major non-point pollution source contributing activities such as road construction, reconstruction, and maintenance; related erosion control BMPs; and riparian area management.

Fisheries: There were originally three fisheries monitoring items when the forest plan was adopted. Later, two of these were combined.

Greater than 80% of potential emergence success: This item was monitored during 1988 and 1989. The findings were that it was not a good monitoring tool to use to report on the health of streams. The decision was made to combine this monitoring item with the one that follows on validation of fish habitat trends.

Validate fish habitat trends: The purpose of this monitoring is to evaluate the impacts of forest management activities on fish habitat. Stream surveys are conducted at both the project and forest level. These surveys evaluate pool conditions, habitat complexity, spawning substrates, etc. Some of these surveys are only conducted once, while others have been surveyed multiple years at the same location. In addition we collect information on substrate size, which can be used as a surrogate for fish habitat quality. Over 400 streams have been surveyed on the IPNF since 1988.

Fish population trends: The objective is to determine the trend in fish populations for important streams. In conjunction with the Idaho Fish and Game Department annual surveys are conducted of a subset of streams on the IPNF. The primary focus of these surveys has been westslope cutthroat and bull trout. Some of these surveys are only conducted once, while others have been surveyed multiple years at the same location. Surveys for bull trout have focused on the Priest, Pend Oreille and St. Joe basins. Extensive surveys for cutthroat trout have been conducted in the Coeur d'Alene basin.

Visual Quality: Decision documents are reviewed annually for Forest Plan visual quality objective compliance. Annually, up to two sales per district may be field reviewed after harvesting has been completed. The objective of the field review is to determine if the (Visual Quality Objectives) VQOs have been met as disclosed by the decision document for that sale. A ten percent departure from Forest Plan direction after five years would initiate further evaluation of the visual resource management program.

Project Monitoring

In addition to Forest Plan monitoring, monitoring is conducted on specific projects to ensure that implementation is consistent with the established standards and guidelines. Monitoring is also conducted to determine the effectiveness of management activities and applied mitigation measures. Specific monitoring developed for the project includes:

Municipal Watershed Monitoring

The Forest Service, in cooperation with the city of Bonners Ferry, would monitor turbidity in selected streams that are adjacent to proposed harvest units where ground-based harvest systems would be used. Baseline data would be established in the spring prior to commencement of harvest operations. Turbidity samples would be evaluated by the city at their water treatment plant. Monitoring would continue until all ground-based units are harvested, or until the Forest Service and the city agree that monitoring is longer necessary due to observed trends. In addition, the city of Bonners Ferry continuously monitors the raw water quality of Myrtle Creek. If any sedimentation problems occur the city would contact the State Forest Practices Act advisor, the Forest Service, or both, to determine the source.

Implementation Monitoring

Project implementation generally involves the efforts of a variety of individuals with both specialized and general skills and training. Employees are accustomed to working together to achieve the desired project objectives. For example, it is common for a sale preparation forester or sale administrator to discuss specific

ground or project conditions with the wildlife biologist or hydrologist to apply the best practices on the ground. Joint field reviews are taken as needed. These steady informal communications allow for incremental project adjustment throughout implementation to achieve the desired results. In addition to these less formal monitoring procedures, the following monitoring items would be conducted.

Air Quality: When burning timber harvest residues (slash), smoke management guidelines would be followed as prescribed in the Idaho Smoke Management Memorandum of Agreement (1990), the North Idaho Cooperative Smoke Management Plan (1990), and the Washington State Smoke Management Guidelines. The portion of Idaho north of the Salmon River has been divided into three airsheds. Each airshed has a coordinator responsible for reporting all planned activity to a monitoring unit. The monitoring unit regulates the prescribed burning activities of all participants in the program. The Idaho Division of Environmental Quality recognizes this process as Best Available Control Technology for prescribed burning.

Air quality is monitored by the North Idaho and Montana Airshed Groups during the Fall burning season and yearlong by the Idaho Department of Environmental Quality and the Washington Department of Natural Resources. Burning is permitted by these organizations only when air quality, atmospheric conditions and proposed prescribed burning amounts and locations would allow smoke production to be in compliance with the Clean Air Act. Burn Bosses also may restrict burning when air quality is judged poor.

Local airshed coordinators are notified annually of all planned fall burning. One day prior to burning, the coordinator is notified that burning is scheduled. Prior to ignition, the burn boss determines if burning the unit is within the smoke management guidelines before making a decision to proceed. If there is a restriction on burning, the restrictions are followed in accordance with direction from the local airshed coordinator. The Airshed Group's restriction procedures enable the Monitoring Unit to reduce burning, stop burning in specific areas, or cease burning entirely when meteorological or existing air quality conditions so warrant. (North Idaho Cooperative Smoke Management Plan, July 1990). Restrictions on prescribed burning for local air quality reasons may be implemented in addition to those imposed by the smoke management monitoring unit.

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

Timber Management: Each active harvest unit would be visited at a frequency necessary to assure compliance with the timber sale contract. Minor contract changes or contract modifications would be enacted, when necessary, to meet objectives and standards on the ground.

Water Quality: The Forest Service would monitor the implementation of applicable BMPs and mitigation measures (site specific BMPs). Monitoring would be documented in BMP inspection reports by the district hydrologist. The completed reports are given to the forest hydrologist, who forwards them to the State Bureau of Water Quality on an annual basis.

The timber sale administrator and the engineering contracting officer representative (COR) would assure that timber and road (reconstruction and obliteration) contract specifications are followed. The district hydrologist would also provide technical assistance and review as needed.

Fuels Treatment: The fuels treatment prescriptions and accomplishments are entered into the TSMRS database; also, walk through surveys are normally conducted after the work is completed.

Effectiveness Monitoring

Timber Management: Units that are treated with a regeneration harvest would be surveyed at one, three, and five years following planting to certify regeneration. (KV-funding assured through timber sale base rates to comply with National Forest Management Act).

Water Quality: BMP effectiveness would be monitored following at least one runoff season after BMP implementation. Watershed rehabilitation projects typically are monitored annually or biannually for effectiveness and maintenance needs. Monitoring would be correlated with watershed exams on the sale area through the 5th year after project implementation based on available funding.

Old growth: Verify applications of harvest prescriptions to determine if they are in compliance with measures to protect old-growth integrity (e.g. vegetative screens or shields) and to determine if predicted results were achieved (post treatment).

Snag Retention: A sample or portion of treatment units would be surveyed to evaluate the influences of forest management practices on wildlife tree retention practices and determine if predicted or stated objectives were achieved.

Noxious Weeds: Pretreatment of roads (C6.27) and equipment cleaning (C6.36) would be documented on sale inspection reports. The effectiveness of seeding disturbed areas would be evaluated upon completion of the activity.

Access Management: Proposed road obliteration work would be monitored during the implementation phase of the project and following the project to determine the effectiveness of obliteration methods.

CHAPTER 3 - AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the current condition of the resources as related to the significant issues. These significant issues represent components of the environment that would affect, or that could be affected by the alternatives if they were implemented. Much of the information in this chapter is tiered directly to the IPNF North Zone Geographic Assessment (GA). The North Zone geographic area consists of approximately one million acres (Bonners Ferry, Sandpoint, and Priest River Ranger Districts) of the northern portion of the IPNF. Assessments of individual sub-basins (essentially ranger districts) were also conducted. For this document the Kootenai River sub-basin refers to the Bonners Ferry Ranger District (BFRD) and accounts for roughly 400,000 acres. One of the primary goals of this project was to assess the changes in forest composition (what the forests are made up of), forest structure (how things are arranged in the forest), and forest disturbance processes (primarily fire and timber harvest) over time. When changes in historic conditions are compared to current conditions management options could be developed. The existing conditions of the components described in this chapter are also pertinent to the resource issues described in Appendix A.

Changes Between the Draft and Final EIS

The DEIS, page 3-5, Figure 3-3 included only Forest Plan allocated old growth for a total of 17% existing old growth. The FEIS includes allocated and non-allocated old growth as part of the total old growth component. This change is reflected in this chapter, Figure 3-3. Additionally, the existing condition for sediment production, "Watershed and Aquatics Resources", Tables 3-5 and 3-6, in the watershed CEA has been updated to reflect changes from logging that occurred on private land in the summer of 2000.

FOREST VEGETATION

Forest Disturbances

The forested hillsides in the analysis area are composed of a wide range of vegetation in various structural conditions. As everywhere, they have changed and will continue to change through time. Various influences have contributed to these changes, both natural and man-caused.

Prior to European Settlement - Fire is the major disturbance factor that produces vegetation changes in our ecosystems. If the role of fire is altered, or removed, this will produce significant changes in the ecosystem. Fire has burned in every ecosystem and virtually every square meter of the coniferous forests and summer-dry mountainous forests of northern Idaho, western Montana, eastern Washington and adjacent portions of Canada. Fire was responsible for the widespread occurrence and even the existence of western larch, lodgepole pine, and western white pine. Fire maintains ponderosa pine throughout its range at the lower elevations and kills ever-invading Douglas-fir and grand fir (Spurr and Barnes 1980). Many ecosystems are regularly recycled by fire; life for many forest species literally begins and ends with fire.

In the discussion that follows "severity" refers to the amount of damage a fire actually causes and "return interval" refers to how often a particular type of fire occurs. Here is a summary of the types of fires that occur in forested ecosystems:

- **Non-lethal fires** - fires that kill 10% or less of the dominant tree canopy. A much larger percentage of small understory trees, shrubs and forbs may be burned back to the ground line. These are commonly low severity surface and understory fires, often (but not always) with short return intervals (few decades).

- **Mixed severity fires** - fires that kill more than 10%, but less than 90% of the dominant tree canopy. These fires are commonly patchy, irregular burns, producing a mosaic of different burn severities. Return intervals on mixed severity fires may be quite variable.

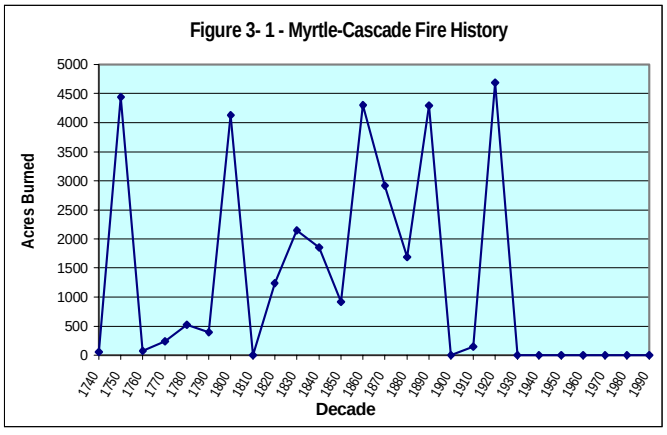
- **Lethal fires** - fires that kill 90% or more of the dominant tree canopy. These are often called "stand replacing" fires and they often burn with high severity. They are commonly (but not always) crown fires. In general (but not always), lethal fires have long return intervals (140-250+ years apart), but affect large areas when they do occur. Local examples of these types of fires would be the Sundance and Trapper Peak fires of 1967 that burned over 80,000 acres in a relatively short time period.

Human influence has likely been felt in the Myrtle-Cascade area for centuries. Archaeological research on the Kootenai River suggests that the Kootenai Indians have inhabited parts of the landscape for at least 3,000 years, and probably much longer (Choquette and Holstine, 1980). The Kootenai inhabited a territory that included the entire drainage of the Kootenai River in Canada and the United States. The area between the Montana-Idaho border and the summit of the Selkirk Range and between the International Boundary and the divide between the Kootenai and Pend Oreille drainages was part of the territory of the Lower Kootenai (Chatters, 1992).

The Lower Kootenai Indians burned parts of the ecosystem in which they lived to promote a diversity of habitats. They tended to burn during different times of the year, sometimes in the early spring or summer, while at other times in the fall after the hunt and berry-picking season was over. Hardly ever did they purposely burn during mid-summer when the forests were most vulnerable to catastrophic wildfire. Often the Indians burned selected areas yearly, every other year, or as long as five years (Chatters, 1992).

Since European Settlement - Since European settlement in the area the landscape has undergone substantial changes. Three main factors have contributed to these changes: fire suppression, past logging practices, and the white pine blister rust fungus (Zack, 1995).

Firefighting effectiveness increased in the 1940's and the 1950's with additional fire suppression dollars, which allowed for the increased use of trained firefighting crews, smokejumpers, airplanes, helicopters and bulldozers (Clark and Sampson, 1995). The last significant fire occurred in the Myrtle-Cascade area occurred in 1926. Prior to 1926 roughly 1,300 acres burned every decade in the Myrtle-Cascade area (Figure 3-1). Over the last seventy years there have been dozens of fire starts in the project area, but the largest fire grew to only 5 acres. The majority of fires during this period were less than one acre.



Extensive timber harvest activity occurred in the late 1950's in the upper end of the Myrtle Creek watershed. Logging continued on both National Forest and private lands (Pack River Co.) in upper Myrtle Creek until the early 1960's. The type of cutting was an even mixture of regeneration harvesting (clearcut and seed tree) and selective harvesting (economic high-grading). Harvesting on National Forest land was curtailed until the 1980's. Periodic harvesting has continued on private land up to the present. These private lands are now owned and managed by Crown Pacific. The Cascade Creek area is predominantly in National Forest ownership. The majority of timber harvest in the Cascade area occurred in the late 1960's and early 1970's when several large clearcuts (100-200 acres) were implemented.

The final factor is the white pine blister rust fungus. It was first detected in western North America in 1921 in Vancouver, British Columbia (Boyce 1961), and in northern Idaho in 1927, near Priest River (Forest Land Use Plan, 1975). This fungus has killed, and is still killing white pine trees, from seedlings to old growth veterans, not only in the assessment area, but also throughout its range.

Forest Habitat Types

The following forest types are unique in some way. These forest types are based mostly on their similarities in forest character, climate and moisture regimes, and natural disturbance processes (primarily fire).

Dry forests - These forest types consist primarily of Douglas fir, ponderosa pine, western larch and grand fir and represent 11% of the project area. Historically these sites maintained grassy and open park-like stands of large, old ponderosa pine (Fischer 1987) with larch mixed in on the moister end of these sites. Prior to European settlement light underburns that occurred every 25 years on the average (O'Laughlin, et al 1993; Mutch, 1993) were common and maintained these open stand structures. Mixed severity fires and stand replacing fires were relatively infrequent in pre-settlement times in these dry forest types.

Moist forests - These forests are dominated by a mixture of conifer species (western red cedar, western hemlock, western larch, Douglas-fir, grand fir, western white pine, lodgepole pine, etc) and account for 45% of the forests in the project area. These are the most common forest types on mid-elevation sites in the mountains of the northern Idaho panhandle. Prior to the introduction of blister rust, when white pine was a dominant species, this was known as the "white pine type." Currently, less than 1% of the project area is composed of stands where white pine is the dominant overstory tree.

These forests are very productive and prior to European settlement tended to accumulate large amounts of biomass (the collection of all the living plant in a forest) in the relatively long intervals (average 200+ years) between stand replacing fires. Sometimes, low-severity fire occurred two to three times as often as either moderate- or high-severity fire (Smith and Fischer 1997). Because presettlement intervals between severe fires were generally long in these forest types, the effects of fire exclusion are subtle. However, exclusion of low- and mixed- severity fires over the past 70 years has reduced ecological diversity and an increased homogeneity (stands of similar size, age, species composition, structure, etc.) across the landscape (Smith and Fischer, 1997).

Cool-Moist forests - These forests are dominated primarily by subalpine fir and Engelmann spruce and represent 35% of the project area. These forests are characterized by cool and moist conditions. In presettlement times, the average interval between stand-replacing fires in these stands was 174 years. Very wet sites are found in forested riparian areas along streams and wetlands. These sites are very difficult to burn

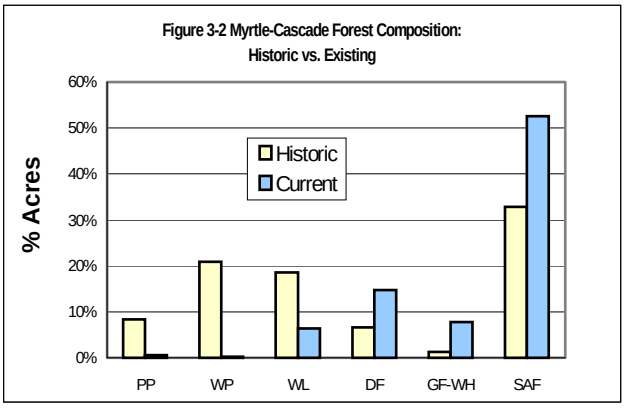
except during extremely dry conditions. Since the period of effective fire exclusion in these stands (100 years since the last significant event) is less than the historic fire return interval (174 years), fire exclusion has not measurably altered the structure and composition of these stands. However, variety in stand structure and fuels across the landscape, created historically by mixed-severity fire and occasional severe fire, has probably decreased. Roughly 75% of these forest types in the project area are in a mature to overmature condition that is increasing the dominance of climax species (i.e., subalpine fir) and therefore increasing the possibility of root disease centers and increased continuity of fuels (Smith and Fischer 1997).

Cold-Dry forests - Generally, these forest types are located at higher elevations and are characterized by harsher and more restrictive growing environments. Consequently, the forest canopy is partially open in many mature stands. Older stands are dominated by subalpine fir. Younger stands are dominated by lodgepole pine or by a mixture of lodgepole pine, Englemann spruce, and Douglas-fir. Western larch, grand fir, and western white are less prevalent. At higher elevations whitebark can dominate along with lodgepole pine. Historically, stand-replacing fires occurred at average intervals ranging from 52 to 200 years or more. Stand replacing fire occurred less frequently at high than low elevations because of slower tree growth and less continuous fuels at high elevations (Barrett 1982; Green 1994). Low severity and mixed severity fires also occurred every 30 to 50 years on average (Smith and Fischer 1997). Where fire has been excluded successfully over large areas, more area is in mature stands than prior to European settlement. Historically, low-severity fires served to break up fuel concentrations and increase forest diversity across the landscape in these forest types. Because of these changes, modern-day fires may be more likely to burn severely over large areas than those in presettlement times. These forests account for roughly 4% of the Myrtle-Cascade landscape.

Other Types - Other miscellaneous habitat types are found within the project area, but represent a minor component of the all the forested communities. Non-forested types (alpine meadows, low elevation grasslands and shrubs, rocky areas, lakes, creeks, etc.) represent about 5% of the project area.

Forest Composition

The composition of a forest changes over time. Historically, fire was the primary ecological process that determined forest composition. The last major fire in the Myrtle-Cascade area was in 1926. Since fire has in effect been removed from the ecosystem for over 70 years forest composition has been determined mostly by fire suppression and timber harvest. As a result, significant changes in forest composition have occurred in the Myrtle-Cascade area as displayed in Figure 3-2. These changes in forest composition parallel changes that have occurred across the IPNF North Zone and the Kootenai River sub-basin. The following is a summary of the changes in forest composition in the Myrtle-Cascade area:



1) The percentage of long-lived seral species has decreased significantly:
   - White pine has ***decreased*** from greater than 20% to less than 1%
   - Ponderosa pine has ***decreased*** from over 8% to less than 1%

- Western larch has ***decreased*** from almost 19% to just over 6%

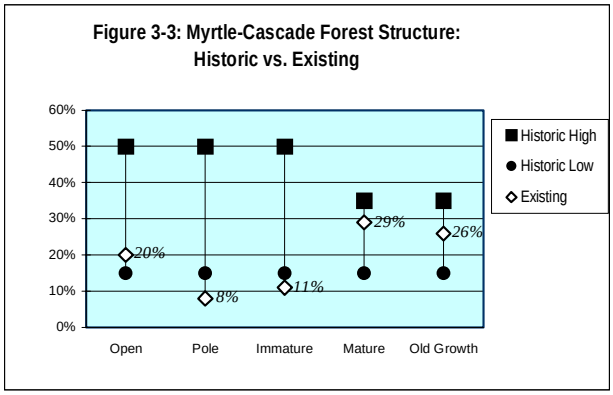
2) The percentage of shade-tolerant and climax species has ***increased*** significantly:
   - Douglas-fir has ***increased*** from less than 7% to almost 15%
   - The combination of grand fir and hemlock has ***increased*** from just over 1% to almost 8%
   - Subalpine fir has ***increased*** from almost 33% to almost 53%

These changes in forest composition have significant implications. The shade tolerant species that now dominate the landscape tend to be much less resistant to fire, insects, and disease than long-live seral species they have replaced. These shade-tolerant species also tend to "hog" nutrients in their foliage, such as potassium, that trees need for disease resistance.

Forest Structure

Prior to European settlement forest structure was determined mostly by fire. Fires served to break the landscape into various forested characteristics. For this analysis the forested landscape has been broken into the following structural classifications: 1) openings, 2) pole timber, 3) immature forests, 4) mature forests and 5) old growth. Once again, since fire has in effect been removed from the ecosystem for over 70 years forest structure has been determined mostly by fire suppression and timber harvest. Figure 3-3 displays current forest structure as compared to the estimated historic ranges (North Zone GA) of each structural class. The following is a summary of the changes in forest structure in the Myrtle-Cascade area:

Figure 3-3: Myrtle-Cascade Forest Structure: Historic vs. Existing

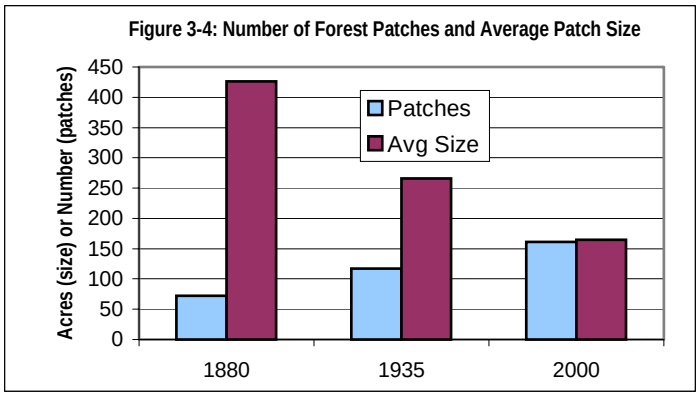


- The current distribution of forested openings (20%) falls ***within*** the historic range (15-50%), but on the lower end of the range
- The current distribution of pole-sized timber stands (8%) falls ***outside*** and slightly ***below*** the historic range (15-50%)
- The current distribution of immature timber stands (11%) falls ***outside*** and slightly ***below*** the historic range (15-50%)
- The current distribution of mature timber stands (29%) falls ***within*** historic range (15-35%).
- The current distribution of old growth timber stands (26%) falls ***within*** the historic range (15-35)

The distribution of old growth forests varies across landscape scales. Historically, an estimated 15-35% of all Idaho Panhandle North Zone forests were composed of old growth. Currently, 14% of the North Zone forests are composed of old growth, slightly below historic levels. In the Kootenai River sub-basin, old growth forests total 17% of the forested landscape, while old growth accounts for 26% of the Myrtle-Cascade forests. Both of these levels fall within the estimated historic range.

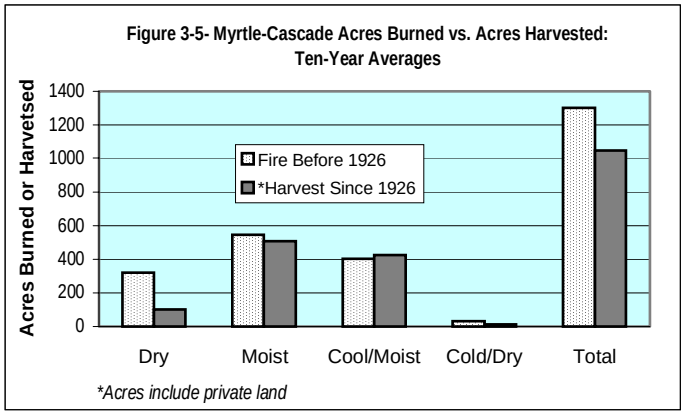
Finally, using historical records (aerial photos, maps, surveyor notes, etc.) the District was able make some general characterizations about forest vegetation at three different points in time: 1880, 1935 and 2000. As shown in Figure 3-4 considerable changes in landscape structure have occurred over time. In 1880, it is

estimated that forest consisted of just over 70 distinctive forest patches (e.g., old growth, forest openings, etc.) averaging over 400 acres per patch. By 1935 the number of distinct patches had grown to nearly 120 and average patch size had decreased to about 260 acres. Currently, in the year 2000, the number of patches has grown to over 160 and average patch size has further decreased to about 165 acres. These changes in landscape structure are due primarily to fire suppression and timber harvest. Historically, large-scale fires burned vast acreages of forests creating a landscape composed of fewer distinct patches, but relatively large average patch sizes. Conversely, timber harvesting in the project area, coupled with fire suppression, has created a landscape mosaic of increased number forest patches and decreased average patch size.



CONCLUSIONS

Dry forests have experienced the greatest ecological change - Significant ecological changes in the Myrtle-Cascade area have occurred with fire suppression and extensive timber harvest (primarily in the upper ends of both the Myrtle and Cascade watersheds). Figure 3-5 displays the estimated number of acres that burned each decade before 1926 and the number of acres that have been harvested since 1926. Given that fires have essentially been eliminated from the area since 1926 changes in forest structure and composition over the past 70 years have come mostly from timber harvest. Figure 3-5 shows that the number of acres harvested in the moist and cool/moist forest types since 1926 is similar to the acres burned before 1926. This has not been the case in the dry, or the cold/dry forest types. Changes in forest composition and structure are probably more significant in the dry forest types since they account for a much larger percentage of the project area than the cold/dry forests. Given the average fire return interval of 25 years these forests could have burned as many as three times since the last major fire in 1926. An historic study of some of these types in western Montana illustrates some of the changes that have occurred in our dry forests. Prior to 1900 these western Montana sites may have supported an average of 27 trees per acre, with ponderosa pine and western larch dominating. Historically, these thick-barked pine and larch withstood frequent low intensity fires. Total density of trees greater than three inches diameter at breast height (DBH) averaged 43 trees per acre (TPA). In 1984 these sites western Montana supported 211 TPA larger than 3 inches and Douglas-fir dominated every size class except the largest (Habeck 1985). Stands on similar forest types in the Myrtle-Cascade analysis area average 253 TPA greater than 3 inches DBH.



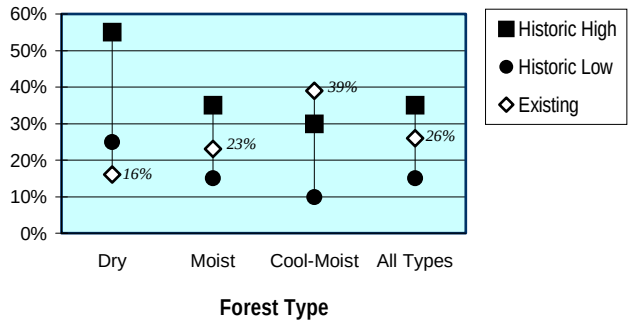
Western white pine is missing - Blister rust has taken its toll on western white pine throughout north Idaho. The Myrtle-Cascade area is no exception. This species was once a significant component of the moist forest types. Now shade tolerant species such as Douglas-fir, grand fir, western hemlock, and western red cedar

dominate areas where western white pine once thrived. These changes in forest composition have some potentially significant effects in today's forests. Conversion of tall, well-spaced white pine to low, densely stocked fir results in hazardous fuel ladders. Thus, significant changes in fire behavior are also characteristic of modern-day, moist interior forests. Such changes in fire behavior threaten future fire control and place neighboring forest ecosystems at risk (Harvey 1994).

The amount of pole-sized and immature timber stands in the Myrtle-Cascade area is less than the estimated historic levels. In particular, these types of forest structure are well below estimated historic levels in the cool-moist and cold-dry forests. Given that the last major fire in the area was in 1926, and extensive timber harvest did not begin until the late 1950's (a period of over 30 years), this may explain the lack of pole-sized and immature forests, and the abundance of mature forests in the area. Based on district fire history studies it was typical for 3,000 to 7,000 acres to burn every 30 years in the area prior to 1926.

The amount of old growth in the Myrtle-Cascade area falls within the historic range, but the composition, structure, and distribution of old growth has changed. Old growth white pine, larch, ponderosa pine, and whitebark pine have all suffered major declines, and unlike the historical condition, today comprise little of the remaining old growth. A large proportion of the old growth that remains is composed of hemlock, subalpine fir, Douglas-fir, and grand fir. There is also a significant amount of old growth cedar, but probably less than there was historically. For old growth stands dominated by Douglas-fir, hemlock, and grand fir, there are serious doubts about the long-term stability or sustainability of these forest types as old growth under northern Idaho climatic regimes (North Zone GA). Of primary concern is the reduction of old growth in dry forest types. In these forest types the amount of old growth is significantly lower than estimated historic levels (Figure 3-6). Based on estimates from the North Zone GA, 40% of these forests were in old growth historically, with a range of 25-55%. Current levels of dry site old growth in the Myrtle-Cascade area are well below the estimated historical average and outside the historical range. Not only is there less dry-site old growth in the Myrtle-Cascade area, but the composition and structure of this old growth has changed significantly. To meet Forest Plan minimum requirements dry-site old growth stands must be at least 150 years old and contain at least 8 trees per acre (TPA) greater than 21 inches in diameter. The dry-site old growth stands in the project area meet these requirements, but they are also densely stocked with small diameter Douglas-fir and grand fir, which threaten the integrity of these old growth forests. With no treatment these stands would continue to meet the minimum Forest Plan old growth standards for size and age. However, with continued fire suppression and no mechanical treatments to reduce natural fuel loads, the risk of catastrophic fire would increase over time in these old growth forests. Such a fire would not only kill invading grand fir and Douglas-fir, but also the old, large-diameter, ponderosa pine and larch that are providing the old growth structure of these stands. Returning fire into these dense stands, or those with understory (ladder) fuels, could fatally damage already stressed overstory trees. Even without catastrophic fire, competition from Douglas-fir and grand fir, which tend to "hog" water and nutrients on these sites, would eventually kill the older pine and larch. Furthermore, pine and larch would not be able to regenerate under a dense canopy of Douglas-fir and grand fir, even if there were a seed source of ponderosa pine and larch. For these reasons, restoring ponderosa pine forests to more healthy and

Figure 3-6: Myrtle-Cascade Old Growth by Forest Type: Historic vs. Existing



sustainable conditions will generally require some kind of silvicultural cutting (Hardy and Arno, 1996). These conclusions are consistent with ICBEMP findings (1996) for north Idaho forests where open grown, large-diameter, ponderosa pine and larch forests have been replaced with dense stands of small-diameter Douglas-fir and grand fir. The net result is a decrease in forest diversity throughout dry-site forests in north Idaho.

As displayed in Figure 3-6 the amount of moist forest (cedar/hemlock) old growth in the project area is well within the estimated historic levels. Although the amount of moist forest old growth falls within the historic range there have been significant changes in this old growth type. First, the North Zone GA determined that this old growth type has been significantly fragmented resulting in smaller old growth patches. Secondly, white pine, once a major component in these old growth types, is now missing. Finally, western larch continues to decline as a significant component in these old growth types.

Currently, 39% of the cool-moist forest types (spruce/fir) are composed of old growth. This amount of old growth is outside the estimated historic range of 10-30% for this species, and far exceeds the historic average of 21%. Given that these old growth forests are dominated by subalpine fir and Engelmann spruce the risk of flammability and vulnerability to insects and disease will continue to increase over time (Covington et al, 1994). Consequently, the ability of the ecosystem to sustain such high levels of this type of old growth is somewhat doubtful in the long-term.

Further compounding matters is that the composition of the forests that make up most of the mature size classes make it unlikely that historical old growth composition or amounts will be restored anytime soon. Most of the mature size classes are composed of Douglas-fir, subalpine fir, cedar, hemlock, grand fir, and grand fir. Under current climatic and disturbance regimes it is not likely that enough of these mature forests will survive long enough to restore old growth to historic levels. There is also very little white pine, larch, and ponderosa pine in these mature size classes in the project area, so those old growth types are not likely to recover to historical levels within the next few decades.

Other functions - Forest composition and structure in a large part determine the function of a variety of wildlife habitats, as well as the hydrologic functions in a watershed. Forests that are managed within their historic ranges in terms of composition and structure are more likely to meet the habitat needs of the species that have evolved under these ranges, and maintain their hydrologic function.

Change is inevitable - We taught the public we should and can control all fires with people, planes, helicopters, and retardants. We need to return a more natural view that all fires are not stoppable in the same sense that we cannot stop hurricanes, earthquakes, floods and other natural events (USDA, 1995). After nearly a century of wildfire control and prevention, the threat of large damaging wildfires has increased in many ecosystems throughout the Pacific Northwest (J.Lehmkuhl, et.al. 1993). It is unlikely that it would be socially acceptable to allow fire to assume the role it played historically in the area. With fire excluded from playing its normal role of stand maintenance and forest regeneration, some mechanism is required to assume this role. Therefore, silvicultural treatments and prescribed burning can be used to create stand conditions that are less susceptible to highly volatile fire events. These treatments would not be designed to eliminate the occurrence of fire, but reduce the severity of fires when they do occur and make them more manageable.

Desired Conditions

The desire is to trend the area toward forest composition and structure levels that existed historically in the area. Specifically:

- Create stand conditions that favor development of seral tree species (larch, ponderosa pine and white pine) and reverse the trend toward dominance by mid and late successional species (Douglas-fir, grand fir, cedar, and hemlock). This can be done by creating forest openings that promote the establishment of these species, or by maintaining the dominance of these species where they are currently a significant component.

- Increase structural diversity by trending some of the overabundant mature forests toward old growth and others into forest openings that would grow into pole-sized stands early in the next century.

- Reduce the number of densely stocked closed canopy stands in the Myrtle-Cascade area. While these types of stands certainly existed historically, they now dominate the landscape to the point where open grown stands of ponderosa pine, western larch, and white pine are virtually non-existent.

FSH 2409.17 Interim Directive No.1 states, "Harvest cutting is done to carry out the intent of the Forest Plan. The objective of harvest cutting is two fold: 1) develop and maintain desired forest conditions over time and 2) utilize the timber resource. These objectives are not exclusive. Both must be considered when applying a harvest cutting method." Specific silvicultural operations can be used to create the desired stand structures and biomass accumulations within each stand. These operations include:

- control of tree density and species composition;

- salvage of dead and dying trees to reduce the amount of carbon on the site - and reduce the potential for unplanned fires and reburns;

- site preparation to reduce undesired fuel, soil, or vegetation conditions; - competition control to encourage targeted species and avoid excesses or non-targeted species

- productivity enhancement through fertilization, which may also increase tree resistance to insects and diseases;

- gene management for trees, shrubs, and herbs to develop races which are resistant to introduced pests (Oliver et al. 1994).

WOODLAND CARIBOU

Habitat Requirements

The population is generally found above 4500 feet elevation in the Selkirk Mountains in Engelmann spruce/subalpine fir and western red cedar/western hemlock forest types. They are highly adapted to upper elevation boreal forests and do not occur in drier low elevation habitats except as rare transients. Seasonal movements are complex in this population and normally occur as altitudinal patterns moving to traditional sites for different seasons (USDI 1994, Allen 1998a).

Reference Condition

The Selkirk caribou population was emergency listed as Endangered in 1983 and a final ruling of its status appeared in the Federal Register in 1984 (USDI 1994). The recovery area for the population is located above 4,500 feet in the Selkirk Mountains of northern Idaho, northeastern Washington and southern British Columbia, Canada.

Existing Condition

As part of the plan for recovery, caribou were transplanted into the U.S. portion of the recovery area from source populations in British Columbia. It was hoped that this would result in creation of one or more herds in the ecosystem that could interbreed, but would generally function as separate caribou populations. Given the varying levels of access, habitat condition, land ownership and associated differences in land management emphasis across the recovery area, the necessity of having more than one herd for long-term viability of the 'southern Selkirk population' was deemed very important to the herd's recovery (USDI 1985). Subsequent efforts to meet this goal included three releases in Idaho (i.e. 1987,1988, 1990) to establish the 'Two Mouth Lakes' herd, two releases into Washington (i.e. 1995 and 1996), and one augmentation effort of the original B.C. 'Stagleap' herd (i.e. 1999). By 1990, the ecosystem-wide population (i.e. Stagleap and Two Mouth Lakes herd) had increased to approximately 55 to 70 animals. The population remained somewhat stable through the early 1990's but declined over the next decade as a result of predation by mountain lions and bears as well as additional mortalities from unknown causes. Caribou numbers continue to vary annually, and have been regularly followed with annual censuses and monitoring of radio-collared animals. The Two Mouth Lakes herd has consisted of only 3 individuals since 1999 (W. Wakkinen's 1999-2001 census).

Some 68.0 % of the project area is within the woodland caribou recovery area. During the late 1980's and early 1990's, the Two Mouth Lakes herd home range was situated along a portion of the Selkirk Mountain crest that included the headwaters of Myrtle, Ball, Two Mouth, Lion, Long Canyon, Pack, and Smith Creeks. Caribou use within the project area during the last 13 years included consistent occupancy of the Slide, Peak, and Jim Creek drainages, as well as use of the Brooks and Little Harrison Lakes, from 1987-1994. Newly released caribou used the Mack, Burton, and Lost Creek basins in 1987-1988, and a caribou calved along the ridgeline above Mack Creek in 1990. Currently, the existing Two Mouth Lakes herd (n=3) uses areas just outside of the project area (i.e. Two Mouth Lakes and upper Pack River), although there are animals within the recent Washington augmentation group that occasionally travelled to the Myrtle Creek area in the last 4 years (J. Almack, pers. comm. 1997).

The Myrtle Creek Caribou Management Unit (CMU) is located above 4,500 feet within the project boundary. The U.S. Forest Service is the dominate landowner within this CMU; however Crown Pacific does own 3,899

acres (17.7%) of the land within this CMU. Currently, some 77.3% of the area capable of supporting spruce/fir forests in this CMU is currently dominated by mature (100-150 years old) and old growth (>150 years) spruce/fir forests. Some 46% of the area capable of supporting cedar/hemlock forests is currently dominated by mature and old-growth forests of this type (Table 3-1).

Table 3-1. Engelmann spruce/subalpine fir (SAF) and western red cedar/western hemlock (CH) distribution and successional stage (total acres/% of area capable of growing either forest type) by land owner within the 21,994.4 acre Myrtle Creek CMU. Some 13,943.2 acres of the CMU is capable of supporting SAF forests and 4,770.9 acres is capable of supporting CH forests (derived from Allen 1999).

Land Owner	Forest Type	Area Capable of Supporting Forest Type Acres / (% of Total CMU	EARLY SERAL SHRUB (post-burn or harvest) Acres / (% of Capable Forest Type	EARLY SERAL FORESTED (1-59 years) Acres / (% of Capable Forest Type)	IMMATURE (60-99 years) Acres / (% of Capable Forest Type)	MATURE (100-149 years) Acres / (% of Capable Forest Type)	OLD GROWTH (150+ years) Acres / (% of Capable Forest Type)	AREA Dominated by other CoverTypes -lodgepole -larch -Douglas fir -Grand fir (Acres/% of Capable Forest Type)
US Forest Service	SAF	11,996.2 (86.1)	609.5 (5.1)	385.6 (3.2)	295.4 (2.5)	5,609.8 [a] (46.8)	4,145.4 [e] (34.6)	950.4 (7.9)
	CH	3,336.2 (69.9)	684.7 (20.5)	66.0 (19.8)	64.4 (19.3)	722.3 [b] (21.6)	817.9 [f] (24.5)	981.6 (29.4)
Crown Pacific	SAF	2,106.4 (15.0)	936.1 (44.4)	0	29.1 (1.4)	676.8 [c] (32.1)	282.4 [g] (13.3)	182.1 (8.6)
	CH	1,620.7 (33.9)	962.1 (59.4)	0	0	93.7 [d] (5.8)	564.9 [h] (34.9)	0

[a] Mean stand age=128 years
[b] Mean stand age=131 years
[c] Mean stand age=123 years
[d] Mean stand age=143 years
[e] Mean stand age=192 years
[f] Mean stand age=216
[g] Mean stand age=183 years
[h] Mean stand age=241 years

Recreational use within the CMU is concentrated in the Two Mouth Lakes area during the spring, summer, and fall months and includes hiking, camping, and fishing. Two Mouth lakes and the headwaters of Slide, Myrtle, and Peak Creek have been closed to snowmobiling since 1994 to protect caribou. These areas have received consistent use by the Two Mouth Lakes herd during the last 13 years. Snowmobile use in the drainage is limited to the Myrtle Creek loop road (# 633 and 661). However, this road is located at or below 5000 feet and has not had documented caribou use from December-May.

Habitat management for woodland caribou management was originally provided by the Forest Plan (1987). However, these guidelines were amended internally in 1994 with the development of a caribou habitat capability (HCI)/suitability (HSI) model (Allen and Deiter 1994, and Allen 1998b), which was derived from habitat research on the translanted caribou as well as earlier research and a preliminary model developed by the recovery team in 1985 (Scott and Servheen 1985, Summerfield 1985, and Warren 1990, Allen 1998a). This mid-scale model uses existing timber inventory data to classify stands as to their *capability* versus *current suitability* for caribou use on a seasonal basis. Application of a mathematical equation for both capability and suitablity results in values from 0 to 1.0. Habitat capability is defined elevation, slope, and habitat type (after Cooper et al. 1991). Capability is set at HCI>=0.5. If the stand is evaluated as capable, then it is reviewed to determine if it has the right combination of vegetation characteristics to be suitable for caribou use. Habitat suitability is defined by elevation, slope, habitat type/existing timber cover type, mean size (diameter) of timber

in the stand, overstory canopy closure, and overall stand age. Current suitability is set at HSI>=0.5. Unlike the Forest Plan which assumed habitat to have discrete seasons of use, this newer model may rank stands as high quality habitat for more than one season of use. Conversely, not all stands have high enough quality to rank as suitable habitat. In general, suitable habitat (HSI>=0.5) are those stands that are at elevations >5000 ft, <40% slope, in 81+ year-old stands of spruce/fir, or 4500-5000 ft, <40% slope, 120+ year-old stands of cedar/hemlock. This fits the definition of critical caribou habitat within the Forest Plan, pg V-3.

The 1994 woodland caribou recovery plan recognizes six seasonal habitats based on behavioral needs, movements, and habitat use, including: early winter (~November 1 – January 15), late winter (~January 16 – May 15), spring (~May 16 – July 15), calving (pregnant cows, June 1 – July 15, summer (July 16 – September 15), and rut (September 16 – October 31). However, subsequent research suggests that five seasonal habitats are appropriate, resulting in selection of similar habitats from July 15 to the end of October (i.e. summer and rut) (Allen 1998). In general, these seasonal habitats can be summarized as follows: 1) Early winter includes the use of mature to old growth cedar/helmlock (age >=120 years) and spruce/subalpine fir stands with >70% canopy closure, slopes < 40%, between the elevations of 3500-6200. Appropriate subalpine fir stands stands need to be within 1.0 mile of useable cedar/hemlock stands to be suitable (Allen 1998). Late winter includes the use of 80 year old and older subalpine fir/spruce stands on 'dry' habitat types with 11-70% canopy cover, and slopes of < 40% found between 5500-7000 ft. elevation. Summer/rut habitat is similar to late winter except caribou range between 5500-6500' elevation. Spring habitat includes 80 year old and older stands of subalpine fir/spruce with canopies ranging from 1-40%, and slopes of <40% found between 5000-6500 ft. elevation. Calving habitat includes 80 year old and older subalpine fir/whitebark pine and nonforest stands located at the highest elevations (5500-7400'), all slopes, and 1-40% canopy cover.

The project area has 7 types of caribou habitat, based on the above descriptions and including the combination 'key' habitat. Stands that have HSI>=0.5 for all seasons except early winter cedar/hemlock are considered key habitat, because they are mid-elevations that have the habitat quality to be useful for more than one season. Early winter habitats and key habitats are likely the most important habitats for woodland caribou. Research involving changes in woodland caribou habitat within the eastern portion of the U.S. recovery area during the last 115 years documented the ecosystems recovery from large fires in the 1800's (Allen 1999). The Myrtle Creek CMU is no exception. There is substantially *more* caribou habitat now for <u>all</u> seasons within this CMU then there was at the turn of the century (Table 3-2). There is a high level of linkages and traval corridors between suitable habitats in this CMU. This includes large, cohesive patches of suitable habitat for all subalpine fir seasonal habitats, including the early winter component.

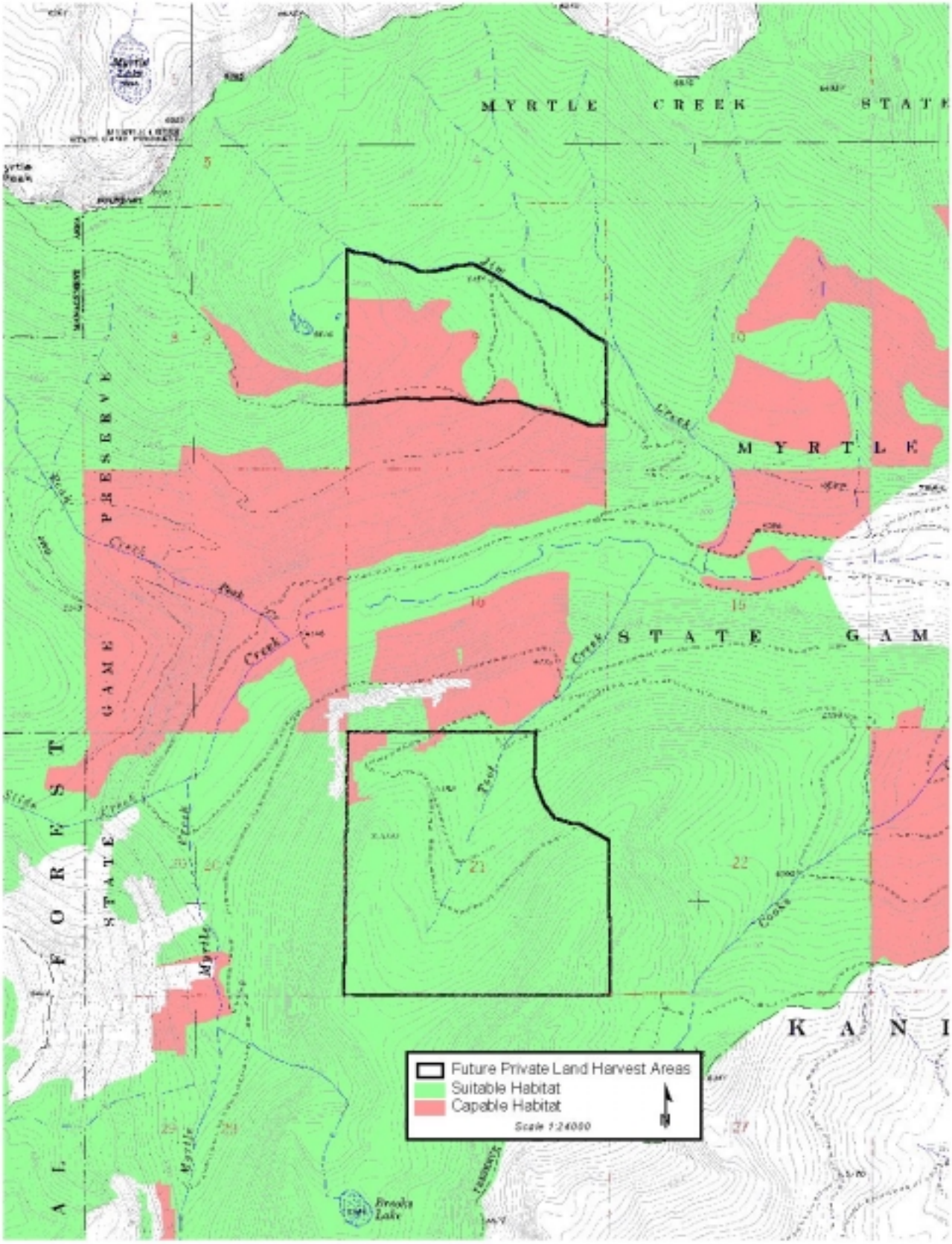
Crown Pacific is actively harvesting in their sections in the Jim Creek and Toot Creek drainages (Figure 3-7). Upon completion this winter, timber harvest of these lands will result in the net reduction of 726 acres of early winter spruce-fir habitat, 427 acres in late winter habitat, 384 acres of calving habitat, 706 acres of spring habtitat and 631 acres of summer habitat. Some 262 acres of the area being harvested within Toot Creek drainage is considered key caribou habitat. CP owns 33% of the capable cedar/hemlock early winter habitat in the CMU. To date, CP is not planning harvest in its CH early winter habitat. This is likely due to the fact that these areas are located in the riparian zone for Myrtle Creek, which is the water source for the city of Bonners Ferry.

Table 3-2. Total forested area capable (Habitat Capability Index (**HCI**) >=0.5) (acres and percent of total CMU) of being woodland caribou habitat versus suitable (Habitat Suitability Index (**HSI**) >=0.5) (acres and percent of capable) in the **Myrtle Creek Caribou Management Unit** (CMU) by land owner (USFS and Crown Pacific (CP)). Assessment of habitat change includes three points in time over a 115-year period. Of the 21,994.4 acre CMU, 18,262.2 acres (83.0%) are capable of being woodland caribou habitat for one or several seasons (derived from Allen 1999).

SEASON	LAND OWNERSHIP	CAPABLE (HCI>=0.5) Acres / (% of total CMU)	1880 SUITABLE HSI>=0.5 Acres / (% of Capable for Season)	1935 SUITABLE HSI>=0.5 Acres / (% of Capable for Season)	1995 SUITABLE HSI>0.5 Acres / (% of Capable for Season)
LATE WINTER	Forest Service	9,762.6 (44.4)	422.4 (3.7)	4,324.8 (38.3)	7,913.2 (81.1)
	Crown Pacific	1,543.1 (7.0)			508.7 (32.9)
SPRING	Forest Service	11,640.3 (52.9)	322.6 (2.2)	4,849.3 (33.3)	8,344.1 (61.9)
	Crown Pacific	2,932.5 (13.3)			1,139.7 (38.9)
CALVING	Forest Service	7,953 (36.2)	372.7 (4.7)	3,187.8 (36.9)	7,280.3 (91.5)
	Crown Pacific	689.9 (3.1)			459.9 (66.7)
SUMMER/RUT	Forest Service	0,013.9 (45.5)	296.8 (3.0)	4,609.8 (37.8)	7,217.8 (72.1)
	Crown Pacific	2,189.4 (9.9)			703.9 (32.2)
KEY[1]	Forest Service	4,963.6 (22.6)	296.8 (1.3)	2,248.0 (40.9)	4,479.2 (90.2)
	Crown Pacific	538.2 (2.4)			329.6 (61.2)
EARLY WINTER (cedar/hemlock)	Forest Service	3,341.8 (15.2)	1,137.6 (22.5)	1,613.6 (31.9)	1,516.8 (45.4)
	Crown Pacific	1,720.6 (7.8)			541.1 (3.1)
EARLY WINTER (subalpine fir)	Forest Service	9,966.3 (45.3)	201.9 (1.7)	4,463.3 (38.0)	8,033 (80.6)
	Crown Pacific	1.770.1 (8.0)			807.2 (45.6)

[1]Key habitat are those areas with Habitat Suitability Index (HSI)>=0.5 for late winter, spring, calving, and summer/rut.

Figure 3-7: Future Private Land Harvests Included in the Environmental Baseline



WATERSHED and AQUATICS RESOURCES

INTRODUCTION

The purpose of this chapter is to provide a context for understanding watershed processes, which are important within the project watersheds, and to describe the existing condition of fisheries resources and habitat. Past and present processes, resource values, and management activities are considered. The information in this section forms the basis for the effects analysis and comparisons made in Chapter 4.

EXISTING CONDITIONS

Beneficial Uses and Quality of Support

Myrtle Creek is designated as a municipal watershed by the State of Idaho. Beneficial uses other than recreation have not been designated for Cascade, Lost, Clark, and Snow Creeks. However, the Forest Service recognizes and is concerned about the existing uses summarized in Table 3-3 below.

Table 3-3. Beneficial Uses

Watershed	Municipal-Domestic Water Supply	Salmonid Spawning	Cold Water Organisms	Irrigation, Livestock Water	Fishing, Boating, Wading	Wetlands
Myrtle Creek	X	X	X	X	X	X
Yellow Pine Creek			X		X	
Adverse Creek			X		X	
Mack Creek			X		X	
White Pine Creek			X		X	
Jim Creek		X	X		X	
Peak Creek		X	X		X	
Slide Creek			X		X	
Toot Creek			X		X	
Cooks Creek		X	X		X	
Cascade Creek		X	X	X	X	X
Lost Creek			X	X	X	
Clark Creek	X		X	X	X	
Snow Creek		X	X		X	X

The City of Bonners Ferry has used Myrtle Creek as a municipal water supply since 1928. Daily usage ranges from 700,000 gallons per day during low season use to 2.3 million gallons in the summer. The City only has 800,000 gallons of storage capacity so a continuous supply of high quality water is especially critical. The utility serves roughly 3500 people. The City regularly monitors water quality for inorganic, organic, microbial, and radioactive contaminants, and pesticides and herbicides to assure compliance with State and Federal water quality standards. This monitoring indicates that the beneficial use for municipal water quality is being fully supported. As will be illustrated throughout this document, there are several actions that can be taken and are proposed to reduce the existing risks to Myrtle Creek water quality, especially during extreme hydrologic events.

None of the streams in the project area are listed by the State of Idaho as Water Quality Limited stream segments (303(d) listing, 1998) so the beneficial uses on National Forest Lands within the analysis area are considered to be fully supported.

Fish Presence and Biological Requirements

Fish Presence

The cumulative effects areas contain approximately 18-miles of fish-bearing streams, all of which are contained in the Kootenai River Basin. Fish species that inhabit streams in the Kootenai River Basin include native populations of westslope cutthroat (*Oncorhynchus clarki lewisi*), bull trout (*Salvelinus confluentus*), interior redband rainbow trout (*Oncorhynchus mykiss* subsp.), whitefish (*Prosopium* spp.), white sturgeon (*Acipenser transmontanus*) burbot (*Lota lota*), kokanee (*Oncorhynchus nerki*), northern pike minnow (formerly squawfish; *Ptychocheilus oregonensis*), large-scale sucker (*Catostomus macrocheilus*), sculpin (*Cottus spp*.; primarily slimy sculpin, *C. cognatus*, and torrent sculpin, *C. rhotheus*), longnose dace (*Rhinichthys cataractae*) and redside shiner (*Richardsonius balteatus*) (Simpson and Wallace 1982; district files).

Introduced fish species include populations of rainbow trout (*Oncorhynchus mykiss*) and eastern brook trout (*Salvelinus fontinalis*). The creation of hybrid fish between native cutthroat trout and exotic rainbow trout and between native bull trout and exotic brook trout may be present. The distribution of some of these fish within streams in the cumulative effects areas can be found in Table 3-4, which lists fish-bearing streams within the project area.

Table 3-4: Summary of Fish Distribution Within the Cumulative Effects Area

Species Name	Myrtle Creek	Jim Creek	Cooks Creek	Peak Creek	Cascade Creek	Snow Creek
Bull Trout – BT	X					X*
Westslope Cutthroat – WCT					X	X
Eastern Brook Trout – EBT	X	X	X	X		X
Rainbow Trout (Coastal Form) – RBT	X				X	X*
Interior Redband – IRBT						X*
Kokanee – KOK	X					
Torrent Sculpin – TS	X					
Slimy Sculpin – SS	X		X*		X*	X*
Burbot – BUR						X*
Mountain Whitefish – MWF	X					
Longnose Dace – LND	X					
Hybrid (WCT x RBT)					X*	

WCT=westslope cutthroat trout; BT=bull trout; RT=rainbow trout; BRK=eastern brook trout; SCP=sculpin species; MWF=mountain whitefish. X=confirmed presence of species; X=presence of species not confirmed but is likely*.

Streams listed in Table 3-2 flow into other fish-bearing waterways, specifically, Deep Creek and the Kootenai River. Given the scope and ensuing analysis of this project, it was determined that cumulative effects would not be detected in these streams. Non-fish-bearing perennial streams within the project area include Clark and Lost Creeks and in the Myrtle Creek drainage: Yellow Pine, White Pine, Adverse, Mack, Toot, and Slide Creeks.

Due to the large number of fish species within the cumulative effects areas, analysis of direct, indirect, and cumulative effects to fish will use the concept of management indicator species (MIS). Under this concept,

larger groups of organisms or communities are believed to be adequately represented by a subset of the group (Idaho Panhandle National Forest Plan 1987). The Forest Plan of the Idaho Panhandle National Forests (IPNF) identifies cutthroat trout and bull trout as potential MIS for fisheries conditions. Westslope cutthroat trout and bull trout are native to some streams in the project area (Simpson and Wallace 1982; district files). Currently, westslope cutthroat trout are known to utilize streams within the project area for spawning, rearing, and over-wintering. Although bull trout may have been historically present across the project area, they currently occur within the lower reaches of Myrtle Creek (Chris Downs IDF&G; personal comm.), Snow Creek and a few other streams within the Kootenai River Basin. Nonetheless, westslope cutthroat trout and bull trout have been selected as appropriate MIS for the fisheries analysis of this project. Although both of these fish do not exist in all streams, in general one of the two is found in all large streams. In addition, westslope cutthroat trout and bull trout are likely sensitive indicators for all the cold-water biota within the stream segments (Meehan 1991).

The life history of the interior redband trout, torrent sculpin, Kootenai River white sturgeon, and burbot will be included below because they are either listed threatened or endangered under the Endangered Species Act of 1973 (ESA), or sensitive by the Regional Forester. Also, the torrent sculpin and interior redband trout are also cold water species, the effects of this action to these species will be similar, where these species occur in the project area, and will be covered under the effects to the MIS. The torrent sculpin and interior redband trout have been documented within the Kootenai River Basin but not in the fish-bearing streams within the cumulative effects areas. White sturgeon and burbot are found only in the main stem of the Kootenai River and possibly large tributaries (e.g., Yaak River).

Westslope Cutthroat Trout - Westslope cutthroat trout are listed as "sensitive" by Region 1 of the USDA Forest Service and are listed as "species of special concern" by the State of Idaho. In addition, the U.S. Fish and Wildlife Service (USFWS) lists westslope cutthroat trout as a "Species of Concern" with respect to section 7(c) of the 1973 Endangered Species Act (ESA) (10/28/99 letter, FWS 1-9-99-SP-483) and is under review for listing under the ESA.

Their preferred habitat is cold, clear streams with rocky, silt-free riffles for spawning and slow, deep pools for feeding, resting, and over-wintering (Reel 1989). Pools are a particularly important habitat component as cutthroat trout occupy pool habitat more than 70% of the time (Mesa 1991). Other key features of westslope cutthroat habitat are large woody debris (LWD) for persistent cover and habitat diversity as well as small headwater streams for spawning and early life-stage rearing.

Resident life history strategies of westslope cutthroat trout are currently present in watersheds within the project area (Table 3-2). Resident populations remain in river tributaries throughout their life. Certain life histories (i.e. fluvial and adfluvial fish) use river tributaries for early rearing and spring spawning as adults but typically out-migrate to river (fluvial) or lake (adfluvial) habitat as they mature. In the fall, fish that have not previously returned to river and lake areas migrate to deeper water where they congregate and over-winter (Bjornn 1975). Streams within the project area may have historically been utilized by westslope cutthroat trout representing all life history strategies during various phases of their life cycle; however, currently mostly resident fish exist.

A population status review of westslope cutthroat trout in Idaho has determined that populations in northern Idaho have declined over their historic distribution with viable populations existing in only 36% of the original Idaho range. The primary cause of the decline was found to be habitat degradation (Rieman and Apperson 1989).

Westslope cutthroat trout have been seriously affected by the presence of introduced brook trout. Brook trout out-compete westslope cutthroat trout in areas where habitat is degraded. In 1961, eastern brook trout were only introduced into Cooks Lake (a lake/tributary to Myrtle Creek); which also corresponds with the period when there were the highest levels of management induced sediment. The associated habitat degradation may have accelerated the decline of potential westslope cutthroat populations in the watershed. The two streams in the project area that are known to contain westslope cutthroat trout, are Cascade and Snow Creeks. Cascade Creek is not known to have brook trout, however westslope cutthroat trout are known to exist (Table 3-2), but populations may be reduced based on embeddedness measurements (41.7% - overall). In Snow Creek, eastern brook and westslope cutthroat trout distributions overlap. Westslope cutthroat trout may be out-competed if habitat is degraded. Consequently, within the cumulative effects areas, Cascade and Snow Creeks are likely the most important to species persistence for westslope cutthroat trout. In addition to these streams, the connectivity between stream habitat and Kootenai River habitat is extremely important to westslope cutthroat trout habitat exhibiting a fluvial life history. However, Cascade and Snow Creeks each have migration barriers that would limit connectivity.

Bull Trout - Bull trout may be native to the 6th HUC (hydrologic unit codes) watersheds within the project area (e.g. Myrtle and Snow Creeks). Bull trout are listed as a "threatened" species under the ESA (Federal Register, Volume 63, No. 111, June 10, 1998). Currently bull trout are known to inhabit Myrtle and Snow Creeks within the cumulative effects areas. Bull trout appear to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Habitat characteristics including: water temperature, stream size, substrate composition, cover and hydraulic complexity have been associated with distribution and abundance (Dambacher and others, in press; Jakober 1995; Rieman and McIntyre 1993).

Stream temperature (below 15 degrees Celcius; Goetz 1989) and substrate composition are important characteristics of suitable bull trout habitats. Bull trout have repeatedly been associated with the coldest stream reaches within basins. The lower limits of many strong bull trout distributions mapped by Lee et al. (1997) correspond to a mean annual air temperature of about 4 degrees Centigrade (ranging from 3 to 6 degrees Centigrade) and should equate to ground water temperatures of about 5 to 10 degrees Centigrade (Meisner 1990). Water temperature can be strongly influenced by land management (Henjum et al. 1994).

Stream channel equilibrium (stability) is the balance between sediment yield, water yield, and channel morphology, which exists within a stream system. Studies indicate that shifts away from channel equilibrium can result in negative changes in the structure and function of stream ecosystems (Bilby and Likens 1980, Schlosser 1982) and their dependent fish populations. Bisson and Sedell (1982) reported that where stream channels became destabilized, riffles elongated and in many cases extended through former pool locations resulting in loss of pool volume. They suggested that declines in older fish might be the result of their dependency upon deeper water habitats. The persistence of bull trout over time can best be provided by maintaining lateral and instream habitat complexity in association with channel stability (Karr and Freemark 1983, Karr and Dudley 1981, Gorman and Karr 1978).

In a status review of bull trout on the Idaho Panhandle National Forests, stocks from the Kootenai River watershed were considered to be at moderate risk of extinction (Cross 1992). Genetic analysis has shown that bull trout within many sub-basins of northern Idaho may be unique stocks (B. Rieman, Forest Service Research, personal communication), but they are closely linked to the upper Columbia River clad - one of three major groupings of bull trout throughout the Columbia and Klamath River drainages (Williams, unpublished).

Of the streams listed within Table 3-2, Myrtle and Snow Creeks are likely the most important to species persistence for bull trout within the cumulative effects areas because they are the only streams they currently inhabit, principally below the falls barriers on both streams. These large systems have fair habitat conditions and connectivity to Kootenai River is especially important to fluvial bull trout. However, none of the drainages within the project area are classified as priority bull trout watersheds.

Torrent Sculpin - Torrent Sculpin were added to the Idaho Panhandle's sensitive species list March 12, 1999. This species is known to inhabit the Kootenai River Basin, but data on distribution by streams is limited (Simpson and Wallace 1982; Scott and Crossman 1973). They prefer riffle habitat in medium to wide streams and rivers (Markle et al. 1996). However, large adults (>150 mm) are found in pools. Spawning usually occurs in May and June and occurs in riffles with moderate to swift flows. Similar to westslope cutthroat and bull trout, the torrent sculpin is also a cold-water species and consequently its range overlaps with both these species. Because this species primarily inhabits large streams, it would only be affected by this project if the magnitude of the effects altered habitat conditions in the larger basins (e.g. Myrtle and Snow Creeks). Because this is a cold water species, possible effects on this species will be covered by analyzing effects on the cold water MIS (management indicator species).

White Sturgeon - The Kootenai River population of white sturgeon are listed as endangered under ESA (Federal Register, Volume 59, No. 171, September 6, 1994). White sturgeon are anadromous in most of the larger rivers in which they occur but are landlocked in the middle and upper Columbia River system. The Kootenai River population range includes lake and river habitats between the outflow of Kootenay Lake and Kootenai Falls upstream in Montana. Most fish have been found only in the Kootenai River, but a few have been located in larger tributary streams (Graham 1981). In 1989, a State of Montana enforcement officer cited an angler for taking of a sturgeon in the Yaak River (USDA 1993). However, few have been sighted in other tributary streams.

Spawning takes place in May or June, occurring over rock or bedrock substrate in swift currents near rapids when water temperatures are between 8.9 and 16.7 degrees Celsius (Graham 1981). It is believed that most spawning in the Kootenai River occurs in the canyon section between Bonners Ferry and Kootenai Falls.

The Kootenai River population has declined and reproduction has been limited since the installation of Libby Dam (Partridge 1983). The current population appears to be composed of mid-size and larger fish, with few juveniles. The May-July regulated flows (1975-80) are now one-fifth or less of the natural discharge patterns (1910-1965; USDA 1993). Daily mean temperatures have dropped approximately five degrees Celsius during the sturgeon spawning period due to selective withdrawal (USDA 1993). These changes have, in effect, converted the river to a third order headwater stream with an aberrant discharge pattern to which few organisms are adapted (USDA 1993).

The Kootenai River population of the white sturgeon is restricted to approximately 270 kilometers of the Kootenai River and do not inhabit any of the streams in the cumulative effects analysis area.

Burbot - Burbot are listed as sensitive by the Regional Forester and are considered a species of concern by the State of Idaho and the U. S. Fish and Wildlife Service (FWS 1-9-99-SP-483, October 28, 1999). They prefer lakes or large rivers and in Idaho are found only in the Kootenai River system (Simpson and Wallace 1982). Spawning takes place in the winter and may occur in shallower waters of rivers and in small tributary streams, as well as in rivers in deep water under the ice (Simpson and Wallace 1982; Scott and Crossman 1973). Numbers of burbot have declined since 1965 in the Kootenai system. However not documented, it is

proposed that burbot historically spawned in the lower reaches of Myrtle and Snow Creeks within the cumulative effects analysis areas (V. Paragamian, personal communication).

Habitat Condition and Connectivity

Natural events and processes (e.g., historic fires), as well as human activities (e.g., logging and road building), have influenced environmental conditions in the cumulative effects area. Effects of natural disturbances have interacted with other land-evolving processes to form the basic character of watersheds and the dependent stream resources. Due to variability in location, frequency, intensity, and ultimately, the effects of natural processes on the physical environment, dynamic landscapes with diverse conditions are formed at various spatial scales. Biological communities including native fish populations led to development of functional ecosystems that are inherently resilient to effects from natural disturbance regimes representing pulse-type disturbance (Reeves et al. 1995). Pulse disturbances influence the natural range of environmental conditions that are expected for ecosystems functioning at broad geographic scales but typically allow systems to begin recovering to pre-disturbance conditions soon after the disturbance.

Natural disturbance regimes (e.g. flood, wildfire, etc) and their associated properties (e.g. sedimentation rates and other influences on aquatic habitat) have been altered in the cumulative effects area by human activity. Land use activities that have modified natural disturbance characteristics include roads, refuge and associated diking, stream modifications (constriction, channelization, diversions, culverts, and cleaning/removal of woody debris), logging and fire suppression**.** Many of these human influences are considered press-type disturbances that continue to affect the condition and trend of fisheries resources long after the initial disturbance. Press disturbance differs from pulse disturbance in several aspects, but generally press disturbance is persistent in ecosystems and impairs the ability for ecosystems to recover to pre-disturbance conditions (Reeves et al. 1995). Within the cumulative effects area, the recovery process from pulse disturbance has been hindered by the presence of various press disturbances. The following discussion relates these findings to the existing condition of fish habitat.

The cumulative effects areas in this project have primarily been affected by historic fires (natural disturbance) and/or logging, road construction and floodplain alteration (human activity). The disturbance history has played a large role in determining habitat conditions in fish-bearing streams. Within the analysis area, only streams that were historic bull trout habitat and known or presumed to be fish bearing (Table 3.2), will be discussed in detail.

Clark Creek (Kootenai River) -Clark Creek is a high-gradient stream with many small pools that does not support a fisheries, but may historically have had bull trout spawning and rearing in the lower basin. Access during low flows (e.g. late summer) at confluence with Kootenai River and several waterfalls (13-17 meters), approximately 0.35 km upstream of Westside Road crossing are migration barriers. Habitat in the headwaters is steep and relatively shallow and likely does not support fish. Past logging and roading activities have removed woody debris from the riparian and contributed to increase sediment into the stream.

Lost Creek (Kootenai River) - Similar to most small Kootenai River drainages, Lost Creek is a high-gradient stream with many step pools, cascade and waterfall habitat, but may have had historic bull trout spawning and rearing in the lowermost portion of the basin. Headwater reaches are mainly groundwater–fed, having many small springs with relatively shallow depths and lack of supporting fish habitat; mid- and low elevation reach characteristics are composed of debris jams, step pools, waterfalls and cascade habitat types. Past logging and roading activities have removed woody debris from the riparian area and contributed to increased sediment

into the stream. Road densities are high because of the size of the drainage and pose a risk to instream sedimentation if road fills fail, which can cause habitat degradation.

Cascade Creek (Kootenai River) - Past logging and roading continue to affect this watershed as may be evident by the relatively high embeddedness (mean = 41.5%) and fines/sand within pool habitat. Cascade is a small creek that has multiple migration barriers, these include: 1) An improperly placed culvert at the confluence with Myrtle Creek (in the Kootenai National Wildlife Refuge - KNWR); 2) An old weir/flow diversion device below the West Side road crossing; 3) The culvert crossing for the West Side Road; 4) And lastly a series of cascade/falls upstream of the West Side road crossing, which one falls is $\geq$ 13 meters high.

Myrtle Creek (Kootenai River) - A multiple series of steep cascade/falls and a large barrier falls, approximately 120' high and 300-500 feet in length, and located approximately four miles upstream of the Westside road crossing. Past logging and roading continue to affect this watershed as may be evident by the relatively high substrate embeddedness (mean = 52.0%; range 16-84%), however, Myrtle Creek has relatively high pool/riffle ratios (4:1 overall). Road density in the Myrtle Creek watershed area is 2.4-mi./ sq. mi.; a majority of these are roads/skid trails located at mid-elevation and headwater locations. Resident forms of bull trout appear to be absent in the Myrtle Creek watershed and fluvial forms are perilously low, but habitat connectivity remains available. Historical levee construction and channelization of Myrtle Creek for KNWR purposes has altered stream dynamics and potential spawning and rearing habitat, which have changed bed load movement and sediment depositional areas. Also, bull trout habitat in this lower valley reach is influenced by Kootenai River level and temperature fluctuations. Re-establishment of healthy bull trout populations in Lower Myrtle Creek watershed is unlikely for two reasons: 1) brook trout are present through-out the system, having the potential to out-compete bull trout for limited food and rearing and spawning habitat; and 2) the Kootenai River populations remain perilously low.

Jim, Peak and Cooks Creeks - These streams are tributaries to Myrtle Creek and do not support bull trout since they exist above the large barrier falls. However, they are in the cumulative affects area for the project and are the only known tributaries in the Myrtle Creek watershed that support fisheries. All of these have known eastern brook trout inhabitance and may contain slimy sculpin.

Snow Creek (Deep Creek) - Past logging and road building have led to some habitat degradation in Snow Creek. Sediment levels are excessive and pool filling is occurring in all pool types. Table 3-2 illustrates a summary of the fish distribution in Snow Creek. Fish migration into the Snow Creek drainage is blocked by a waterfall, 0.8 km upstream from the Deep Creek confluence.

PROCESS DESCRIPTIONS and INDICATORS for the PRINCIPLE ISSUES

Stream Crossing Risk

Structures that are used to cross streams have a limited life span and capacity. There is always some period of time or flood or landslide event that will exceed the capacity of the crossing to safely pass water and debris. When stream crossings fail, large amounts of road fill can be directly delivered to streams, detrimentally affecting water quality and habitat for aquatic organisms. The sediment can come directly from the throughfill over the crossing or from the road prism in cases where the culvert failure diverts all or a portion of streamflow down along sections of the road prism or ditch line. These types of events can scour the receiving channel bed

and banks adding to the total sediment delivery. Several crossings in Myrtle Creek increase the velocity of streamflow enough to scour the channel below the culvert outlet for up to a few hundred feet. The indicators for this issue will be the calculated risk associated with the inventoried crossings and the potential for road prisms and ditchlines to capture streamflow. The locations of inventoried crossings are displayed in Figure 2-10. Risk is a combination of two factors - probability of failure, and the cost of failure. Risk at stream crossings is managed by reducing the probability of failure, and the cost (in terms of sediment delivery) if a failure were to occur. Table 3-5 lists existing risk of the inventoried crossings within the project area.

Table 3-5: Existing Condition for Stream Crossing Risk Indicators

Watershed	Total Stream Crossings (number)	Inventoried Stream Crossings (number)	Inventoried Crossing Risk (tons/year)	Can Divert Streamflow? (number)	Inventoried Migration Barriers (number)
Myrtle Creek (upper)	15	2	3	0	4
Myrtle Creek (lower)	49	24	158	9	4
Yellow Pine Creek	1	1	37	0	-
Adverse Creek	1	1	1	0	-
Mack Creek	1	1	28	0	-
White Pine Creek	3	2	3	0	2*
Jim Creek	6	0	0	0	0
Peak Creek	4	0	0	0	-
Slide Creek	1	0	0	0	-
Toot Creek	5	0	0	0	-
Cooks Creek	4	0	0	0	2
Cascade Creek	7	3	8	0	3*
Lost Creek	2	1	0	0	-
Clark Creek	4	2	0	0	-

** fish presence not confirmed*

Almost all of the roads in Myrtle Creek were built or improved between 1950 and 1970. Therefore, many of the drainage relief culverts and stream crossings are 30 to 50 years old. The designed life expectancy for culverts is typically 20 years. This increases the need for and importance of upgrading existing road improvements. Some facilities were replaced as a result of damages incurred from climatic events in 1974, 1985, and 1997, but even pipes installed in 1985 are now nearing the end of their expected service life.

In addition to the introduction of sediment, stream crossings can also act as barriers to fish migration by creating velocities or jump heights that are too high for fish to pass. This type of fragmentation and disruption of habitat will lead to problems for populations and ultimately increase the risk of extinction (Rieman and McIntyre 1993). Similarly, delivery of sediment to streams from other sources can fill in habitat such as pools that are used by fish, and can fill in the spaces between gravels, cobbles, and boulders on the streambed, which are used by rearing juveniles and a variety of aquatic organisms.

Sediment Production and Delivery

Sediment production and delivery, as used in this analysis, refers to landslide potential and surface erosion. Roads are the primary focus for this issue, although harvest and site preparation activities will be discussed when they have the potential to create or increase erosion. Roads can potentially increase the natural rate of landslide occurrence by creating unstable road cut and fill slopes and by greatly expanding the number of ways and locations where ground water can be intercepted, rerouted, and concentrated. Surface erosion occurs on

most forest roads because their surfaces, cutslopes, fillslopes and associated drainage structures are usually composed of erodible material and are exposed to rainfall and concentrated surface runoff. Minimizing the potential for roads to intercept, concentrate, and route water to streams and unstable slopes can reduce sediment production and delivery. Maintaining soil organic layers and functioning riparian zones are also strategies that are used to minimize sediment production and delivery.

The faulting and glaciation that created the Purcell Trench lowered the base elevation of the Kootenai River. This has caused Myrtle Creek (and Cascade, Lost, and Clark Creek) to aggressively scour down in elevation to try to match grade with the Kootenai. As a result, lower Myrtle Creek has steep V-shaped valley slopes, which are naturally more prone to landslides than surrounding slopes, and has steep stream gradients. The presence of Myrtle Falls, near the bottom of the drainage, illustrates that the stream is still not at grade with the Kootenai River. U-shaped valleys resulting from alpine and continental ice masses characterize the upper portion of the watershed. The slopes in upper Myrtle Creek have been rejuvenated to a much lesser degree (and are more stable) than in the lower portion of the watershed, but are more likely to have compacted till near the soil surface, which perches the water table. As a result, the upper portion of the watershed creates more of a water yield response per unit area than the lower section of Myrtle Creek. A report by Taylor and Olson (1956) provides a more detailed characterization of soils and geology within the Myrtle Creek watershed.

The different landforms in the geographic areas have been characterized as distinct landtypes. Landtype mapping combines bedrock geology, surficial geology, landforms, soils, slope gradients, aspects, elevation, amount of rock outcrop or talus, presence of avalanche chutes, rain-on-snow zones and canopy cover. Within the analysis area are lands having many combinations of these characteristics with many different implications for management. If a particular combination is abundant on the Forest and has management interpretations, which are different from the other combinations, it is mapped as a landtype and assigned a unique code. Some landtypes are more responsive to disturbances. The ”responsive” areas include riparian zones (which range from low to high mass failure potential) and known landslide prone areas. Mass failures or surface erosion will not definitely happen if management activities occur in these areas. Instead, the landtypes are used to indicate the areas where more careful planning and use of mitigation measures or restoration will usually be needed to avoid or reduce resource impacts. Results from WATSED modeling, and the amount of activity and reduction of risks on sensitive landtypes are used as indicators for the potential for production and delivery of sediment. The existing condition for these indicators is contained in Table 3-6.

Table 3-6: Existing Condition for Sediment Production and Delivery Indicators		
Watershed	**WATSED Sediment Yield Increase (percent)**	**Road on Sensitive Landtypes (miles)**
Myrtle Creek (upper)	83	27.7
Myrtle Creek (lower)	68	33.0
Yellow Pine Creek	-	0.1
Adverse Creek	-	0.4
Mack Creek	23	1.1
White Pine Creek	98	3.5
Jim Creek	-	1.8
Peak Creek	-	3.4
Slide Creek	-	0.4
Toot Creek	-	1.4
Cooks Creek	-	1.7
Cascade Creek	148	3.7
Lost Creek	-	1.7
Clark Creek	-	0.7

While interpreting the sediment yield increase above natural, it is important to consider that WATSED assumes that a road prism stays open and maintained for perpetuity and continues to generate a base level of sediment. In reality, many of the roads in the project area are heavily revegetated which greatly reduces actual surface erosion. For this reason, the estimates of sediment yield increase above natural are somewhat overstated. However, WATSED generally understates stream-crossing risk. Also, a road that is revegetated can still be a concern if it intercepts, concentrates, and re-routes substantial amounts of ground water and if it increases the natural potential for mass erosion. Therefore, it is best to use the yield increase estimates as a relative indicator of sediment regime alteration rather than taken as an absolute. Other indicators are used in conjunction with the WATSED estimates.

Wildfire Risk

In the Inland Northwest, the rate of tree biomass accumulation is typically much greater than the rate of decay. The combination of fire, insects, and disease play important roles in helping to maintain nutrient cycling. Unfortunately, fire suppression has allowed greater and more continuous accumulations of biomass and debris over larger areas than was typical before fires were suppressed. On dryer sites, these conditions can result in more intense and severe wildfire than was common historically. Intensity describes the rate of heat created by the fire for a given period of time. Severity describes the total amount of heat generated by the fire. A very intense fire may not be severe if it burns for a short period of time. Fire severity is a function of fire intensity and duration. Small diameter fuels typically play a larger role in fire intensity than do large diameter fuels because they burn more readily and quickly. Large diameter fuels add to fire severity primarily because they burn much longer than fine fuels. Dense stocking levels can lead to crown fires and/or higher rates of stand mortality that make the potential for severe burning conditions more likely. Decreasing stocking levels of Douglas-fir on dry sites can reduce risk related to the potential for severe wildfire. Increasing fire severity results in greater nutrient losses, and promotes erosion by reducing or eliminating protective organic soil layers and by causing the soil to repel water. Therefore, fire severity is usually more important than intensity in determining affects to water quality. For the above reasons, resulting stand and fuel density, composition, and

structure on dry sites will be used to assess wildfire risk. Existing condition for wildfire risk indicators are listed in Table 3-7.

Table 3-7: Existing Condition for Wildfire Risk Indicators

Watershed	Dry Sites at Risk from Severe Fire (acres)
Myrtle Creek (upper)	0
Myrtle Creek (lower)	2179
Yellow Pine Creek	0
Adverse Creek	0
Mack Creek	0
White Pine Creek	0
Jim Creek	0
Peak Creek	0
Slide Creek	0
Toot Creek	0
Cooks Creek	0
Cascade Creek	340
Lost Creek	27
Clark Creek	13

REFERENCE CONDITIONS

Stream Crossing Risk

There is no reference condition for stream crossings. There are no good natural analogs that can create the types and magnitude of disturbance and sediment delivery that stream crossings can cause, especially in headwater streams.

Waterfalls, channel flow intermittency, high water temperatures, and some debris jams are part of the reference conditions that naturally fragment aquatic habitats for various periods of time. In the project area, waterfalls are the predominant form of natural barriers. However, the fact that there are natural fish populations that persist, means that they successfully adapted to these conditions over time. Stream crossings are a new type of migration barrier that has greatly increased the fragmentation in some drainages.

Sediment Production and Delivery

Mass erosion and, to a much lesser extent, surface erosion are part of the natural reference conditions for sediment production and delivery. Prior to fire suppression, wildfire frequently altered the structure and composition of forest stands within the assessment area. At times site conditions following fires would coincide with wet climatic conditions in a season, year, or period of years that would trigger landslides or surface erosion. Several landslides occurred after the 1926 wildfire and can be seen on the 1935 aerial photos in lower Myrtle Creek on the south facing slopes and on stream breaklands. Within the cumulative effects areas, debris avalanches, shallow seated planar slides, and debris torrents were the most common types of failures. Failures were most common along the steep stream breaklands such as those found in Myrtle, Cascade, and Lost Creeks. Other than topographic characteristics such as slope shape and drainage networks, there were no features such as roads on the landscape that would increase the potential for slope failures or surface erosion by intercepting, re-routing, and concentrating water. Other than hillslope rejuvenation caused by streams

reaching a lower base elevation or channel migration, there was no major mechanism such as roads that could cause slope instabilities by undercutting or overburdening slopes.

Wildfire Risk

Prior to active suppression by humans, fire played a dominant role in recycling nutrients and preventing large accumulations of debris and is an important part of the reference condition. On the drier sites, low intensity fires, and fires of mixed severity, would tend to favor fire dependent tree species such as ponderosa pine, western larch, and lodgepole pine and would tend to kill Douglas-fir and grand fir. Under the natural regime, fire would often thin stands on drier sites resulting in lower numbers of trees per acre than what is typical today. Current and projected stand conditions favor more severe, stand replacing fires. Certainly, before fire suppression, some stands would look and function very similarly to current conditions in the project area, but the dense dry site stands would not have been as common and widely distributed as they are today.

DESIRED CONDITIONS

Stream Crossing Risk

On roads that are a necessary part of the transportation system, the desired condition is to have crossings that have a low probability of failure, that would erode and deliver a minimum amount of sediment and debris if a failure does occur, and allow for fish passage. On roads that are unnecessary or are difficult to maintain, the desired condition is to remove the crossings and restore the natural stream gradient, floodplain width, and channel side slopes. Rieman and McIntyre (1993) state that fragmentation and disruption of bull trout habitat will increasingly isolate populations and isolate or eliminate life history forms. This fragmentation and disruption of habitat will lead to problems for populations and ultimately increase the risk of extinction (Rieman and McIntyre 1993). Though bull trout migration is not the principle issue at these barrier crossings that create fragmentation of habitat, since they are not present in that portion of the basin where the road related work activities are planned, it is still important to replace/remove these man-caused barriers for other salmonid migration.

Sediment Production and Delivery

The desired condition is to have slopes and watersheds where roads and harvest units do not create circumstances that unnecessarily or unnaturally increase landslide potential and surface erosion.

Wildfire Risk

The desired condition is to prevent fuel loadings and dense stand conditions that could result in severe wildfires on the dry site, south facing slopes within the project area.

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

This chapter describes the probable environmental consequences of implementing the alternatives described in Chapter 2. This includes post harvest work associated under the action alternatives (e.g., sale area improvement activities and slash disposal). Chapter 4 forms the scientific and analytical basis for the comparison of alternatives. Impacts to resources described are directly linked to the alternative driving issues listed in Chapter 1. Both positive and negative effects are considered. Environmental consequences that relate to issues in Appendix A are not discussed.

Changes Between the Draft and Final EIS

Appendix C provides a list of site-specific BMPs that would be applied under any action alternative. Appendix D has been added, which provides a Forest Plan consistency check for watershed and fisheries standards. Maps of the cumulative effects areas (CEAs) for the alternative driving issues, and other selected wildlife species, are provided in Appendix F of the FEIS. Maps of Forest Plan allocated old growth, and non-allocated old growth, that would be affected by the proposed alternatives are provided in Chapter 4. Additionally, estimated changes in sediment production from existing condition for Alternatives 2, 3, and 4, have been updated to reflect the cumulative impact from logging that occurred on private land in the summer of 2000 (Chapter 4, pages 4-33 through 4-36, Tables 4-3 through 4-8). Some reasonably foreseeable actions listed in the DEIS have been eliminated from discussion after it was determined their boundaries do not overlap with the CEA of this project. A discussion roadless has also been added to the end of Chapter 4.

FOREST VEGETATION - Forest Disturbances

Alternatives 1 and 5

The old belief in a steady-state forest has led scientists and others to assume that undisturbed forest structure or development pattern is natural and therefore conducive to sustaining biodiversity and sustainability. The steady-state paradigm of forest development has prevailed at different times in the thinking of foresters, conservationists, ecologists, and politicians for some parts of the past century. The paradigm has led to the management policy of stopping all fires, to the ecological theories of disturbances destroying a steady-state ecosystem, to the policies of reducing clearcuts and trying to stop stream siltation events, and to the political assumption that stopping all human activities in the forests would mitigate loss of endangered species (Johnson et al, 1994). The steady-state paradigm for forest ecosystems has lost credit among plant ecologists during the past years (Oliver and Larson 1990, Picket and White 1985, Stevens 1990). Ecosystem management is based on the understanding that forested ecosystems are constantly changing with or without human intervention. Figure 4-1 is a photograph of unit MC06, a typical dry forest old

Figure 4-1 – Typical dry forest old growth stand in the project area. Under Alternatives 1 and 5 the understory Douglas-fir and grand fir would continue to encroach on older ponderosa pine.

growth stand in the project area. This photograph, taken in the summer of 2000, shows how the smaller diameter Douglas-fir have encroached on the old growth ponderosa pine after more than 70 years of fire suppression. Figure 4-2 provides a Forest Vegetation Simulator (FVS) illustration of the same stand.

Currently, there is no "let it burn" policy for the Myrtle-Cascade area. Therefore, active fire suppression is expected to continue in the area. Continued fire suppression, and no silvicultural treatments, would further trend vegetation patterns away from historical conditions. Morgan and others (1994) stated that when ecosystems are outside their historical range of variability, changes may occur dramatically and rapidly. Figure 4-3 illustrates a long-term projection of a similar stand where Douglas-fir and grand fir have taken over, pine and larch have been eliminated, and natural fuels have built up increasing the risk of stand-replacing fire over time. An investment of money, energy, or human effort may be required to counter processes that would change the desired state of the ecosystem. In other words, ecosystems outside their historical range will be much more susceptible to catastrophic changes from fires and insects and diseases. Consequently, these forests will be much more costly and difficult to manage in the future.

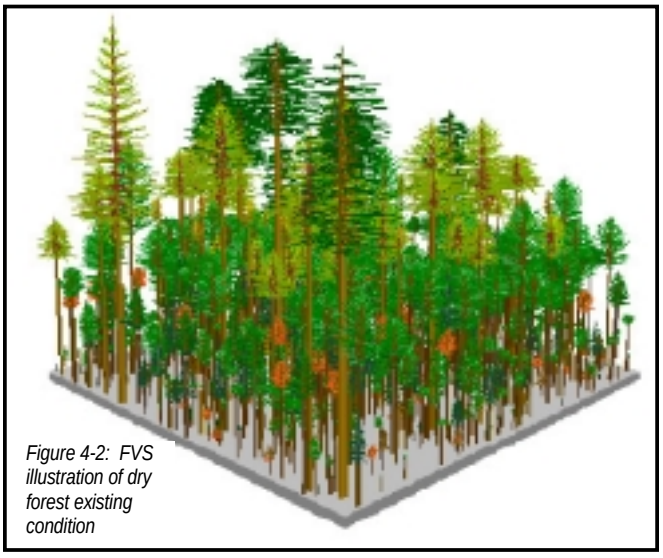


Figure 4-2: FVS illustration of dry forest existing condition

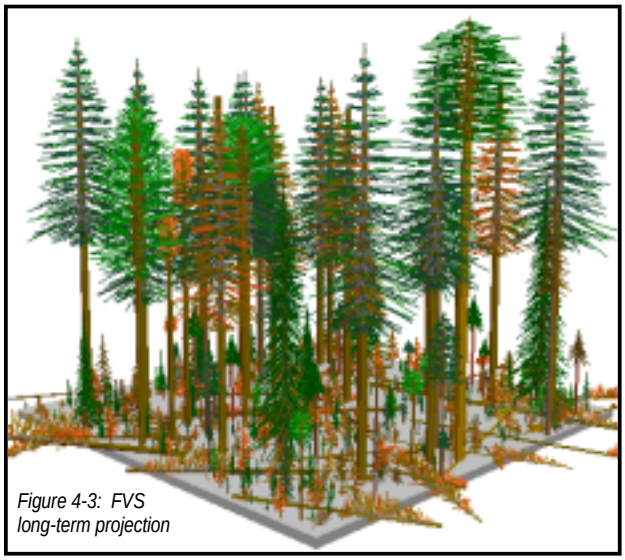


Figure 4-3: FVS long-term projection

Alternatives 2, 3, and 4

From the standpoint of forest vegetation the biggest concern at this time is to reduce natural fuel loads on the dry forest types where fires have been excluded for over 70 years. Proposed silvicultural treatments and prescribed fire in dry forest types would create more open stand structures, thereby improving tree vigor and reducing vulnerability to insects, diseases, and severe fire. One of the primary advantages of silvicultural cutting is that it allows for the controlled removal of specific trees in terms of number, size, species, and location (Fielder 1996). Each of these alternatives initiates the process of restoring dry forest types to conditions that more closely resembles historic

Figure 4-4: Long-term target stand objective for dry forests stands

levels of tree species (ponderosa pine and western larch) and stand structure (open-grown). Alternatives 2 proposes treating more acres than Alternatives 3 or 4, providing a greater measure of natural fuel hazard reduction and reducing the likelihood of insect and disease outbreaks on dry forest types. In the long-term open grown stands of large-diameter ponderosa pine and western larch would be developed, as shown in Figure 4-4. Figure 4-5 provides a Forest Vegetation Simulator (FVS) illustration of a typical dry forest type target stand featuring retention of large-diameter ponderosa pine and western larch.

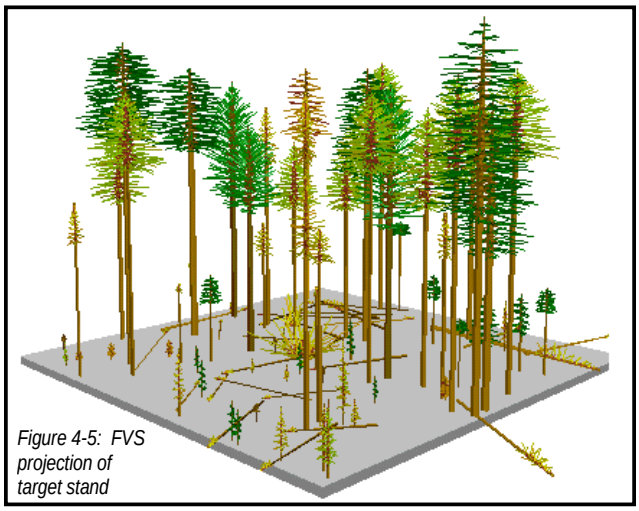


Figure 4-5: FVS projection of target stand

The loss of western white pine as a significant component of moist and cool/moist forests in the project area is also a major concern. Converting many of these forests to well-spaced stands of genetically improved western white pine would reduce hazardous fuel ladders that have built up in these forest types. In addition, western larch, which is highly resistant to fire and insects and disease, would also be a featured species in these forest types. In the long-term, promoting the development of more open grown stands of white pine and larch, a missing component of the landscape, through the use of silvicultural treatments and prescribed burning would reduce the risk of high severity fires. Consequently, when fires burn in these stands they will burn with less intensity and will be easier to control. These three alternatives initiate the process of restoring this missing component of the Myrtle-Cascade landscape, although by varying degrees, providing a greater measure of natural fuel hazard reduction and likelihood of insect and disease outbreaks on moist and cool-moist forest types.

Forest Composition

Alternatives 1 and 5

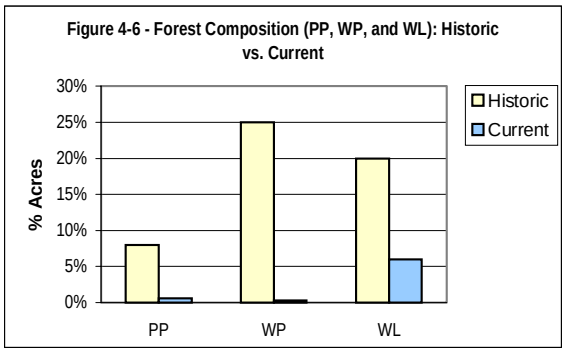
On drier sites Douglas-fir and grand fir would continue to dominate and western larch and ponderosa pine would fail to regenerate in the absence of canopy openings created by fire or silvicultural treatments. Douglas-fir and grand fir are both more susceptible to insect and disease problems than pine and larch. These species also tend to "hog" nutrients like potassium, which plays a critical role in forest health. Ponderosa pine and western larch accumulate fewer nutrients in their foliage leaving more available in the soil (Moore 1995). Given that these dry sites already have a limited supply of moisture and nutrients, stocking excessive numbers of Douglas-fir and grand fir on them would further limit their productivity.

In the moist forest types succession would continue toward the development of closed canopy stands of Douglas fir, grand fir, western red cedar, and western hemlock. Western white pine would continue to succumb to blister rust. Western larch is a species that grows fast and lives long, but requires lots of direct sunlight to establish itself. Without either natural (fire or pathogen-caused) or human thinning, larch would drop out of most stands sometime in the future and not maintain the ecological role it had prior to Euro-American settlement and fire suppression (Zack 1995). Even-aged silviculture systems best fit the ecological requirements of larch and white pine forests (USDA 1990). Both species would fail to regenerate without forest openings and they would eventually become insignificant components of these stands.

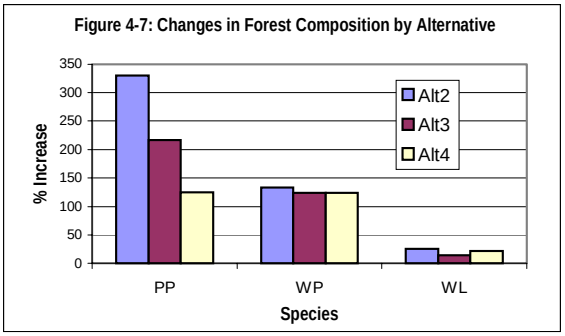
With continued fire suppression subalpine fir and Engelmann spruce would continue to dominate the cool/moist forest types. Where lodgepole pine is currently a major component of these forests this species would gradually die out and be replaced by spruce and fir. Dead and dying lodgepole pine would combine with spruce and fir, in both the understory and overstory, to form a continuous layer of ladder fuels. For lodgepole pine, which is very intolerant of shade (USDA 1990), to resume the role it played historically in these forest types large-scale forest openings would have to be created through fire or silvicultural treatments. Subalpine fir, which is more susceptible to insect and disease attacks, would generally die out sooner than Engelmann spruce. Covington et al (1994) found that where subalpine landscapes contain increasingly continuous stands of mature Engelmann spruce and subalpine fir they may be increasing in flammability and vulnerability to insects and disease. These conditions bode well for an eventual stand replacing fire in these forest types. Finally, without disturbance western larch and white pine would be expected to drop out of these stands.

Alternative 2, 3, and 4

Figure 4-6 demonstrates that the composition of ponderosa pine, white pine, and western larch are well below estimated historic levels in the Myrtle-Cascade area. Historically, it is estimated that ponderosa pine was the major species on about 8% of the area, or about 2,400 acres. Currently, ponderosa pine is the primary species on 0.6% (about 170 acres) of the forested acres in the Myrtle-Cascade area. Prior to the introduction of blister rust white pine was a major species on an estimated 21% of the forests in the area. Today white pine is a major species on only 0.3% (90 acres) of the forests in the Myrtle-Cascade area. Historically, western larch was the major forest species on an estimated 19% of the forested landscape. Western larch is now the major species on about 6% (1,830 acres) of the forested acres.



Silvicultural treatments would be used in conjunction with prescribed fire to begin the restoration of ponderosa pine, white pine, and western larch toward historic levels on the Myrtle-Cascade landscape. Where they currently exist in the overstory the most vigorous ponderosa pine, white pine, and larch would be maintained in treated stands. Where regeneration harvests are prescribed these species would be restored through planting. All of these alternatives restore these species to some extent; however, Alternative 2 would restore the greatest number of acres of these seral species. Alternative 2 would increase the acres where ponderosa pine is the dominant species by an estimated 330%, white pine by 130%, and larch by 25%. Figure 4-7 compares the level of restoration each alternative would generate for these species. Restoring these species to the Myrtle-Cascade landscape would improve overall ecosystem health by replacing overcrowded forests of Douglas-fir, grand fir, western hemlock, cedar, and subalpine fire with open-grown stands of ponderosa pine, white pine, and western larch. These species are typically more resistant to fires (especially ponderosa pine and western larch) and insects and disease problems than the species they would be replacing. In particular, planting of blister rust resistant stock is needed to obtain substantial white pine



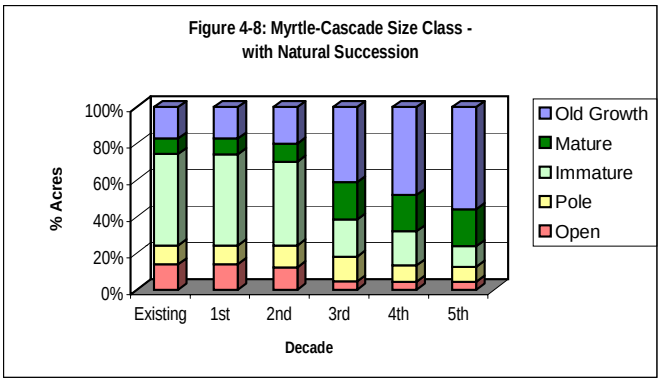
regeneration, which was dominant in many stands prior to the advent of white pine blister rust (Byler et al, 1994).

In northern Idaho and central Oregon lodgepole pine stands begin to break up at 80 to 100 years (USDA 1990). Cooper et al (1991) reported that lodgepole pine dies out in cool/moist forest types within 120 to 160 years after establishment. In these areas mountain pine beetle and other agents of mortality will eventually eliminate lodgepole pine (Smith and Fischer 1997). Historically, the mountain pine beetle invaded these stands creating large amounts of fuel that would eventually result in stand replacing fire. Under Alternative 2 (292 acres) and Alternative 3 (174 acres) overmature lodgepole pine would be harvested to reduce the risk of mountain pine beetle infestation and other injurious agents in these stands.

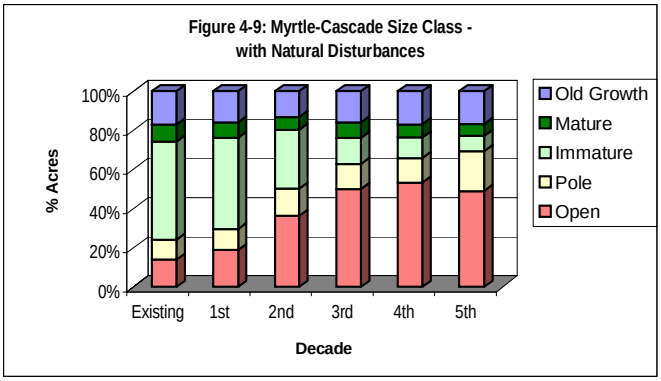
Forest Structure

Alternatives 1 and 5

Changes in forest structure are subtle until they are looked at over a longer period of time. Currently, mature forests dominate the landscape. Figure 4-8 projects forest succession with no natural disturbances in the Myrtle-Cascade landscape using the SIMPPLLE model. The simulation depicts a landscape that would be dominated by old growth forests (greater than 50% of the landscape) in 50 years, assuming no disturbance. Smaller size classes would continually grow into larger classes, and forest openings would eventually become a very small part of the landscape. Hunter (1990) states that a forest landscape with many forest structures represented will be more diverse and have more kinds of wildlife than a landscape with any single forest structure. Under the no action alternative forest diversity is projected to decrease over time (with continued fire suppression and no silvicultural treatments) and the distribution of forest structures would be outside the historic range of variability. In particular, the amount of old growth and mature forests would be much higher and the amount of forest openings will be much lower.



However, the assumption that the landscape would develop without natural disturbance is somewhat dubious. This scenario is presented as a contrast to a more likely scenario presented in Figure 4-9. In this scenario another 50-year SIMPPLLE simulation was conducted assuming natural disturbances would continue to be a part of the landscape. In this simulation nearly 4,400 acres were projected to burn each decade. When compared to actual fire history data (Figure 3-1, page 3-2) SIMPPLLE appears to over estimate the average acreage that would burn in the future. Fire history records reveal that an estimated 1,300 acres burned every decade prior to 1926 (before active fire



suppression). However, the data also shows that prior to 1926 relatively lighter burning periods were followed by periods of excessive burning. In these instances more than 4,000 acres burned in several decades. Given that fires have essentially been eliminated from the landscape for nearly 75 years it is possible that in the next five decades the amount of acreage burned would exceed the historical average of 1,300 acres. With no treatments the risk of stand-replacing fire on dry site forests would continue to increase over time. In summary, the "No Action Alternative" does not to equate to "No Change." These SIMPPLLE simulations provide a possible look at future landscapes based on historic disturbance patterns.

Alternative 2 and 3

Units MC23 and MC24, under both alternatives, include cool-moist forest old growth that was not allocated to the Forest Plan strategy (see Figure 4-10 and Figure 4-11). The proposed prescription for these units would be a group selection treatments where only lodgepole pine would be removed. Some openings of up to three acres would be created in these units where high percentages of lodgepole pine currently exist. In these openings the residual forest canopy would be about 20%. In portions of the stand where lodgepole pine is not such a heavy component the residual forested canopy will exceed 50%. Throughout the units none of the larger-diameter (spruce, fir, larch, etc.) that are providing the old growth structure would be harvested. In summary, these units will still meet the minimum criteria for this old growth type after the lodgepole pine is removed.

Alternative 2

Alternative 2 would include harvest in dry-site old growth that was allocated, and old growth that was not allocated to the Forest Plan strategy. Alternative 2 includes 230 acres (MC05-MC11, MC18 and MC19) of harvest in allocated dry forest old growth and 45 acres (MC22) of harvest in non-allocated dry forest old growth. These treatments are designed to remove the smaller-diameter Douglas-fir and grand fir that have become established during seventy years of fire suppression, and leave the large-diameter ponderosa pine and western larch. Mechanical removal of these smaller diameter trees, followed by prescribed burning, will restore these stands to a more open grown character that existed historically.

SIMPPLLE modeling estimates that Alternative 2 would reduce the probability of a stand replacing fire on the dry sites by about one-third relative to the No Action alternative over the next 5 decades.

Alternative 3

Alternative 3 includes 163 acres (MC05, MC06, MC18 and MC19) of harvest in allocated dry forest old growth and 45 acres (MC22) of harvest in non-allocated dry forest old growth.

This alternative would include 90 acres of harvest in allocated moist forest old growth and 10 acres that was not allocated (Figure 4-12). Partial cutting (sanitation-salvage and commercial thinning) in M03, M04, M10, M11, and M14 would not change the old growth character of these stands. However, unit M05 would convert 31 acres of allocated old growth to a forest opening using a shelterwood harvest. This would result in a decrease of moist forest old growth of less than one percent in the Myrtle-Cascade area.

SIMPPLLE modeling estimates that Alternative 3 would reduce the probability of a stand replacing fire on the dry sites by about twenty-eight percent relative to the No Action alternative over the next 5 decades.

Figure 4-10: Alternative 2 units (Myrtle-Cascade) in old growth

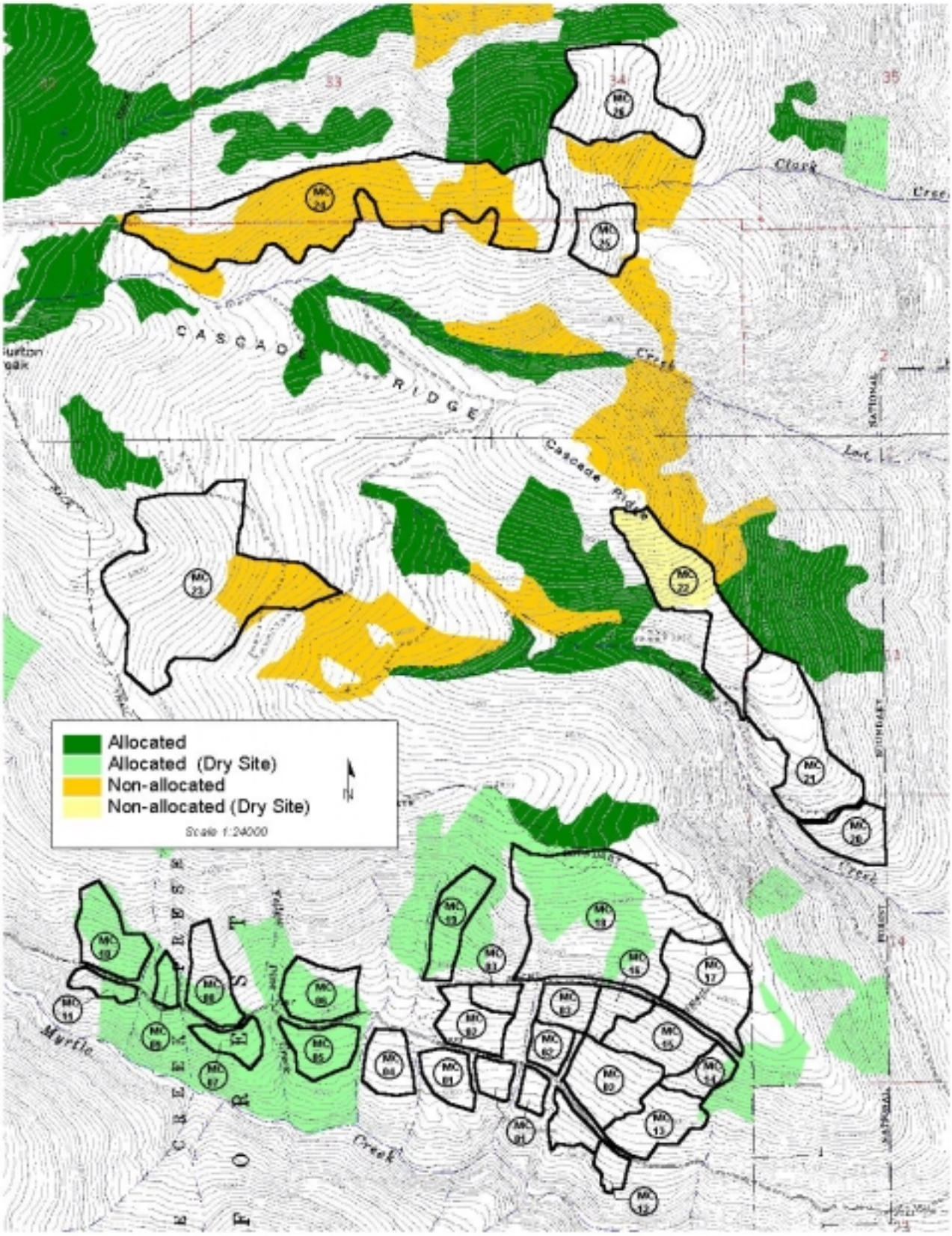


Figure 4-11: Alternative 3 units (Myrtle-Cascade) in old growth

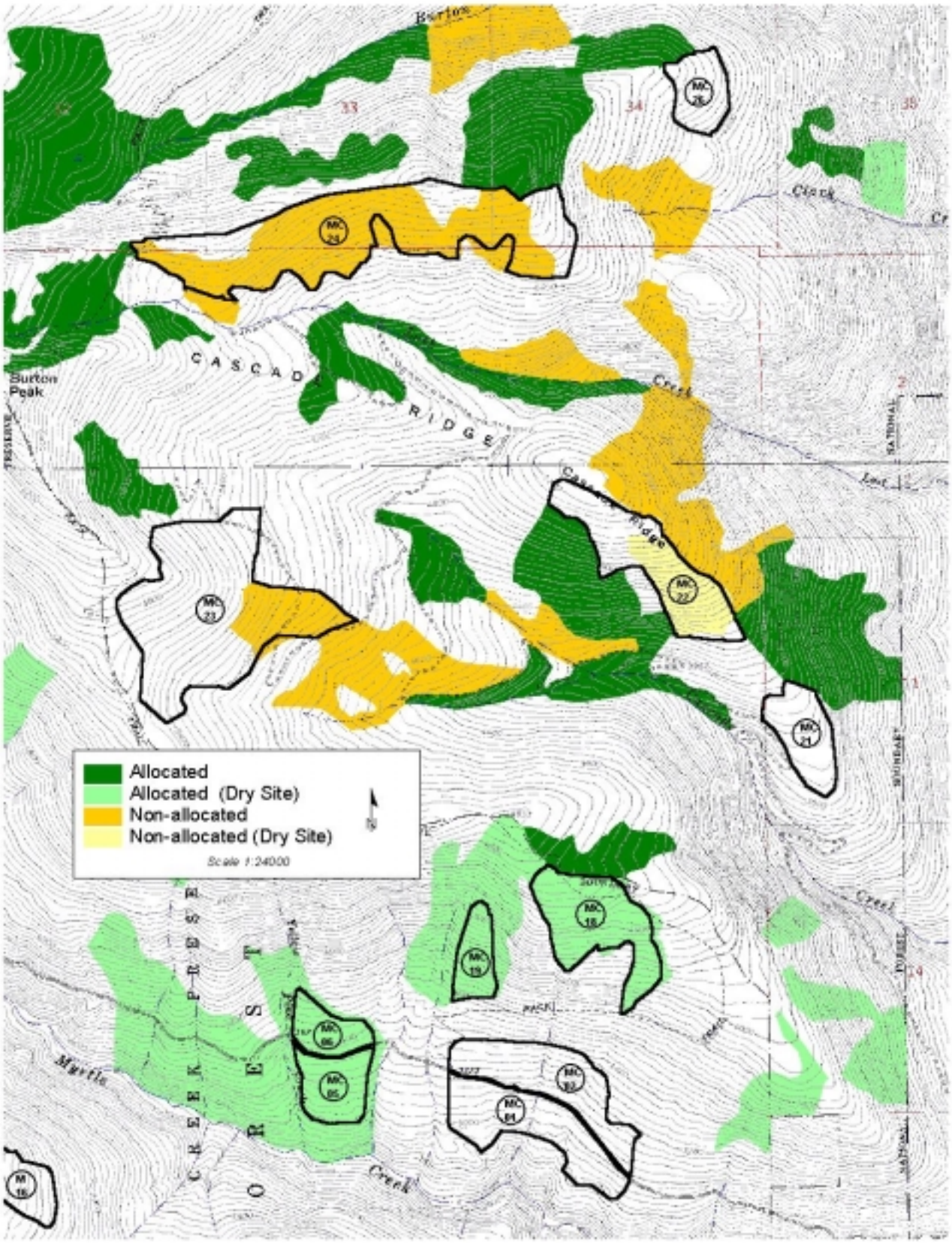
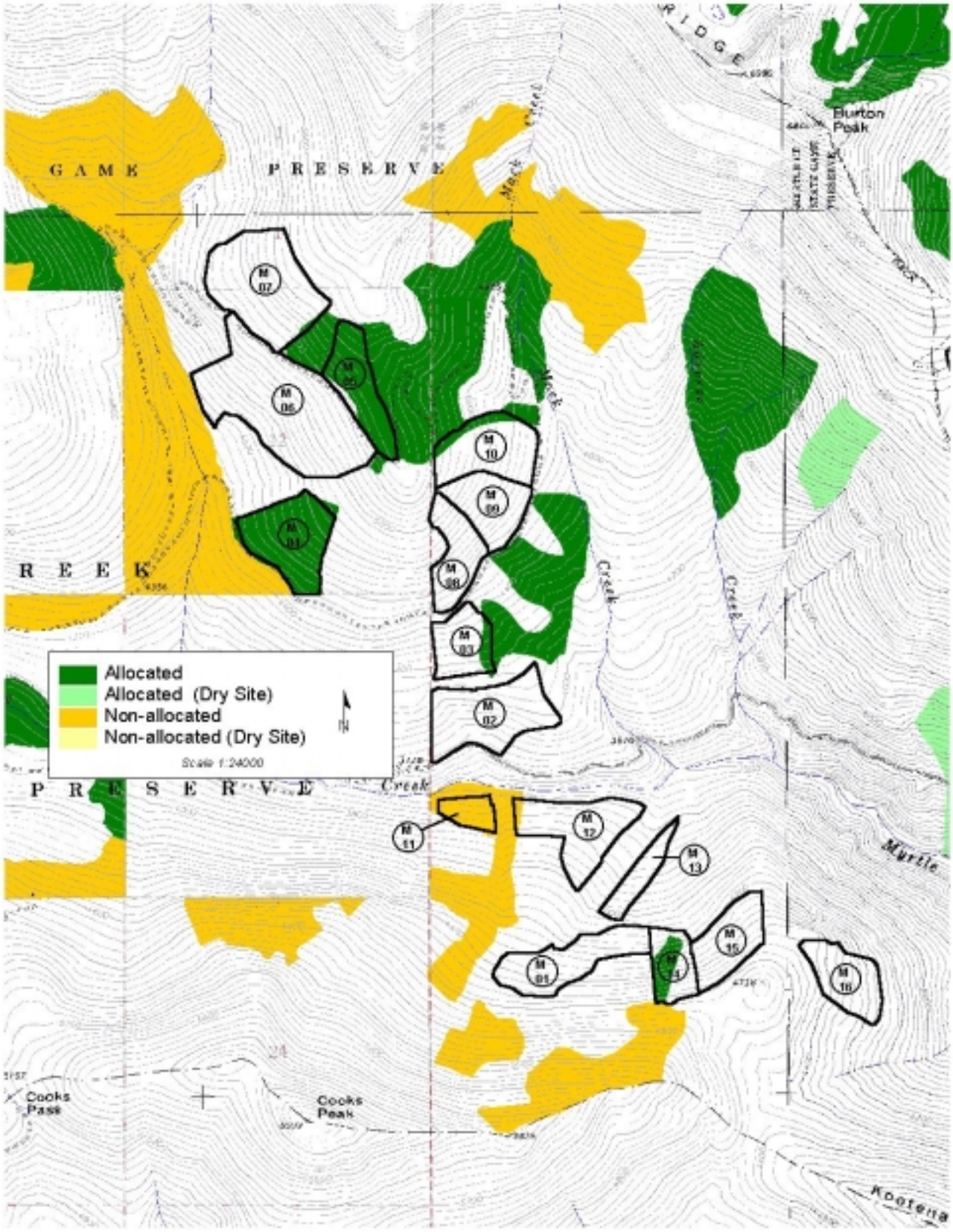


Figure 4-12: Alternative 3 units (Mack-Creek) in old growth



Alternative 4

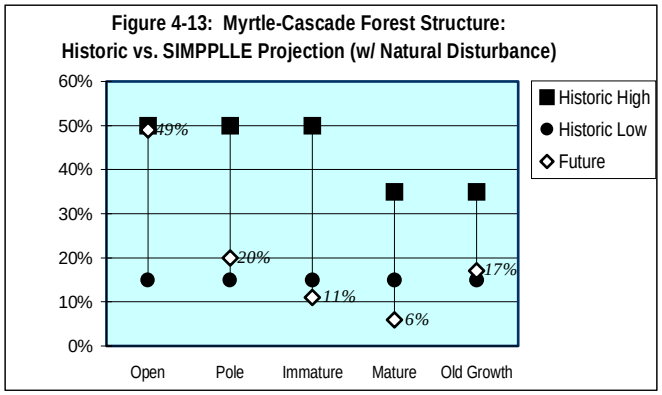
This alternative includes no harvest in allocated or non-allocated old growth.

SIMPPLLE modeling estimates that Alternative 4 would reduce the probability of a stand replacing fire on the dry sites by about twenty-five percent relative to the No Action alternative over the next five decades.

Alternatives 2, 3, and 4

All of these alternatives begin to trend the Myrtle-Cascade landscape toward historic levels of forest structure on dry forest types by reducing the number of small-diameter Douglas-fir and grand fir and favoring open-grown stands of ponderosa pine and larch. All of the alternatives would increase the percentage of forest openings in the project area, which are near the lower end of the historic range, but each alternative would reduce the current average patch size of about 165 acres. Alternatives 2 and 4 would reduce average patch size by less than one acre, while Alternative 3 would reduce average patch size by about four acres. In conclusion, none of these alternatives would significantly alter landscape structure and composition in the long-term. Significant changes in landscape pattern would require treatments similar to those proposed in these alternatives, but with larger patch sizes, over an extended period of time.

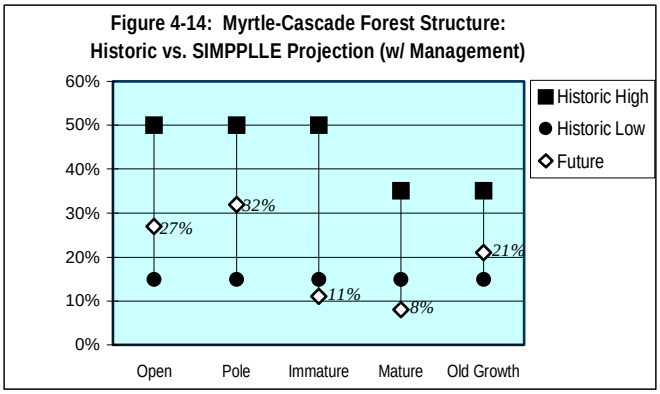
Long-term Management Scenario



The SIMPPLLE model was used to simulate changes in structure if landscape treatments were to continue into the future. Under this scenario roughly 1,300 acres, or 4% of the project area, were simulated for harvest over the next five decades using a variety of silvicultural treatments. Natural disturbances were also included as part of this simulation. The 1,300 acres represents the average acreage burned in the project area prior to active fire suppression. To represent a more natural fire mosaic the simulated treatments were concentrated in one geographic area, rather than being spread out in 40-acre blocks that were typical of past management. Figure 4-13 projects what the landscape could look like in fifty years with continued treatments. Estimated historic forest structure highs and lows are compared to simulated results in Figure 4-13. When compared to existing forest structure (Figure 3-2, page 3-5) younger forests (openings and pole stands) are projected to dominate the landscape. Old growth is projected to fall within the historic range, while immature and mature forests would be lower.

Figure 4-14 projects what the same landscape might look like with natural disturbances and no silvicultural treatments. Under this scenario 49% of the landscape is projected to be in forest openings, compared to 27% with the continued treatment scenario. The reason for such a high percentage of forest openings is that the SIMPPLLE model projects a 20,000-acre fire, roughly two-thirds of the project area, to occur at some time during the next fifty years. Given the fire history of this area such a fire would certainly not be outside the historic range. The model estimated that the risk of stand replacing fire would be reduced by 25% under a scenario of continued silvicultural treatments. The risk of stand replacing fire on dry forest types would be reduced by nearly 45%. In roadless areas, SIMPPLLE estimates the risk of stand replacing fire would be 20%

higher than roaded areas. Finally, the estimated cost of fire suppression would also be reduced by 50%. These cost savings could be significant when suppression costs are estimated in millions of dollars. This model is presented to display that long-term management scenarios will be required to return the landscape to its historic structure. Solutions to creating historic vegetation patterns would include returning fire to its historic role, or using silvicultural treatments together with prescribed fire as proposed under Alternatives 2 and 3. A "let-burn-policy" will not likely be a viable alternative in the Myrtle-Cascade area, especially given that Myrtle Creek is the municipal watershed for the city of Bonners Ferry. Therefore, it appears that silviculture and prescribed fire will be needed to return the landscape to vegetative patterns that resemble historic conditions



Reasonably Foreseeable Actions

The Bonners Ferry Ranger District Salvage sales EIS is scheduled for FY 2001. A proposed action has been developed and is scheduled for release in the summer of 2000. Harvest of these trees is proposed to reduce hazardous fuels, to restore productive stand conditions and/or ecological functioning in areas affected by windstorms, insects, disease and other damaging events. The vegetative objectives of this proposal are consistent with the objectives of the Myrtle-Cascade EIS. The cumulative effects of this project would contribute toward vegetative restoration in the Selkirk Mountains.

The Forest Service Roadless Area Conservation Project (RACP) initiated by President Clinton is a reasonably foreseeable action. The preferred alternative would prohibit road construction, reconstruction, and timber harvest except for stewardship purposes within inventoried roadless areas. The effects of the preferred alternative are represented in the range of alternatives analyzed for Myrtle-Cascade. Therefore, the analysis done for Myrtle-Cascade represents the reasonably foreseeable site-specific effects of the preferred alternative in the RACP on forest composition and structure.

The Bonners Ferry Douglas Fir Beetle EA was prepared in October 1999. The effects of proposed harvest included in this EA were incorporated as baseline information for the vegetative analysis in the Myrtle-Cascade EIS.

CONSISTENCY WITH FOREST PLAN

Old growth

These forests have a unique structure and composition that provides critical habitat for a wide range of plants, animals, and other biota. Forest Plan direction is to maintain at least 10 percent of the forested portion of the IPNF as old growth. For distribution purposes at least 5% of each old growth management unit must be maintained as old growth. The Myrtle-Cascade assessment area is included within old growth management units (OGMU) 13 and 14. As part of the IPNF Forest Plan strategy, 14% of the total forested area (roughly 51,000 acres) on Bonners Ferry Ranger District was allocated for old growth management, as directed in a letter from the Forest Supervisor on May 7, 1991. In the Myrtle-Cascade assessment 17% of the forested

landscape (about 5,300 acres) was allocated as old growth. Another 9% (about 2,700 acres) of the landscape meets the minimum old growth standards, but was not allocated as part of the Forest Plan strategy.

Alternative 1

This alternative includes no entry into allocated, or non-allocated old growth. Forest Plan standards for old growth maintenance and distribution would be met. However, the long-term integrity of dry forest old growth would be somewhat dubious given the risk of stand-replacing fire would continue to increase over time. Historically, this type of old growth was characterized by open-grown stands of large diameter ponderosa pine and western larch that were maintained through frequent underburning. A fire history study conducted by Zack (1994) in the Myrtle Creek drainage revealed that the average fire return interval on these sites was about 40 years, with the shortest return interval of 17 years and the longest interval of 74 years. Stands where treatments are being proposed last burned in 1926, or 74 years ago. On an individual stand basis 74 years is within the historical range, however, from a landscape perspective the entire dry-site landscape in the Myrtle-Cascade area has had 74 years of fire exclusion. This landscape level fire exclusion is outside the historic range.

Alternative 2

This alternative includes entry into allocated, and non-allocated, dry forest old growth. Treatments would be designed to restore the historic integrity of this type of old growth. In the long-term these conditions would be more sustainable. Alternative 2 includes partial cutting in non-allocated old growth (MC23 and MC24), which would not change the old growth character of these stands. This alternative would result in no net loss off allocated old growth. Consequently, Forest Plan standards for old growth maintenance and distribution would be met.

Alternative 3

Alternative 3 would include partial cutting in allocated and non-allocated old, but these treatments would not change the old growth character of these stands. Unit M05 would convert 31 acres of allocated old growth to a forest opening using a shelterwood harvest. This would result in a decrease of allocated old growth of less than one percent in the Myrtle-Cascade area. However, Forest Plan standards for old growth maintenance and distribution would still be met.

Alternative 4

This alternative includes no entry into allocated, or non-allocated old growth. Forest Plan standards for old growth maintenance and distribution would be met. Long-term integrity of dry forest old growth would be somewhat dubious given the risk of stand-replacing fire would continue to increase over time. However, treatments in mature dry forests would be designed to trend stands toward old growth characteristics.

Alternative 5

This alternative includes no entry into allocated, or non-allocated old growth. Forest Plan standards for old growth maintenance and distribution would be met. However, the long-term integrity of dry forest old growth would be somewhat dubious given the risk of stand-replacing fire would continue to increase over time.

Reforestation

Alternative 2, 3, and 4

Regeneration harvests are proposed for stands in all action alternatives. Site preparation and fuels reduction activities are planned to provide appropriate sites for planting. Following site preparation, usually underburning, regenerated stands would be planted with seral species (white pine, larch, and ponderosa pine) to promote stand structures and species composition, which reduce susceptibility to insect and disease damage. This is consistent with Forest Plan direction that "reforestation will feature seral tree species". All stands proposed for regeneration harvests are on lands suitable for timber production and can be adequately restocked within five years of the final harvest. As directed by the Forest Plan, stands would be regenerated with trees from seed that is well-adapted to the specific site conditions, and would be regenerated with a variety of species (Timber Standard 4 and 5, page II-32).

Forest Openings

Alternative 2, 3, and 4

Created openings would be blended to the form of the natural terrain as much as practicable. The Forest Plan states that creation of openings larger than 40 acres must conform with current Regional guidelines regarding public notification, environmental analysis and approval. The DEIS informed the public that openings of greater than 40 acres would be created. Openings would no longer be considered openings when both vegetation and watershed conditions meet management objectives established for the management area. Openings on adjacent private lands were considered in the analysis of effects of the alternatives (Forest Plan, Timber Standards 7 and 8, page II-32).

Lands Suitable for Timber Production

Alternative 2, 3, and 4

These alternatives include lands that were designated as unsuitable for timber production in the Forest Plan (MA9). The Forest Plan (Timber Standard 3, page II-32) allows for changes in land suitability classification based on recommendations of a certified silviculturist. In accordance with this standard lands within the units listed below have been field reviewed and re-classified as suitable for timber production:

- Alternative 2: MC02, MC03, MC07, MC08, MC09, MC10, MC11, MC17, MC18, and MC19
- Alternative 3: MC02 and MC19
- Alternative 4: MC02, MC03, and MC17

WOODLAND CARIBOU

Throughout the discussion on effects of this project on woodland caribou, it should be kept in mind that the HCI/HSI model used to identify suitable habitat is a mid-scale model and can not distinguish canopy covers at a fine scale by tree species. Ground-truthing has been done to determine if a given treatment would reduce the suitability of a stand based on the prescription, the existing and residual condition, seasonal habitat, and configuration of tree species in the stand. For instance, the model will likely rate a stand as suitable (HSI>=0.5) even if the canopy cover required to achieve that rating includes a high proportion of lodgepole pine or other tree species that do not contribute to the overall structural characteristics required by caribou. This is because the model differentiates current cover type suitability if the desired cover types (i.e. spruce/fir or cedar/hemlock) dominate the stand's total basal area (i.e. >=50% basal area). So, a stand with 48% lodgepole/52% spruce/fir in the basal area will still be rated by the model as suitable (HSI>=0.5) for caribou (all other variables being suitable). In reality, however, caribou generally avoid lodgepole stands in this ecosystem. The discussion of effects is further complicated by the fact that HCI/HSI ratings are run at the stand level—not for an entire harvest unit. This is because the best data is available for timber stand vegetation plots is done at the stand level. Hence, the overall harvest unit can have sections of high and low HSI ratings. So, in the example concerning lodgepole, when this species is removed during a harvest operation, a stand will likely increase in suitability--particularly if it is managed to protect and enhance the remaining spruce/fir trees. As long as the canopy is not reduced to levels below typical caribou use (i.e. generally < 25%), the stand generally remains suitable for all spruce/fir seasons. If lodgepole pine is clustered in a given area, that microsite (which would be too small to be detected in the database or model) is not suitable habitat anyway, so harvesting it would not reduce suitability. Finally, the small openings may be beneficial to caribou because these sites can produce attractive caribou forage used during the spring and summer seasons (Allen 1998a).

Effects Common to All Alternatives

- Disturbance and/or Increased Mortality

Disturbance and/or increased mortality for caribou due to human activities (i.e. harrassment, poaching and/or legitimate hunting) will remain the same under any of the alternatives. Existing road access, or mechanical activities associated with road obliteration or timber harvest will not increase the likelihood of displacing animals in the existing Two Mouth Lakes herd, largely because these access points and proposed activities are 2-6 miles away from the herd's activity centers. Furthermore, it is extremely unlikely that the existing small population would alter their center of activity to areas closer to the proposed activities. Hence, roads opened for planned harvest activities or associated harvest activities pose little-to-no threat of increased mortality or displacement to the remaining caribou herd.

The existing Two Mouth Lake herd is currently afforded good winter security from snowmobiling activity by the 1994 snowmobiling closure. Levels and distribution of snowmobiling activity are unlikely to increase within this CMU with any of the alternatives in the near future. More specificially, road reconstruction and/or obliterations will not increase the access or attractiveness of these areas for snowmobiling above current use.

- Available Caribou Habitat

For all alternatives, the CMU trend in currently suitable seasonal habitat is towards larger, older trees. This is particularly important for early and late winter spruce/fir habitat because of the increased amount lichen available for caribou on older trees. However, the majority of suitable high elevation habitat in the eastern Selkirks is currently rated as mature (100-149 years old) and old growth (150 years and older). Arno and Davis documented stand-replacing fire intervals in spruce/fir types in the western Selkirks of >150 years. Hence, this forest cover type is likely at increasing risk for catastophic wildfire stand replacement throughout the ecosystem. This is substantiated by the IPNF wildfire risk assessment (Harkin et al. 1998). Although some stand replacement is necessary in order to maintain caribou habitat across the landscape in the long-term, distribution and size of these stands needs to provide quality habitat in a suitable mosaic across the landscape.

Direct and Indirect Effects

Alternative 1 and 5

These alternatives would retain the amount and quality of habitat currently available. For the short-term, this would imply conditions would continue essentially as they are today. For the longer-term, the stands proposed for treatment to reduce fire danger would not be treated. This would continue the incremental trend towards increased fire risk in caribou habitat. This increased fire risk is likely to cause a catastrophic stand replacing fire in caribou habitat at some point in the future. It is impossible to predict a time or exact location, but fire risk assessments have determined that it is likely to occur. The SIMPPLLE model predicted that risk of stand replacing fire would increase by about 10% in the short-term under no action. In the long-term, the model predicts the risk of stand replacing fire would be roughly 25% higher under no action versus a scenario of continued silvicultural treatments. These conclusions appear to be supported by fire research. Although lightning strikes are frequent in the subalpine forest types (Arno and Davis 1980; Fowler and Asleson 1984), where much of the key caribou habitat is located, few large fires apparently originated in these stands (Barrett 1982). Most large fires probably moved in from drier sites during severe fire weather. Therefore, treatments that reduce the risk of severe fire in drier stands could reduce the risk of severe fire in neighboring stands, as predicted by the SIMPPLLE model.

An indirect effect of implementing these alternatives would be to perpetuate the loss of western larch throughout the treatment areas. This species is a frequent component of cedar/hemlock stand structure and is also found in many spruce/fir habitat types (Cooper et a. 1991). Western larch produces a long-lasting snag, which can serve as lichen seed sources for surrounding trees (Schroeder 1974). This could be ecologically significant in terms of severe fire events, which typically remove most conifer species, with the exception of western larch, the most fire resistant species in northern Idaho (Smith and Fischer 1997). Distance from a lichen propagule seed source is often a key limiting factor in germinating lichen growth in second-growth stands (Stevenson et al. 1994).

Alternative 2

One proposed regeneration harvest (M05) in the CMU would be located adjacent to mature and old growth forests. Past regeneration harvests are also part of the forested matrix, but are not adjacent to proposed regeneration harvests. Ten of the proposed units have capable habitat that is not currently suitable ((Figures 4-15 through 4-17). None of the treatments proposed for this alternative would trend the condition of the capable stands away from suitability.

Unit M05 is located within capable early winter cedar-hemlock habitat. This unit is located adjacent to mature and old growth forests. Past regeneration harvests are also part of the forested matrix, but are not adjacent to proposed regeneration harvests. This unit meet all of the requirements for suitability (i.e., elevation, slope, habitat type, canopy cover and age) with the exception of tree size, which averages less than 7 inches (dbh). When average tree size is below 9 inches (dbh) for a given stand, the habitat suitability index (HSI) rating will default to zero. Such is the case for this unit. Essentially this unit is considered overstocked and would not respond favorably to intermediate treatments, such as commercial thinning, due to poor live crown development. In such stands where thinnings are conducted, decades may pass between the release of trees with small live crowns and their increase in diameter and height growth – if they increase at all. A previously crowded tree is physically susceptible to stem buckling or tipping immediately after release because of its small diameter relative to height. Severely repressed trees are not usually considered capable of responding to release because periodic strong winds, freezing rains, wet snows, or other factors can exacerbate their instability long before they grow stable (Oliver 1996). Historically, these forests were characterized by mixed severity fire regimes and small, nonlethal burns. Stand replacing fires occurred every 200-250 years in these forest types (Smith and Fischer 1997). Consequently, dense stands have developed in the absence of low severity fire, which is linked to a decrease in vigor and crown volume of western larch and thus a reduction in fire resistance (Zack 1992). Proposed regeneration harvests would reduce canopy cover to below 30% in the short-term, but subsequent silvicultural treatments (thinnings, weedings, cleanings, etc.) would allow for better control of stand density and species composition, factors that cannot be controlled without treatments.

MC23 and MC24 are capable woodland caribou late winter and early-winter spruce-fire habitat. However, only portions of MC23 are currently rated as suitable (Habitat Suitability Index – HSI >= 0.5). The majority of MC23, and all of MC24, have HSI ratings of 0 - 0.4, which is too low to be considered suitable. Average size (less than 7 inches dbh) and average stand age (less than 120 years) are the factors that are limiting suitability at this time. Spruce and subalpine fir are the dominant species in this unit, but lodgepole pine is also a significant component. Some openings will be created, up to three acres in size, where lodgepole pine is the dominant species. Based on the HSI model for caribou these areas dominated by lodgepole pine would actually receive a habitat rating of zero. Following harvest, canopy coverage in these openings would be less than 25%, and given there would be no underburning for site preparation understory would be primarily spruce and fir (Ferguson 1994), with a scattered overstory of western larch. Total area in openings would be about one quarter of these stands. In areas where lodgepole is only a minor component of this unit, residual canopy coverage would be in excess of 60%. Overall, average canopy coverage after harvest would be about 50%. In order to significantly lower the existing suitability the overall canopy cover in these stands would have to be reduced below 25%. Combined with the fact that the major species and average age of the unit would not change, and that average size would change very little, no short-term changes in suitability are expected for this unit. However, long-term improvements in suitability would be expected as these stands grow older, average size increases, and the openings created with this entry convert to spruce and fir.

As for lichen production, research demonstrates that opening stands generally results in altered lichen growth and species composition. Aboreal lichens, both *Alectoria* and *Bryoria*, are the main winter food of woodland caribou (Stevenson 1992), although Rominger (1995) documented a preference for the latter. Rominger et al. (1994) studied the impacts of partial cut stands versus uncut stands in British Columbia and northern Idaho. The percent canopy coverage in uncut stands was 77% and the canopy coverage in partial cut stands ranged from 24% to 60%. Their research showed that lichen biomass per centimeter of branch did not differ between uncut and partially cut stands. However, it did appear that the decrease in *Alectoria sarmntosa* was compensated by an increase in *Bryoria*. The proposed treatments in caribou habitat, under all action

alternatives, would maintain canopy coverage between 25-60%, within the range observed by the 1994 Rominger study. Consequently, implementation of this alternative is expected to maintain lichen loads at current levels, although the mix of lichen species is likely to vary depending on the site.

Indirect effects of this alternative would bbe to incrementally reduce fire danger throughout the treated units. Wildfire in suitable caribou habitat is currently rated as high risk and this will increase over time, so incremental reductions are appropriate (Harkins et al. 1998). Unfortunately, the amount of acres proposed to be treated to reduce fire risk is so small proportional to the amount increasing in risk annually that it is unlikely to be a measurable benefit, at least in the short term and in the absence of continued similar efforts. The SIMPPLLE model was also used to predict the risk of stand replacing fire in key woodland caribou habitat. The model estimated that risk of stand replacing fire would be reduced by about 8% with treatments prescribed under Alternative 2.

Addlitional indirect effects are the likelihood of disturbance caused by the timber harvesting operation. Nine units are proposed for helicopter removal. Helicopters are loud for a relatively short period of time while the operation is occurring (usually a maximum measured in days or weeks), then the disturbance is removed. Historically, helicopter logging operations have not occurred more frequently than once per drainage per 5-10 years (including private operations), so this disturbance is minimal. The Selkirk caribou are somewhat habituated to aerial disturbance, because they have been monitored by both fixed-wing and rotorwing aircraft up to once per week for well over a decade. The few animals currently present are in habitat more than 6 miles away. This decreases the likelihood of disturbance unless an ususual movement was made towards the harvested units. It is unlikely that the disturbance caused by helicopter logging would pose more than a temporary, insignificant disturbance to them.

This project does not propose to improve ungulate habitat significantly. While forage habitat is likely to improve to some extent whenever stands are opened up, the number and distribution of other ungulates in the Myrtle Cascade area is not likely to dramatically change. Because mountain lions have been a significant mortality source for caribou in the Selkirks, a generally steady status of ungulates would continue with the existing condition. Mountain lion predation is a complex situation that is based on several factors besides ungulate habitat conditions in mid-elevations such as is present in the Myrtle Cascade project.

Alternative 3

Some of the units for Alternative 3 differ from Alternative 2. Twenty of the units proposed for this alternative contain capable but not currently suitable caribou habitat. The majority of capable habitat (930 acres) is capable of becoming spring habitat, which is one of the least limiting seasonal habitats. The unit with the greatest amount of capable habitat is MC24 (see Figure 4-18), as with Alternative 2, the proposed prescription for this unit would trend stand conditions towards an increase in HSI rating

Alternative 3 would treat nine units (Figure 4-19) with currently suitable habitat (HSI>=0.5). This alternative would reduce the total amount of suitable caribou habitat by 42 common acres for early winter spruce/fir, late winter, spring and summer habitat, and by 149 acres in early winter cedar/hemlock habitat. While this does not represent a large decrease in the proportion of suitable habitat available (0.5 to 4.6% change depending on season), two seasonal habitats affected are important. Both early winter spruce/fir and cedar/hemlock are critical seasonal habitats in the Selkirks. Caribou use these two habitats in tandem by using the closed-canopied cedar/hmelock forests to escape accumulations of deep, soft snow but moving into associated spruce/fir types to forage on the heavier biomass of arboreal lichens in between snow storms. Suitable

cedar/hemlock early winter habitat is more limited in this CMU—and at greater risk for reduction due to the high percentage of capable habitat (i.e. 33%) that is privately owned.

Alternative 3 would also treat MC23 as in Alternative 2, which would retain its suitability.

The SIMPPLLE model estimated that risk of stand replacing fire would be reduced by about 16% with treatments prescribed under Alternative 3. This alternative is predicted to reduce the risk of stand replacing more than any other action alternative. This reduction of fire risk can possibly be explained by the fact that Alternative 3 would treat more acres in upper Myrtle Creek adjacent to key caribou habitats than the other alternatives.

Indirect effects would be as described for Alternative 2.

Alternative 4

This alternative would have the same effects as listed for Alternative 2 except that 14 units would be excluded. Except for Unit MC23, these units do not have any suitable caribou habitat. If not harvested, the lodgepole pine in unit MC23 will continue to reduce habitat quality (HSI values) over time due to the dominance of lodgepole in the overstory and reduced timber size-class resulting from overstocking. While suitable caribou habitat is not currently limiting caribou recovery, it is also important to manage for younger successional stages where risk to the herd's current habitat use is low. This will help produce a mix of spruce/fir size classes for the long-term maintenance of caribou habitat.

This alternative proposes very little treatments adjacent to woodland caribou habitat. Consequently, the SIMPPLLE model estimates the risk of stand replacing would be reduced by less than 5% under this alternative.

Cumulative Effects

Cumulative effects for Alternatives 2, 3, and 4 would continue on a similar pathway as Alternative 1 (no action) and Alternative 5 (no timber harvest) in overall trend. However, treated areas would contribute to incremental decreases in fire risk over the recovery area, there would be a small decrease in fire risk or severity.

Reasonably Foreseeable Actions

The majority of the Bonners Ferry Ranger District Salvage Sales EIS is outside the caribou recovery area. Those portions of the Salvage Sale EIS project area within the Myrtle-Cascade project area not within key caribou habitats (Appendix G). Areas within early-winter spruce-fir caribou habitat, which provide the bulk of forage during seasonal transition periods, will be excluded from the salvage treatments. The nature of salvage operations within early-winter cedar-hemlock habitat will have no impact on tree canopy closure, which is an important variable in determining suitable caribou habitat. There will be no increase in road densities with this project, therefore, no increased risk of mortality. The cumulative effects of this project would have no negative impacts on woodland caribou habitat in the Selkirk Mountains.

The effects of the preferred alternative in the Forest Service RACP are represented in the range of alternatives analyzed for Myrtle-Cascade. Therefore, the analysis done for Myrtle-Cascade represents the reasonably foreseeable site-specific effects of the preferred alternative in the RACP on woodland caribou.

The Bonners Ferry Douglas Fir Beetle EA was prepared in October 1999. The effects of proposed harvest included in this EA were incorporated as baseline information for the vegetative analysis in the Myrtle-Cascade EIS.

All proposed activities in woodland caribou habitat must go through the consultation process with the U.S. Fish and Wildlife Service (USFWS). None of the projects these projects will be allowed to proceed until concurrence from the USFWS is given, either formally, or informally.

Figure 4-15: Alternative 2 Units (Kootenai Point) in Woodland Caribou Habitat

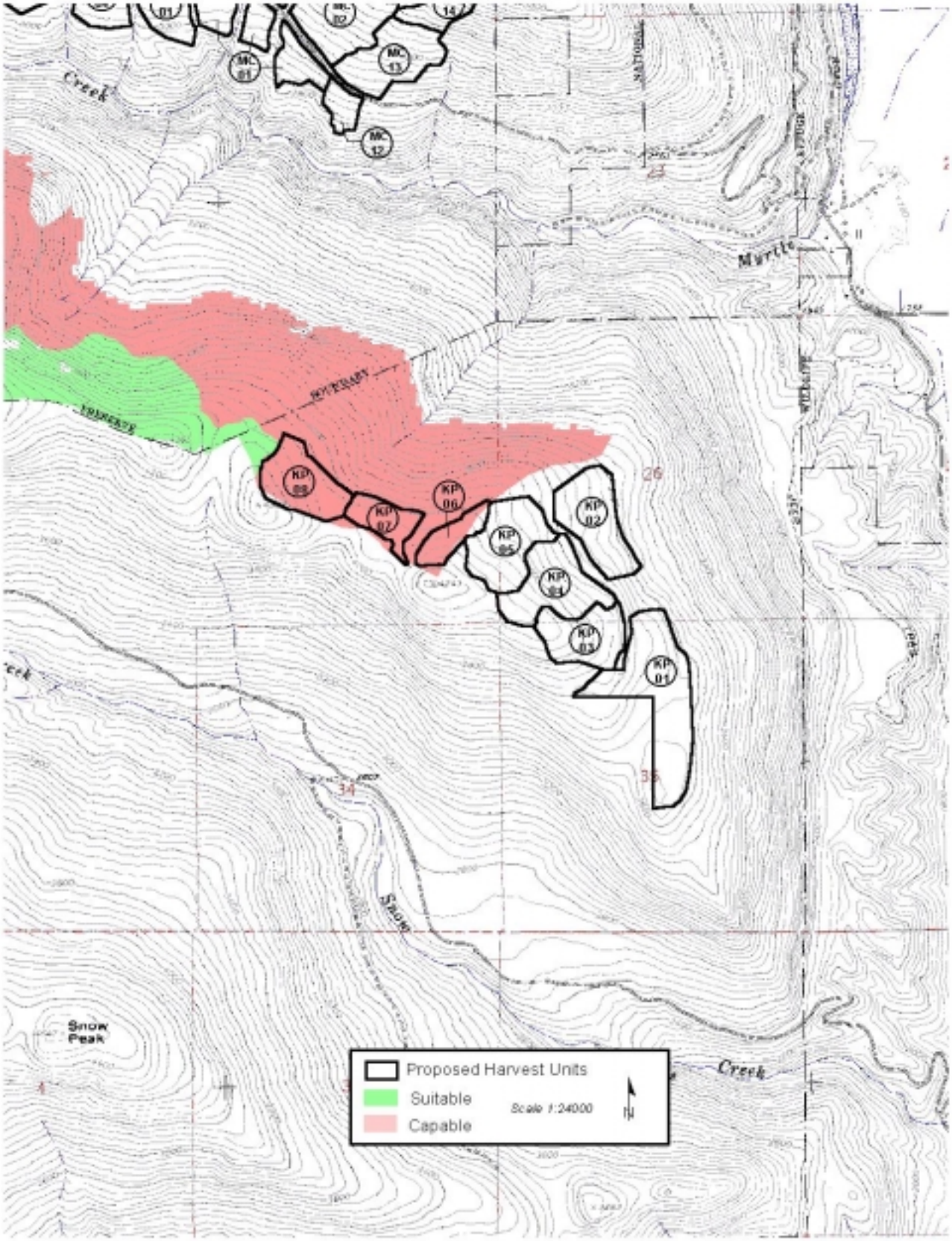


Figure 4-16: Alternative 2 Units (Mack Creek) in Woodland Caribou Habitat

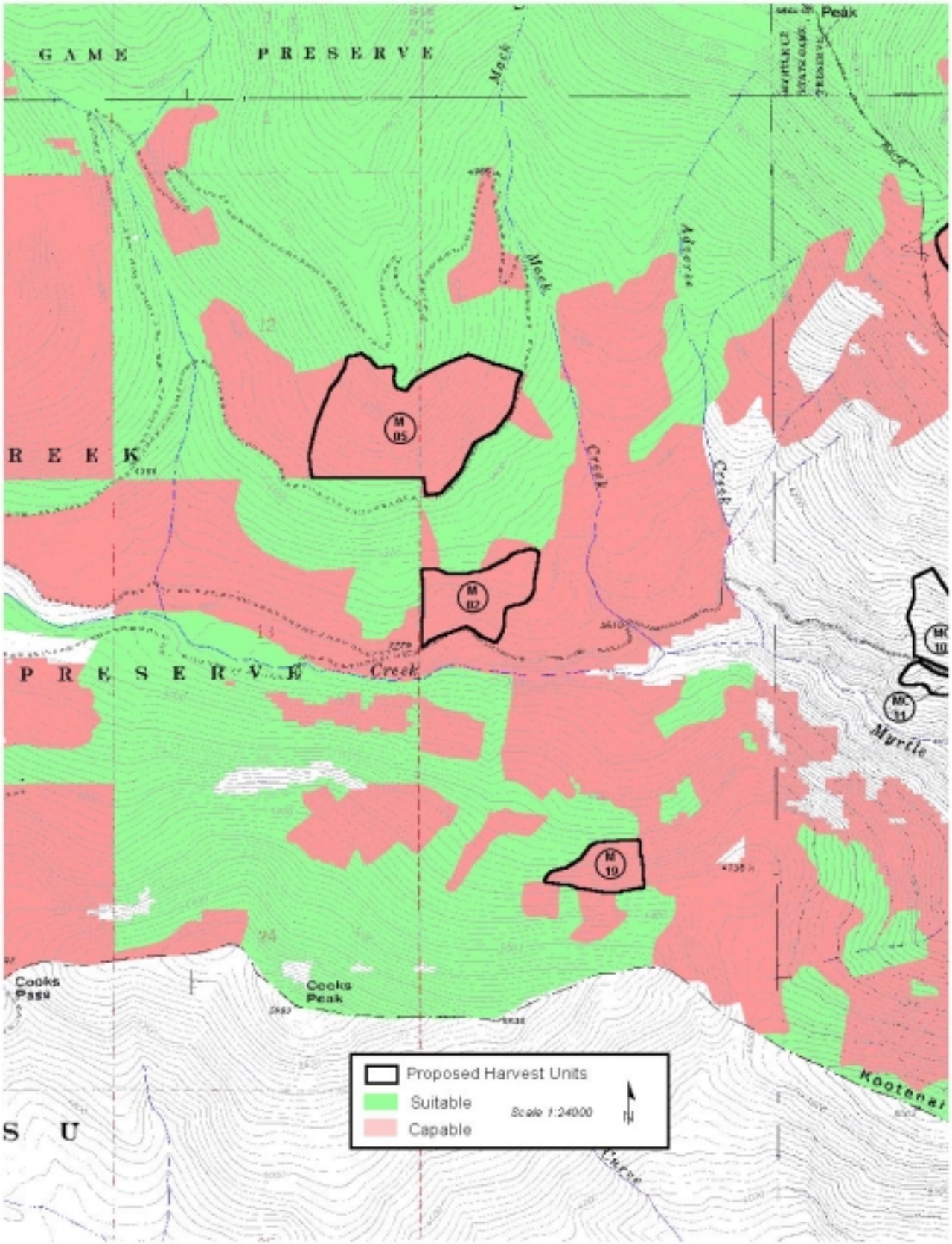


Figure 4-17: Alternative 2 Units (Myrtle Cascade) in Woodland Caribou Habitat

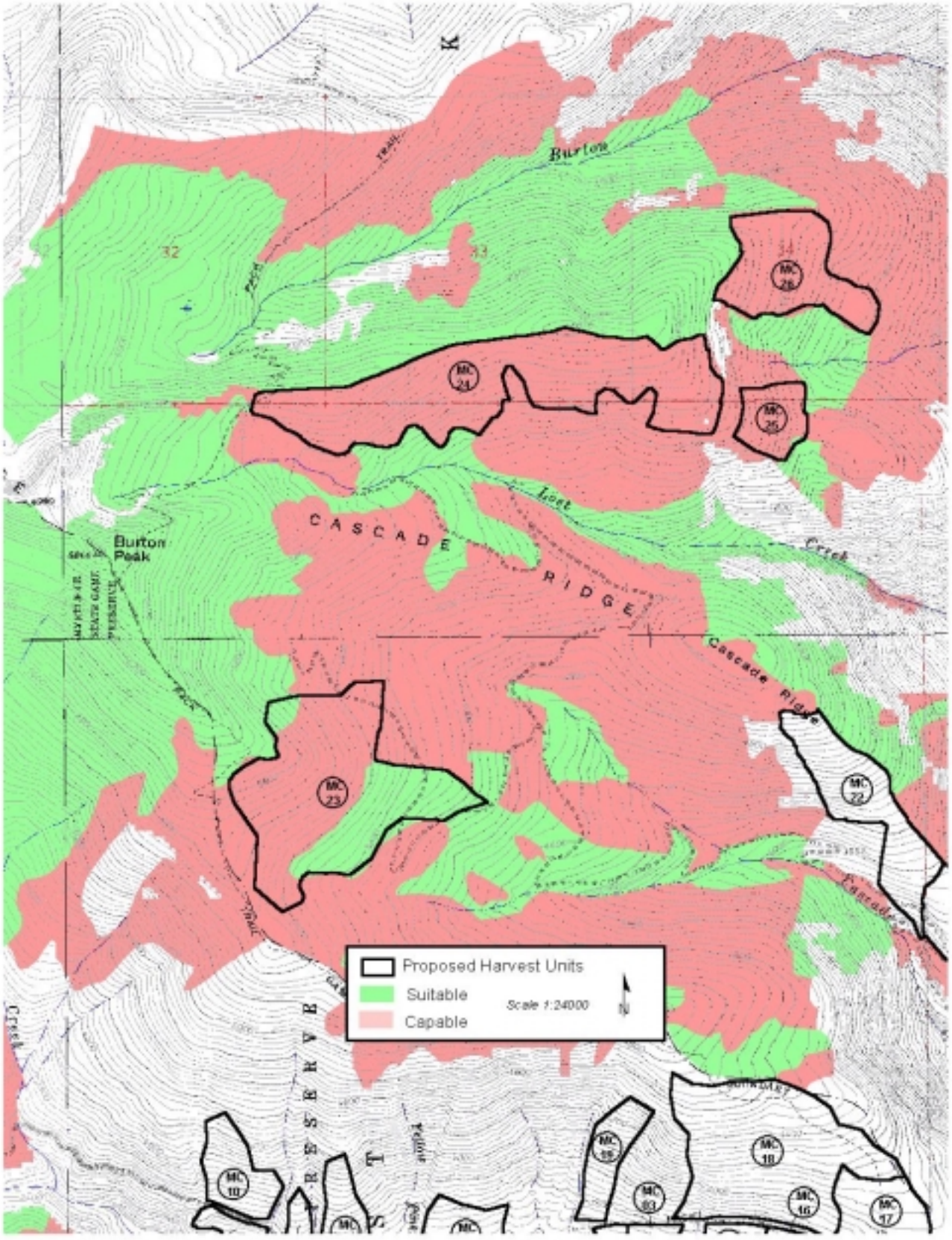


Figure 4-18: Alternative 3 Units (Myrtle-Cascade) in Woodland Caribou Habitat

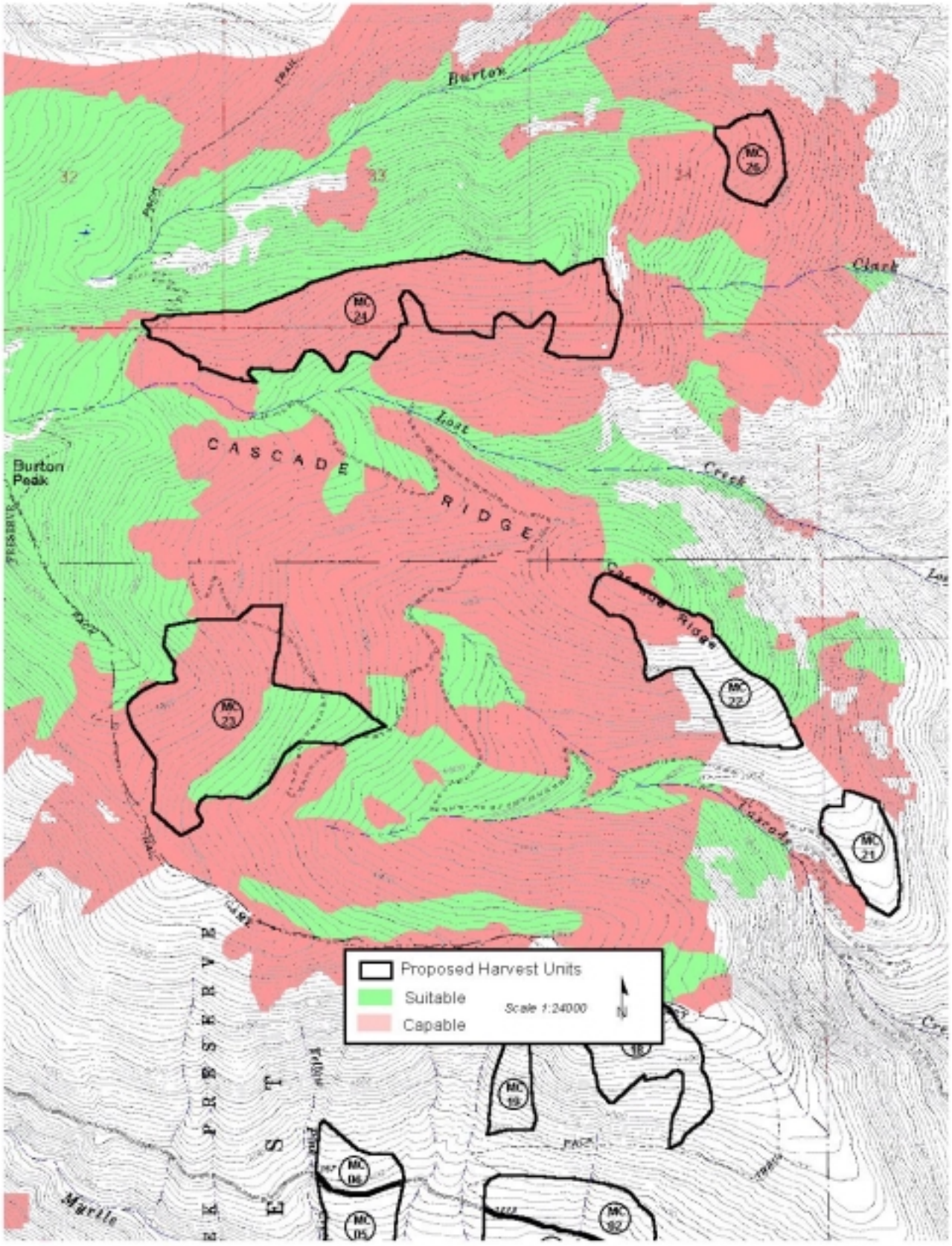
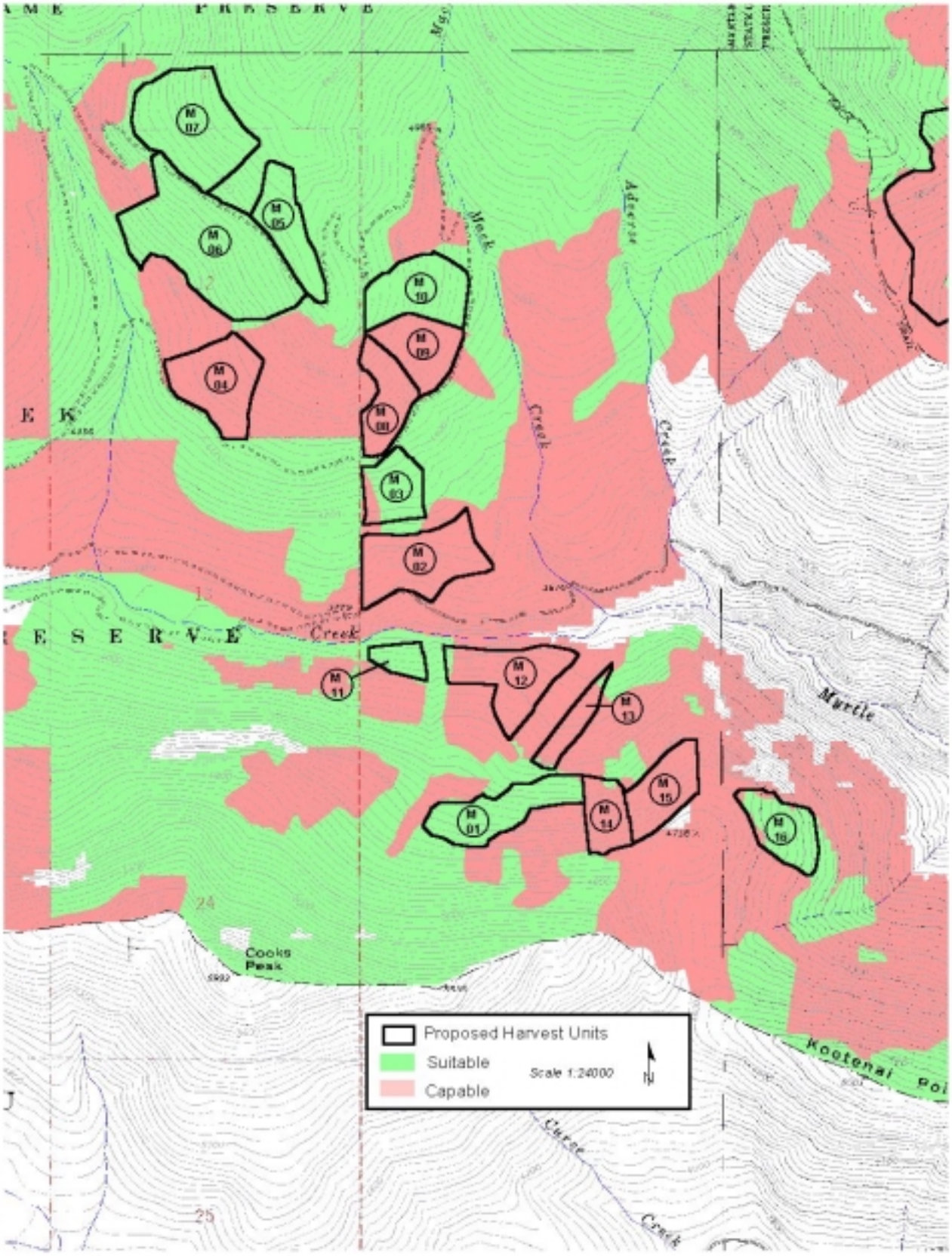


Figure 4-19: Alternative 3 Units (Mack Creek) in Woodland Caribou Habitat



WATERSHED and AQUATIC RESOURCES

The purpose of this chapter is to discuss the direct, indirect, and cumulative effects of the proposed and reasonably foreseeable activities. The discussion of effects is based on the principle issues and indicators identified in Chapter 2 and the existing conditions and processes presented in Chapter 3. The Endangered Species Act effects calls and discussion for fisheries are contained in the Fisheries Biological Assessment in Appendix B.

SCOPE OF ANALYSIS

The cumulative effects watersheds for this assessment are displayed in Figure 4.1. A cumulative effects watershed (or watershed area) is the logical culmination point of water flow where the effects of the distributed project activities could possibly integrate or synchronize over time and space and be addressed cumulatively in a larger watershed. Cumulative watershed effects are greatest and easiest to detect at the highest point in the watershed where the individual effects overlap in time and space (MacDonald 1989). The analysis includes effects from past, present, and reasonably foreseeable activities. The cumulative effects areas in Myrtle Creek are Cascade, Mack, White Pine, Upper Myrtle Creek (above the point between the White Pine and Mack Creek confluences), and Lower Myrtle Creek (above the west-side road crossing). These areas were chosen based on the amount and types of proposed activities planned within these basins and because they are logical cumulative affects areas as described above. Snow Creek and Burton Creek both have minor amounts of proposed activities, which would create site affects, but would not result in cumulative impacts. The projects in Snow and Burton Creek are on non-sensitive landtypes and would reduce the potential for interception, concentration, and re-routing of water and would reduce delivery of erosion off site. As a result, Burton and Snow Creeks are not analyzed in detail. Lost and Clark Creeks are analyzed as separate cumulative effects areas. The proposed activities on the slopes between Myrtle and Snow Creek are not analyzed in detail because the proposed units and road reconstruction are located along the top of the ridgeline above a face-drainage. Any site affects from proposed activities (or no action) would not interact cumulatively because the slope drains subsurface to multiple points in the Kootenai valley. There are no stream crossings that could be affected. Sediment production and delivery would not be affected provided that the "Required Design Criteria for All Action Alternatives" are followed. Unit KP01 is a dry site, but the unit is not a high-risk site like those in the Myrtle Creek drainage because it is fairly flat and would not affect any value-at-risk if it burned severely. Therefore, wildfire risk would not be appreciably changed under any of the alternatives. Even if upslope activities triggered an off site impact, the flat slopes and valley bottoms below the face drainage would dissipate the effects.

Typically the physical effects of runoff modifications, sediment loading, and water temperature, if they occur in projects of this scale, are immeasurable and/or not observable at large watershed and sub-basin scales. This results from desynchronization (individual tributaries respond at different times of the year or may be slower to respond than others to disturbance events); the inherently large range of variability that watershed processes operate at and under which they have evolved and adjusted; and, the fact that watershed systems are dynamic in nature. At the point where Myrtle Creek joins the Kootenai River, Myrtle Creek accounts for less than 0.28 percent of the drainage area of the Kootenai Basin. The Kootenai River is controlled by the Libby and Corra Linn Dams and has a drainage area and flow several orders of magnitude larger than Myrtle Creek. In addition, the proposed activities have been designed to reduce existing risks to water quality, salmonid spawning and aquatic organisms while minimizing new effects. Thus, no physical response from the Myrtle-Cascade project would extend to or be measurable in the Kootenai River.

DIRECT AND INDIRECT EFFECTS COMMON TO ALL ALTERNATIVES

Within the cumulative effects areas there are reasonably foreseeable Forest Service activities for which a decision has not been made. The activities will be presented in the District Salvage Sale Environmental Impact Statement, which will propose salvage of standing and down timber within non-sensitive areas in response to recurring weather events or insect or disease activities. Salvage in the Myrtle-Cascade project area would be contingent on actual mortality from insect, disease, or weather events, which have not yet occurred. Based on current stand conditions there is no plan to conduct salvage harvest beyond what is already included in the Myrtle-Cascade project. For reference, within the Myrtle-Cascade project area there has been one salvage (near Burton Creek) of the type proposed in the District Salvage Sale EIS in the last 5 years. The proposed action is still being developed. The "Required Design Criteria for All Action Alternatives" developed for Myrtle-Cascade will be required for the District salvage project as well. This activity would have no effect to stream crossing risk because no new roads would be constructed and no activity would occur within the riparian conservation areas. Given that the proposed action is to salvage dead trees on non-sensitive areas that have low sediment risk, and provided that the required design criteria will be followed, this activity would have no affect to sediment production and delivery. The salvage logging would either have minimal effect to the potential for severe wildfire, or may have a beneficial effect by reducing fuel loadings of large dead debris.

The Forest Service will also be proposing an analysis to harvest seed and shelter trees from existing regeneration units across the Bonners Ferry Ranger District. The intent of these activities is to follow up with silvicultural activities prescribed and accomplished in previous timber sale projects. The proposed action is still being developed. However, the proposed actions for Myrtle-Cascade project cover the existing and anticipated needs for follow up treatment. Therefore, no new activities beyond those included in the Myrtle-Cascade EIS will likely be proposed within any of the project area watersheds.

There are additional foreseeable activities on private industrial forestland within Myrtle Creek that are included in the WATSED data files and the overall watershed assessment. Current and proposed activities on private land were obtained directly from the landowner. The most likely activities are pre-commercially thinning and limited timber harvesting. Most of the merchantable timber on all of the private sections in Myrtle Creek was removed during the 1950s to the 1970s, but has also been harvested in the late 1990s to present in Toot and Jim Creeks. With the exception of a few small steep isolated portions, the remaining timber can be accessed from existing roads and skid trails. No new stream crossings are needed to access the remaining timber so stream crossing risk would not be changed. The potential for sediment production and delivery is not anticipated given the limited amount of ground disturbance that is expected in order to harvest the remaining trees, and given that State of Idaho Best Management Practices would be applied by the private forester and inspected by the State Forest Practices Advisor. The thinning and harvesting may add to short-term fuel loadings of fine fuels, but none of the activities would be on dry sites where wildfire risk is a concern.

The effects of the preferred alternative in the Forest Service RACP are represented in the range of alternatives analyzed for Myrtle-Cascade. Therefore, the analysis done for Myrtle-Cascade represents the reasonably foreseeable site-specific effects of the preferred alternative in the RACP on streamcrossing risk, sediment production and delivery, and wildfire risk.

The decision for the Bonners Ferry Douglas-fir Environmental Assessment has been made, but has not yet been implemented. It has been treated as an existing condition for this analysis.

DIRECT AND INDIRECT EFFECTS OF THE ACTION ALTERNATIVES

If an action alternative were chosen, several activities would be implemented. These actions and their effects to stream crossing risk, sediment production and delivery, and wildfire risk are described below. Issues presenting minimal risk to beneficial uses or eliminated by project design are discussed in Appendix A.

Timber Harvesting

The felling, harvesting, and transport of timber would not appreciably affect peak flows (see Appendix A and WATSED project file) or loadings of sediment and debris at stream crossings within the project area. Therefore, timber harvesting would not affect stream crossing risk. The proposed units for both alternatives are proposed on landtypes with low sediment delivery potential. The unit location and prescriptions, and "Required Design Criteria for All Action Alternatives" (Chapter 2) have been site specifically designed to avoid or reduce the potential for sediment production and delivery. Accordingly, sediment production and delivery would not be affected by the proposed timber harvesting. The timber harvesting would open up tree canopies, and logging slash from tree limbs, tops, and un-merchantable pieces would add to existing fuel loadings. For 2 to 3 years, this would allow wind and sunlight to penetrate, heat, and dry the debris, which could increase potential fire intensity and severity until the slash is treated or naturally abated by being compacted by snow and naturally recycled. However, the long-term risk for severe wildfire would be reduced by creating more open stand structures that would have lower accumulations of large diameter fuels, and that would be less likely to support crown fires. This is especially true in dry forest types where the exclusion of low-intensity fires virtually assures the eventual occurrence of large high-intensity fires that kill most trees (Arno 1996).

Road Construction

Roughly 0.2 miles of temporary road would be built under Alternatives 2 and 4. No new road would be constructed under Alternatives 3 and 5. The district hydrologist walked the proposed location and determined that the road can be built without creating unstable cut and fill slopes. The temporary road would be constructed as an outsloped road that follows the natural terrain and would not be expected to intercept ground water flow. The road location would have no new stream crossings and is separated from the stream network by several hundred feet. Therefore, stream crossing risk would not be changed. Following use, the purchaser would obliterate this road by restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding if needed. WATSED predicts no sediment yield increase or delay of recovery resulting from the construction and obliteration of this road. Neither sediment production and delivery nor wildfire risk would be affected.

Road Reconstruction

A road package is included with each action alternative. The reconstruction, maintenance, and repair would occur on existing system roads displayed in Figure 2-9 that would be used as haul routes for this project. This work was considered certain to occur if on a haul route that could be included in the timber sale road package. Funding for this work under Alternatives 1 or 5 is much less certain.

1. Redesigning and Upgrading Existing Stream Crossings: The crossings that need to be replaced are undersized relative to Forest Plan standards or are at or near the end of their designed life expectancy. Redesigning and replacing undersized culverts at stream crossings would reduce the risk of massive sediment

delivery from either washouts or fill failures. The road fill would be moved away from the stream prior to pulling the pipe. Most of the crossings are intermittent or have base flows less than 0.5 cubic feet per second. Only a minimal amount of sediment would be entrained and transported at these crossings. At Adverse, Mack, White Pine, Cooks, Cascade and Lost Creeks fine sediment would be entrained and could be transported for a few to several hundred feet as the old culvert is pulled and the new structure is placed. Standard erosion control measures such as temporarily diverting flow into a culvert, a plastic or rock lined channel, pumping water below the site, or use of silt fences or hay bales would be used to minimize sediment transport downstream. Adverse Creek is the closest crossing to the City water diversion with any appreciable flow and is over 3 miles away. This distance would allow for additional downstream trapping of sediment and dilution of turbidity. The small amount of sediment input would occur over a span of minutes to hours and is not expected to exceed turbidity standards for domestic water quality and cold water biota, and is inconsequential relative to the resulting reduction in crossing risk. Risk at the inventoried crossings within Myrtle Creek would be reduced from the existing estimate of 158 tons per year to an estimated 40 tons per year. Cascade Creek would be reduced from the existing 8 tons per year to an estimated 2 tons per year. The 40 and 2 tons per year of remaining sediment risk is a high estimate since a large percentage of the fine soil in the road throughfill would be replaced with large rock, which would be more difficult to displace and erode.

2. Strengthening Unstable Cut and Fill Slopes: Yellow Pine, Adverse, Mack Creek, and Cascade Creek each have bin and gabion walls that need maintenance, partial replacement, and extensions. Bin and gabion walls stabilize road cuts by adding weight and/or strength to the base of the slope and by reducing the steepness of the cutslope to more closely match the natural angle of repose. The bin and gabion walls are in place to prevent mass and surface erosion where the road prism cuts through steep stream breaklands at crossings. Excavated materials displaced by extending existing bin walls would be hauled to sites where slope stability is not a concern and where the materials could not be delivered to the stream network. Standard BMPs and erosion control measures would be used to assure that sediment would not be generated from newly excavated sites. The work would occur during the dry season to minimize the potential for entraining disturbed soil during the project. These bin walls significantly reduce the amount of sediment delivered from unstable cutslopes to the ditchlines and stream crossings so they are important to maintain. The western approach to Mack Creek and the southern approach to Cascade Creek each have unstable road fill that should be reinforced with geogrid or rock fill. Geogrid and the associated recompaction add to fill slope stability by significantly increasing tensile strength and soil “cohesion”. Because of the proximity to the channels, very small volumes of fine sediment may increase stream turbidity during subsequent storm events the first fall or spring following construction work. However, the turbidity increase would not exceed State standards for domestic water quality or cold water biota. Overall, stream crossing risk and sediment production and delivery would be reduced by these activities by minimizing potential mass erosion and existing surface erosion near stream crossings. Wildfire risk would not be affected.

3. Increasing the Frequency of Ditch Drainage: Installation of additional relief culverts would reduce the amount of water carried by and eroded from ditchlines. This would allow the ditchwater to reinfiltrate the forest floor and deposit sediment before reaching stream networks, and would help prevent multiple culvert failures ("domino effect"). The dispersion of surface runoff would help “normalize” the flow regime of a basin by recharging the groundwater. The groundwater would slowly release into the live streams. There would be less of an opportunity for water to concentrate and be delivered to the naturally unstable stream breaklands along Myrtle, Cascade, Lost, and Snow Creeks. The volume of water and sediment delivered to stream channels (especially during peak flow conditions) would be reduced, as more water and sediment would be cross drained before reaching channel contributing areas. Therefore, adding relief drainage would reduce the probability that

roads could affect stream crossing risk and sediment production and delivery. Wildfire risk would not be affected.

4. Rolling the Road Grade: Graded rolling dips and drivable dips would reduce the amount of water that runs down the road surface. This would reduce the loss of fine material from native and graveled surfaces. The changes in grade would be large enough to cross drain water from the road surface even if wheel ruts are present. Gravel surfacing and recompaction during construction where the road grade is rolled would reduce erosion from these sites. Bypass dips would be constructed at stream crossings that have the potential to intercept streamflow in the ditchline or down the road prism. The dip surface and outflow would be armored so that the water could safely be returned to the stream channel. Most of this work would occur far enough away from crossings to prevent any sediment delivery to streams. However, standard erosion control practices would be applied as necessary. The bypass dips would substantially reduce stream crossing risk by eliminating the potential for severe erosion of the road prism that would otherwise occur if streamflow were diverted down the road surface. The potential for sediment production and delivery would be reduced because of the improved dispersion of water. Wildfire risk would not be affected by this activity.

5. Surfacing: Surfacing native surface roads has been shown to decrease sediment production 70 to 84 percent (Swift 1984). Burroughs and others (1985) found that graveled road surfaces produced an average of 77 percent less sediment than bare roads. Existing gravel sources would most likely be used. Site excavation on any new pits would meet INFISH (1995) standards and guidelines and would not occur within Myrtle Creek. Therefore, surfacing would reduce sediment production and delivery. Stream crossing and wildfire risk would not be affected.

6. Standard Maintenance: Road brushing, blading, shaping, and ditch cleaning would help maintain the structures and method of drainage for which the road was designed. This work results in exposed soil, which can be eroded. The production and delivery of sediment would not be significant given the condition and locations of the roads being treated, the planned cross drain improvements that would reduce water concentration and delivery to channels, and the fact that the loose soil particles would quickly be recompacted. Maintenance of existing stream structures reduces the risk of failure by assuring that debris is cleared from the inlets and that the crossing is functioning properly. Wildfire risk would not be affected.

Road Obliteration

All action alternatives include road obliteration proposals that are designed to restore normal slope hydrology and reduce existing road related sediment risks. The obliteration would occur on the existing system and non-system roads that are displayed in Figure 2-9. Multiple funding sources are potentially available and would be pursued to fund implementation of this work. Implementation of this work was not considered a certainty in the effects analysis.

1. Obliteration of Stream Crossings: The crossings that would be obliterated are undersized relative to Forest Plan standards or are at or near the end of their designed life expectancy. As many as 17 crossings (intersecting USGS blue-line streams) would be removed. Throughfill currently situated over the crossings would be removed and safely stored outside the channel floodplain, which would make it unavailable to the stream network. The risk of massive sediment delivery from either washouts or fill failures would be eliminated at these sites. Most of the crossings are intermittent or have base flows less than 0.5 cubic feet per second. Only a minimal amount of sediment (or none if the channel is dry) would be entrained and transported at these crossings during the obliteration activities. At two crossings on Jim Creek and five crossings on Cascade Creek

fine sediment would be entrained and could be transported for a few to several hundred feet as the stream channel and floodplain are restored. Sediment would be created from the moment that the pipe is removed until a short time after the recontouring is completed. The road fill would be moved away from the stream prior to pulling the pipe or log bridge. Standard erosion control measures such as temporarily diverting flow into a culvert, a plastic or rock lined channel, pumping water below the site, or use of silt fences or hay bales would be used to minimize sediment transport downstream. All crossings would flush a minimal amount of fine sediment to parent streams during first mid-winter rain-on-snow event or spring snowmelt following the channel restoration. Jim Creek is the only crossing above the City water diversion with any appreciable flow and is over 7 miles away. This distance would allow for additional downstream trapping of sediment and dilution of turbidity. The small amount of sediment input during and after obliteration would occur over a span of minutes to several hours. Provided that the "Required Design Criteria for All Action Alternatives" are followed, the stream channel restoration is not expected to exceed turbidity or other water quality standards for domestic water quality and cold water biota, and is inconsequential relative to the resulting reduction in sediment risk. Past monitoring of similar projects on the Bonners Ferry Ranger District and on the Forest verify that obliteration is an effective means to minimize sediment risk at stream crossings. Wildfire risk would not be affected because the roads proposed for obliteration are not needed for initial attack access for fire suppression and most are not located on the high-risk dry site areas.

2. Obliteration between Crossings: Most of the obliteration between stream crossings would involve cutting brush from the road prism, cross draining the road with waterbars on roughly 45 feet spacing, and removing relief culverts. Less than five percent of the obliterated road would need to be fully recontoured in order to stabilize unstable cut and fill slopes. Under both obliteration scenarios, a large percentage of the roadbeds in the project area would be disturbed. Vegetation usually becomes re-established on the disturbed soil by the end of the next growing season following obliteration. Until the vegetation does re-establish, the disturbed soil would be more susceptible to erosion. The frequent cross ditching would significantly reduce the volume of water that could entrain and transport soil from the excavated sites, and would promote re-infiltration of surface water down slope. Eroded soil would no longer be moved once the water re-infiltrated the undisturbed forest floor. Additional filtering or buffering potential is provided by down slope vegetation, downed wood, and distance from the channel network, which is typically greater than 300 feet (Ketcheson and Megahan 1996). The obliterated roads would no longer concentrate and re-route water to naturally unstable slopes or other roads so landslide potential would be reduced. Recontouring would stabilize unstable road segments by restoring the natural slope (which is less steep than constructed cut and fill slopes) by buttressing the cutslopes with the soil excavated from the fill slopes, and by promoting the natural dispersion of water. Reducing the potential for roads to cause mass erosion translates into an immediate reduction in sediment risk within the project watersheds. As a result, and provided that the "Required Design Criteria for All Action Alternatives" are followed, obliteration between crossings is expected to reduce the short and long term production and delivery of sediment to streams. Stream crossing risk would not be affected. Wildfire risk would not be affected because the roads proposed for obliteration are not needed for initial attack access for fire suppression and most are not located on the high-risk dry site areas.

Helicopter Landings

The landings areas proposed for use with this project would be improved to accommodate landing, processing, fuel storage and refueling needs. This would include minor excavation, to create safe, usable landing areas, and some spot gravelling, to better facilitate log truck parking/loading and to reduce dust during the yarding process from the helicopter rotor-wash. Given the proposed landing locations, unstable fill and cutslopes would not be created. The Idaho Forest Practices Act and the site specific BMPs provide standard design criteria that

would protect soil and water resources. INFISH standard and guidelines would be followed. The 300 foot stream buffers would protect municipal water quality, salmonid spawning and cold water biota in case of a fuel spill. For the proposed landing locations, improvement and use of the sites would not affect stream crossing risk or sediment production and delivery provided that these BMPs and the "Required Design Criteria for All Action Alternatives" are followed.

Prescribed Burning for Fuel

Roughly, 895 acres in Alternative 2, 540 acres in Alternative 3, and 511 acres in Alternative 4 are scheduled for prescribed burning. On the south facing dry site units, the prescribed burns would only be done in the spring when fuel and soil moisture would not result in a severe burn that could produce hydrophobic soils or eliminate the soil duff layer. Higher elevation snow could also be used for control lines. Soil moisture would be at least 25 percent regardless of the season when a unit is burned (eg. for a fall burn on the wet sites such as units M02 or MC05). Firelines would be frequently waterbarred to prevent erosion. Chemical foaming agents would not be used for any units in Myrtle Creek above the point where the City diverts water. Nutrients such as nitrogen would be volatilized during the burn, but the higher soil moistures resulting from harvesting coupled with higher soil temperatures would increase nutrient cycling making more of the stored nutrients available to plants. Plants, especially on units burned in the spring, would quickly capture these nutrients. The proposed burns are located on slopes with a low potential for sediment production and delivery. Given the location of the proposed burns and the use of riparian buffers (INFISH 1995), there is a low potential that sediment from firelines, released nutrients, or water foaming agents (if used outside of Myrtle Creek) would be delivered to streams and tributaries. The riparian conservation areas would function as filter zones for any upslope runoff. However, runoff from overland flow will not likely occur. The prescribed burning activities would not negatively affect stream crossing risk or sediment production and delivery. Reducing existing and post harvest fuel loadings would decrease the potential for severe wildfire on the dry sites.

Mechanical Slash Disposal and Site Preparation

Grapple piling would occur on 483 acres within 3 units in Alternative 2, and on 447 acres in 3 units under Alternative 3. No units would be grapple piled under Alternative 4. Roughly 268 acres of grapple piling would occur in Cascade Creek, and 215 acres in Lost Creek under Alternative 2 and would occur on units that are helicopter logged. Under Alternative 3, roughly 40 acres of grapple piling in would occur in Myrtle Creek, 184 acres in Cascade, and 215 acres in Lost Creek. The silviculturist estimates that about 25 percent of the listed acreage would need to be grapple piled in areas with high concentrations of slash. These units would be accessed from existing roads, skid trails, and firelines below or within the proposed units. Only areas that could be reasonably accessed would be treated. None of the trails would be excavated to facilitate access. Roughly 440 acres in Alternative 2 and 388 acres in Alternative 3 would be lopped and scattered which is not a ground disturbing activity. The residual logging debris which was lopped and scattered or that could not be grapple piled and burned would increase potential fire intensity and severity for a few years until snow could compress the slash mat and the fine organics could be recycled. Overall, reducing existing and potential fuel loadings of large wood would reduce the long term potential for a severe fire within the units. In some cases, burning of the slash piles would create small patches of hydrophobic (water repellent) soils for as much as one to two years, but the areas would not be large or extensive enough to alter the slope hydrologic response or slope stability. Erosion from these treatments is not anticipated, however, untreated forest and riparian habitat conservation areas between the grapple piling activity and the stream networks in Lost, Cascade, and Myrtle Creeks would prevent sediment delivery to stream channels if erosion did occur. Risk at stream crossings and sediment production and deliver would not be affected.

Reforestation

Planting would be done by hand crews and would be accessed from existing system roads. This activity would reduce the amount of time needed for vegetative and hydrologic recovery following regeneration harvesting, which would reduce potential for sediment production and delivery. Risk at stream crossings and wildfire risk would not be affected by this activity.

Noxious Weed Control

Implementation of this project is dependent on funding that is not certain. Most of the noxious weed controls used in Myrtle Creek have been biological. However, herbicides have been used sparingly and judiciously in Myrtle Creek on noxious weeds in accordance with the requirements of the Bonners Ferry Noxious Weed EIS. Monitoring of water quality by the City of Bonners Ferry has not detected herbicide contaminants from this low level use in the past. Noxious weed control would not affect stream crossing and wildfire risk. Noxious weed treatments do kill vegetation that reduces vegetative ground cover, but does not remove protective organic layers and occurs over relatively small treatment areas away from streams. Therefore, this activity is not expected to add to sediment production and delivery. This activity would not affect wildfire risk.

CUMULATIVE EFFECTS TO VALUES-AT-RISK

Table 4-1 summarizes the principle issue indicators resulting from implementation of each alternative within the Myrtle-Cascade project area. Ranges of values are shown to reflect that funding of some of the road reconstruction and all of the road obliteration is not guaranteed to occur, even though it is likely to occur.

Table 4-1: Comparison of Alternatives – Project Summary

Alternative	Total Stream Crossings (number)	Inventoried Crossing Risk (tons/year)	Can Divert Streamflow? (number)	Inventoried Migration Barriers (number)	Road on Sensitive Landtypes (miles)	Dry Sites at Risk from Severe Fire (acres)
1	41	166	9	7*	39.1	2559
2	30 to 41	42	0	0 to 2*	29.1 to 39.1	1802
3	30 to 41	42	0	0 to 2*	29.1 to 39.1	2221
4	30 to 41	42	0	0 to 2*	29.1 to 39.1	2215
5	30 to 41	42	0	0 to 2*	29.1 to 39.1	2559

** fish presence not confirmed for streams at 5 of the crossings*

Under Alternative 1 (No Action), stream crossing and wildfire risk, and sediment production and delivery would be maintained at existing levels in the short-term. No Action results in the greatest long-term effects to the values-at-risk (relative to the action alternatives) because many of the road structures such as culverts are currently at or near the end of their expected design life, and stand development in untreated dry site stands would continue towards conditions that favor severe stand replacing fires. As can be seen in the Table 4-1, the action alternatives would result in substantial reductions in sediment risk from stream crossings. The degree of stream crossing and sediment production and delivery risk reduction from road obliteration would depend on how many and which segments were obliterated, but would be substantial if fully implemented. Alternative 2 would treat about 30 percent of the dry site acres at risk to severe wildfire. Alternative 3 would treat about 13 percent of the dry site acres at risk. Alternative 4 would treat about 16 percent of the dry sites at risk. Alternative 5 would incur the same elevated wildfire risk on dry sites as Alternative 1, No Action.

Alternative 1

Only the foreseeable actions related to the District Salvage Sale Environmental Impact Statement and management on private land in Myrtle Creek are likely to occur under this alternative. As discussed previously, there would be no change in any of the principle issues from these actions as is indicated in Table 4-2.

Table 4-2: CHANGE from Existing Conditions for Alternative 1

Watershed	Total Stream Crossings (number)	Inventoried Crossing Risk (tons/year)	Inventoried Migration Barriers (number)	WATSED Sediment Yield Increase (percent)	Road on Sensitive Landtypes (miles)	Dry Sites at Risk from Severe Fire (acres)
Myrtle Creek (upper)	0	0	0	0	0	0
Myrtle Creek (lower)	0	0	0	0	0	0
Yellow Pine Creek	0	0	-	-	0	0
Adverse Creek	0	0	-	-	0	0
Mack Creek	0	0	-	0	0	0
White Pine Creek	0	0	0	0	0	0
Jim Creek	0	0	0	-	0	0
Peak Creek	0	0	-	-	0	0
Slide Creek	0	0	-	-	0	0
Toot Creek	0	0	-	-	0	0
Cooks Creek	0	0	0	-	0	0
Cascade Creek	0	0	0	0	0	0
Lost Creek	0	0	-	-	0	0
Clark Creek	0	0	-	-	0	0

** fish presence not confirmed*

Over time the risk of structural or functional failure at stream crossings would increase as culverts age beyond the normally expected design life. The size of flood events that a crossing could safely pass would remain the same as existing conditions, as would the number of road segments at crossings that could intercept streamflow. Road related potential for triggering landslides would not change given that the miles of road on sensitive landtypes would not change and that the amount of water intercepted, concentrated, and re-routed to unstable slopes by ditchlines would not be reduced. Therefore, the amount of sediment available to the stream network would remain the same as existing conditions and the probability of delivery would increase with time. The risk of severe wildfire on dry sites would increase because both the probability and cost of a stand replacing fire would increase under this alternative. The continuity and amount of biomass would continue to accumulate faster than the rate of decay.

The values-at-risk would likely be fully supported in years that did not experience extreme hydrologic or wildfire events. However, the amount of resource damages experienced during the extreme events would be more severe than natural reference conditions. Accordingly, the values-at-risk may be impacted to a greater extent and the recovery would be slower than if the existing unnatural risks had been reduced or eliminated. There is also the possibility that the aging of existing culverts could cause smaller return interval flood events to trigger failures, or that a wider range of climatic conditions could support severe burning conditions on dry sites.

Alternative 2

The proposed, connected, and foreseeable actions are all likely to occur under this alternative. Table 4-3 summarizes how these actions would change the principle issues. Ranges of values are shown to reflect that funding of some of the road reconstruction and all of the road obliteration is not guaranteed to occur, even

though the projects are likely to occur.

Table 4-3: Change from Existing Conditions for Alternative 2						
Watershed	**Total Stream Crossings (number)**	**Inventoried Crossing Risk (tons/year)**	**Inventoried Migration Barriers (number)**	**WATSED Sediment Yield Increase (percent)**	**Road on Sensitive Landtypes (miles)**	**Dry Sites at Risk from Severe Fire (acres)**
Myrtle Creek (upper)	0 to –1	-2	-2 to -4	0	0 to -5.5	0
Myrtle Creek (lower)	0 to –9	-118	-2 to -4	0	0 to -7.1	-661
Yellow Pine Creek	0	-30	-	-	0	0
Adverse Creek	0 to –1	0	-	-	0	0
Mack Creek	0 to –1	-20	-	0	0 to -0.9	0
White Pine Creek	0 to –1	-2	-2*	+1	0 to -1.4	0
Jim Creek	0 to –2	0	0	-	0 to -0.6	0
Peak Creek	0	0	-	-	0	0
Slide Creek	0	0	-	-	0 to -0.1	0
Toot Creek	0	0	-	-	0	0
Cooks Creek	0	0	0 to -2	-	0 to -0.1	0
Cascade Creek	0 to –5	-6	-3*	+2	0 to -1.3	-96
Lost Creek	0	0	-	-	0 to -1.1	0
Clark Creek	0 to –3	0	-	-	0 to -0.5	0

** fish presence not confirmed*

Table 4-3 illustrates that inventoried stream crossing risk would be substantially reduced from existing conditions under Alternative 2. If the road obliteration occurs, the crossing risk would be reduced further. All inventoried crossings would be upgraded to safely pass 100-year return interval floods and associated debris, which means that 10 of the inventoried crossings would have larger flow capacities than currently exists. There would be no more inventoried crossings that could intercept and transport streamflow down along segments of the road ditch and prism. The road related potential for triggering landslides would be reduced by decreasing the amount of water concentrated and re-routed to unstable slopes by ditchlines. If the road obliteration occurs, landslide potential would be further reduced by stabilizing unstable cut and fill slopes and decreasing the interception and re-routing of groundwater. Therefore, the amount of sediment available to the stream network would substantially be reduced below existing conditions. Much of the reduction in sediment risk, especially from road obliteration, would be permanent. The 1 percent modeled increase in sediment yield in Whitepine Creek and the 2 percent modeled increase in Cascade Creek are not significant given the inherent uncertainty in the model and the natural range of variability for sediment yield, and given the protection of riparian areas and the reduction of stream crossing risk and road/slope interactions. WATSED was not used to model road mitigations such as adding gravel surfacing, or obliteration because the model applies simple linear (percent) reductions of sediment and is not modeled as a process. This type of estimation can be done outside the model. Table 4-4 shows estimates of how road obliteration would reduce the base level sediment yield attributable to roads as predicted by WATSED. These numbers were approximated for each watershed by calculating an average sediment yield per mile of road using the percent sediment yield increases above natural conditions predicted by WATSED. The sediment yield reductions from the road reconstruction items are not included, but would be expected to further reduce the base sediment yield increases attributable to roads.

Table 4-4: Alternative 2 Estimated Changes in Sediment Yield from Existing Conditions	
Watershed	**Adjusted WATSED Sediment Yield Increase (percent)**
Myrtle Creek (upper)	-20
Myrtle Creek (lower)	-18
Mack Creek	-20
White Pine Creek	-49
Cascade Creek	-58

Relative to the other alternatives, Alternative 2 has the most acres and best distribution of units that would reduce existing and potential fuel loadings on the dryer south facing slopes of Myrtle Creek. There would be a short-term increase in potential wildfire intensity and severity on these sites, until the fuels were treated or naturally abated. Following fuels treatment, the risk of severe wildfire would decrease on the 757 acres of high risk dry site treated and on adjacent stands and riparian areas because the continuity and amount of biomass would be reduced. SIMPPLLE modeling estimates that Alternative 2 would reduce the probability of a stand replacing fire on the dry sites by about one-third relative to the No Action alternative over the next 5 decades. Wildfire risk would be reduced accordingly under this alternative because the probability of a stand replacing fire and the cost in terms of fire severity would be much lower than under No Action.

Under Alternative 2, the values-at-risk would likely be fully supported in years that did not experience extreme hydrologic or wildfire events. The amount of resource damages experienced during the extreme events would be much less severe than current conditions and would be some measure closer to the natural reference conditions. The "storm proofing" associated with the road reconstruction would reduce the potential for stream crossing failure and road related sediment production and delivery even if a severe wildfire does occur. Accordingly, the values-at-risk would be impacted to a lesser extent and the recovery would be quicker than if the existing unnatural risks were not reduced or eliminated.

Alternative 3

The proposed, connected, and foreseeable actions are all likely to occur under this alternative. Table 4-5 summarizes how these actions would change the principle issues. Ranges of values are shown to reflect that funding of some of the road reconstruction and all of the road obliteration is not guaranteed to occur, even though the projects are likely to occur.

Table 4-5: Change from Existing Conditions for Alternative 3

Watershed	Total Stream Crossings (number)	Inventoried Crossing Risk (tons/year)	Inventoried Migration Barriers (number)	WATSED Sediment Yield Increase (percent)	Road on Sensitive Landtypes (miles)	Dry Sites at Risk from Severe Fire (acres)
Myrtle Creek (upper)	0 to -1	-2	-2 to -4	0	0 to -5.5	0
Myrtle Creek (lower)	0 to -9	-118	-2 to -4	0	0 to -7.1	-293
Yellow Pine Creek	0	-30	-	-	0	0
Adverse Creek	0 to -1	0	-	-	0	0
Mack Creek	0 to -1	-20	-	0	0 to -0.9	0
White Pine Creek	0 to -1	-2	-2*	+1	0 to -1.4	0
Jim Creek	0 to -2	0	0	-	0 to -0.6	0
Peak Creek	0	0	-	-	0	0
Slide Creek	0	0	-	-	0 to -0.1	0
Toot Creek	0	0	-	-	0	0
Cooks Creek	0	0	0 to -2	-	0 to -0.1	0
Cascade Creek	0 to -5	-6	-3*	0	0 to -1.3	-45
Lost Creek	0	0	-	-	0 to -1.1	0
Clark Creek	0 to -3	0	-	-	0 to -0.5	0

**fish presence not confirmed*

The resulting sediment risk reduction and effects from road reconstruction and obliteration under Alternative 3 are the same as described above for Alternative 2 since the proposals are the same. The 1 percent modeled increase in sediment yield in Whitepine Creek is not significant given the inherent uncertainty in the model and the natural range of variability for sediment yield, and given the protection of riparian areas and the reduction of

stream crossing risk and road/slope interactions. The approximate adjusted sediment yield increases are given in Table 4-6 using the same methodology described for Alternative 2.

Table 4-6: Alternative 3 Estimated Changes in Sediment Yield from Existing Conditions

Watershed	Adjusted WATSED Sediment Yield Increase (percent)
Myrtle Creek (upper)	-20
Myrtle Creek (lower)	-18
Mack Creek	-20
White Pine Creek	-49
Cascade Creek	-60

Alternative 3 focuses more on reducing existing and potential fuel loadings on the wetter sites in Myrtle Creek that has a lower risk of being burned severely than the dry sites. Therefore, this alternative does less than Alternative 2 to reduce the risk of severe wildfire on dry sites. There would be a short-term increase in potential wildfire intensity and severity on treated sites, until the slash was burned or naturally abated. Following fuels treatment, the risk of severe wildfire would decrease on the 338 acres of high risk dry sites treated and on adjacent stands and riparian areas because the continuity and amount of biomass would be reduced. SIMPPLLE modeling estimates that Alternative 3 would reduce the probability of a stand replacing fire on the dry sites by about twenty-eight percent relative to the No Action alternative over the next 5 decades. Wildfire risk would be reduced accordingly under this alternative because the probability of a stand replacing fire and the cost in terms of fire severity would be much lower than under No Action, but more than Alternative 2.

The values-at-risk would likely be fully supported in years that did not experience extreme hydrologic or wildfire events. The amount of resource damages experienced during the extreme events would be much less severe than current conditions, but relatively more severe for wildfire risk than under Alternative 2, and would be some measure closer to the natural reference conditions. The "storm proofing" associated with the road reconstruction would reduce the potential for stream crossing failure and road related sediment production and delivery even if a severe wildfire does occur. Accordingly, the values-at-risk would be impacted to a lesser extent and the recovery would be quicker than if the existing unnatural risks were not reduced or eliminated.

Alternative 4

The proposed, connected, and foreseeable actions are all likely to occur under this alternative. The following Table 4-7 summarizes how these actions would change the principle issues. Ranges of values are shown to reflect that funding of some of the road reconstruction and all of the road obliteration is not guaranteed to occur, even though the projects are likely to occur.

Table 4-7: CHANGE from Existing Conditions for Alternative 4						
Watershed	Total Stream Crossings (number)	Inventoried Crossing Risk (tons/year)	Inventoried Migration Barriers (number)	WATSED Sediment Yield Increase (percent)	Road on Sensitive Landtypes (miles)	Dry Sites at Risk from Severe Fire (acres)
Myrtle Creek (upper)	0 to –1	-2	-2 to -4	0	0 to -5.5	0
Myrtle Creek (lower)	0 to –9	-118	-2 to -4	0	0 to -7.1	-324
Yellow Pine Creek	0	-30	-	-	0	0
Adverse Creek	0 to –1	0	-	-	0	0
Mack Creek	0 to –1	-20	-	0	0 to -0.9	0
White Pine Creek	0 to –1	-2	-2*	+1	0 to -1.4	0
Jim Creek	0 to –2	0	0	-	0 to -0.6	0
Peak Creek	0	0	-	-	0	0
Slide Creek	0	0	-	-	0 to -0.1	0
Toot Creek	0	0	-	-	0	0
Cooks Creek	0	0	0 to -2	-	0 to -0.1	0
Cascade Creek	0 to –5	-6	-3*	0	0 to -1.3	-20
Lost Creek	0	0	-	-	0 to -1.1	0
Clark Creek	0 to –3	0	-	-	0 to -0.5	0

** fish presence not confirmed*

The resulting sediment risk reduction and effects from road reconstruction and obliteration under Alternative 4 are the same as described above for Alternative 2 since the proposals are the same. The 1 percent modeled increase in sediment yield in lower Whitepine Creek is not significant given the inherent uncertainty in the model and the natural range of variability for sediment yield, and given the protection of riparian areas and the reduction of stream crossing risk and road/slope interactions. The approximate adjusted sediment yield increases are given in Table 4-8 using the same methodology described for Alternative 2.

Table 4-8: Alternative 4 Estimated Changes in Sediment Yield from Existing Conditions	
Watershed	Adjusted WATSED Sediment Yield Increase (percent)
Myrtle Creek (upper)	-20
Myrtle Creek (lower)	-18
Mack Creek	-20
White Pine Creek	-49
Cascade Creek	-58

Alternative 4 does not directly reduce wildfire risk on the dry site old growth because existing fuel ladders and loadings would remain. Therefore, this alternative does less than Alternative 2 to reduce the risk of severe wildfire on dry sites. There would be a short-term increase in potential wildfire intensity and severity on treated sites, until the slash was burned or naturally abated. Following fuels treatment, the risk of severe wildfire would decrease on the 344 acres of high risk dry site treated and on adjacent stands and riparian areas because the continuity and amount of biomass would be reduced. SIMPPLLE modeling estimates that Alternative 4 would reduce the probability of a stand replacing fire on the dry sites by about twenty-five percent relative to the No Action alternative over the next 5 decades. Wildfire risk would be reduced accordingly under this alternative because the probability of a stand replacing fire and the cost in terms of fire severity would be much lower than under No Action, but would be more than Alternative 2.

The values-at-risk would likely be fully supported in years that did not experience extreme hydrologic or wildfire events. The amount of resource damages experienced during the extreme events would be much less severe than current conditions, but relatively more severe for wildfire risk than under Alternative 2, and would be some measure closer to the natural reference conditions. The "storm proofing" associated with the road reconstruction would reduce the potential for stream crossing failure and road related sediment production and

delivery even if a severe wildfire does occur. Accordingly, the values-at-risk would be impacted to a lesser extent and the recovery would be quicker than if the existing unnatural risks were not reduced or eliminated.

Alternative 5

The proposed, connected, and foreseeable actions are all likely to occur under this alternative. The following Table 4-9 summarizes how these actions would change the principle issues. Ranges of values are shown to reflect that funding of some of the road reconstruction and all of the road obliteration is not guaranteed to occur, even though the projects are likely to occur.

Table 4-9: CHANGE from Existing Conditions for Alternative 5

Watershed	Total Stream Crossings (number)	Inventoried Crossing Risk (tons/year)	Inventoried Migration Barriers (number)	WATSED Sediment Yield Increase (percent)	Road on Sensitive Landtypes (miles)	Dry Sites at Risk from Severe Fire (acres)
Myrtle Creek (upper)	0 to –1	-2	-2 to -4	0	0 to -5.5	0
Myrtle Creek (lower)	0 to –9	-118	-2 to -4	0	0 to -7.1	0
Yellow Pine Creek	0	-30	-	-	0	0
Adverse Creek	0 to –1	0	-	-	0	0
Mack Creek	0 to –1	-20	-	0	0 to -0.9	0
White Pine Creek	0 to –1	-2	-2*	0	0 to -1.4	0
Jim Creek	0 to –2	0	0	-	0 to -0.6	0
Peak Creek	0	0	-	-	0	0
Slide Creek	0	0	-	-	0 to -0.1	0
Toot Creek	0	0	-	-	0	0
Cooks Creek	0	0	0 to -2	-	0 to -0.1	0
Cascade Creek	0 to –5	-6	-3*	0	0 to -1.3	0
Lost Creek	0	0	-	-	0 to -1.1	0
Clark Creek	0 to –3	0	-	-	0 to -0.5	0

** fish presence not confirmed*

The resulting sediment risk reduction and effects from road reconstruction and obliteration under Alternative 5 are the same as described above for Alternative 2 since the proposals are the same. Timber sale funds would not be available to pay for road reconstruction. Therefore, it may be more difficult to secure funding for the road upgrades. There is no consequential reduction to sediment production and delivery by not harvesting the units that were included in Alternatives 2, 3, and 4 given the design measures and requirements that were incorporated into the those alternatives. In fact, not treating the at-risk dry sites could result in more severe burning conditions during wildfire, which would increase the potential for sediment production and delivery. Wildfire risk for this alternative is the same as Alternative 1, No Action. The approximate adjusted sediment yield increases are given Table 4-10 using the same methodology described for Alternative 2.

Table 4-10: Alternative 5 Estimated Changes in Sediment Yield from Existing Conditions

Watershed	Adjusted WATSED Sediment Yield Increase (percent)
Myrtle Creek (upper)	-20
Myrtle Creek (lower)	-18
Mack Creek	-20
White Pine Creek	-50
Cascade Creek	-60

Alternative 5 does not directly reduce wildfire risk on the dry sites. The continuity and amount of biomass would continue to accumulate faster than the rate of decay. As with No Action, the risk of severe wildfire on dry sites would increase because both the probability and cost of a stand replacing fire would increase.

The values-at-risk would likely be fully supported in years that did not experience extreme hydrologic or wildfire

events. The amount of resource damages experienced during extreme hydrologic events would be much less severe than current conditions, and would be some measure closer to the natural reference conditions. The damages from extreme fire events could be substantial especially if followed by heavy rates or volumes of rain or snowfall. The "storm proofing" associated with the road reconstruction would reduce the potential for stream crossing failure and road related sediment production and delivery even if a severe wildfire does occur. Accordingly, the values-at-risk would be impacted to a lesser extent and the recovery would be quicker than if the existing unnatural risks were not reduced or eliminated, as would be the case under No Action.

CONSISTENCY WITH THE FOREST PLAN

Appendix D lists where information can be found about how aquatic Forest Plan Standards and regulatory requirements have been addressed in this project and report.

Alternative 1

This alternative does not preclude future options to reduce sediment and wildfire risks that currently threaten water quality and long-term support of beneficial uses within the project area. These risks must eventually be reduced or eliminated to fully meet the intent of the Forest Plan and the Clean Water Act. Alternative 1 is consistent with Forest Plan Standards and the Clean Water Act provided that the minimum subset of road improvements and maintenance necessary to comply with State Best Management Practices and INFISH are accomplished in the short-term. However, the minimum required road projects may be more difficult to fund under this alternative given current road maintenance backlogs and financial constraints. Desired future watershed and stream conditions would be more difficult to maintain under No Action than under the action Alternatives 2, 3, and 4.

Alternative 2

This alternative is consistent with Forest Plan Standards and the Clean Water Act provided that the minimum subset of road improvements and maintenance necessary to comply with State Best Management Practices and INFISH are accomplished, and provided that the "Required Design Criteria for All Action Alternatives" are applied. The full road package proposed with this alternative goes beyond minimum legal requirements for reducing road related sediment risk. Alternative 2 has the greatest level of sediment and wildfire risk reduction for the benefit of water dependent resources relative to the other alternatives. Desired future watershed and stream conditions would be maintained or improved under this alternative.

Alternative 3

This alternative is consistent with Forest Plan Standards and the Clean Water Act provided that the minimum subset of road improvements and maintenance necessary to comply with State Best Management Practices and INFISH are accomplished, and provided that the "Required Design Criteria for All Action Alternatives" are applied. The full road package proposed with this alternative goes beyond minimum legal requirements for reducing road related sediment risk. Alternative 3 results in fewer acres of dry site fuels reductions and has more treatment on the wet sites which are currently not a concern for severe wildfire risk. The extra harvest in White Pine Creek, beyond that proposed under Alternative 2, does not support any additional watershed restoration objectives. Alternative 3 would result in the same decreases in sediment risk and less reduction in

wildfire risk than Alternative 2. Overall, desired future watershed and stream conditions would be maintained or improved under this alternative.

Alternative 4

This alternative is consistent with Forest Plan Standards and the Clean Water Act provided that the minimum subset of road improvements and maintenance necessary to comply with State Best Management Practices and INFISH are accomplished, and provided that the "Required Design Criteria for All Action Alternatives" are applied. The full road package proposed with this alternative goes beyond minimum legal requirements for reducing road related sediment risk. Alternative 4 would result in the same decreases in sediment risk and less reduction in wildfire risk than Alternative 2. Overall, desired future watershed and stream conditions would be maintained or improved under this alternative.

Alternative 5

This alternative is consistent with Forest Plan Standards and the Clean Water Act provided that the minimum subset of road improvements and maintenance necessary to comply with State Best Management Practices and INFISH are accomplished, and provided that the "Required Design Criteria for All Action Alternatives" are applied. The full road package proposed with this alternative goes beyond minimum legal requirements for reducing road related sediment risk. Alternative 5 would result in the same decreases in sediment risk associated with the other action alternatives, but would increase wildfire risk in the same manner and degree as the No Action alternative. Overall, desired future watershed and stream conditions would be maintained or improved under this alternative.

ROADLESS

The following is a discussion of roadless area characteristics as described in the Forest Service Roadless Area Conservation FEIS, and the DEIS, released May 11, 2000 (page 2-8). The effects on the characteristics are described below. For some resources (e.g., drinking water) the effects on these characteristics have been incorporated elsewhere in the Myrtle-Cascade FEIS as part of the analysis for the entire project area.

Soil, water, and air

There would be no effects to soil, water, and air in the Selkirk Mountain Roadless Area (SMRA) that are different from those that are discussed for the entire project area. The cumulative effects analysis described for these resources in Chapter 4 and Appendix A incorporate the effects that would occur in the roadless area.

Sources of public drinking water

Myrtle Creek is the municipal watershed for the City of Bonners Ferry. The headwaters of Myrtle Creek are located within the SMRA. There would be no effects in the SMRA to the municipal watershed that are different from those disclosed in the Watershed and Aquatics section of Chapter 4. The cumulative effects analysis described for the municipal watershed in Chapter 4 incorporates the effects that would occur in the roadless area.

Diversity of plant and animal communities

There would be no direct effects on the diversity of plant and animal communities in the Selkirk Mountain Roadless Area (SMRA) that are different from those discussed for the entire project area. The cumulative effects analysis described in Chapter 4 and Appendix A incorporate the effects that would occur in the roadless area. However, the diversity of plant and animal communities could be indirectly affected as a result of increased fire risk in the roadless portion of the project area. The results of SIMPPLLE modeling estimated that the risk of stand-replacing fire in the SMRA is currently 25% higher than the roaded portion of the project area. If such a fire did occur it would have an effect on plant and animal community diversity. These effects could be either beneficial or detrimental depending on the species of wildlife considered. For example, such a fire may increase the percentage of forested openings in the project area, which would result in a long-term increase in foraging habitat for Canada lynx, but a decrease in the amount of early winter caribou habitat.

Habitat for threatened, endangered, proposed, candidate, and sensitive species, and for those species dependent on large, undisturbed areas of land

There would be no direct effects on the habitat for these species in the Selkirk Mountain Roadless Area (SMRA) that are different from those discussed for the entire project area. The cumulative effects analysis described in Chapter 4 and Appendix A incorporate the effects that would occur in the roadless area. Indirect effects would again be related to the risk of stand-replacing fire that is estimated to be higher in the roadless portion of the project area. These effects could be either beneficial or detrimental depending on the species of wildlife considered.

Primitive, Semi-Primitive Non-Motorized, and Semi-primitive Motorized classes of recreation opportunities

Currently there are no semi-primitive motorized recreation opportunities within the roadless area, consequently, there would be no indirect, indirect, or cumulative effects on this type of recreation in the SMRA.

Primitive recreation opportunities in the roadless portion of the project area are limited to the higher elevations in the upper end of the project area where no activities are proposed. Consequently, there would be no indirect, indirect, or cumulative effects on this type of recreation in the SMRA.

Currently, there are only semi-primitive non-motorized recreation uses in the SMRA that could be affected by proposed activities, specifically in the Burton Peak area. The sights and sounds of proposed helicopter logging operations could directly and indirectly change the remoteness of an experience in this area in the short-term. Direct effects would be related to seeing the helicopter logging operations from a distance, whereas indirect effects would be related to the sounds of logging and roadwork operations in the distance. However, after operations are completed and the sights and sounds are removed there would be no long-term cumulative effects on the remoteness experience.

Timber harvest units that would be visible from the Burton Peak area would have direct effects on the visual experience on semi-primitive non-motorized uses. In the short-term, units M02 and M05, which would be viewed looking to the west and away from the city of Bonners Ferry, would have the greatest impact on visuals from the Burton Peak area. The long-term cumulative impacts would diminish over time as these harvest units would eventually blend in with other harvested areas on both National Forest and private land.

Reference landscapes

There would be no direct effects on reference landscapes in the Selkirk Mountain Roadless Area (SMRA) that are different from the project area as whole. High elevation whitebark pine stands, which are typically found in roadless areas, are not a part of any alternative. Indirectly, fire exclusion coupled with no vegetative treatments would have the greatest impact on dry forest reference landscapes within the roadless area. These forested areas would burn with greater severity than they would have historically. Such fires would threaten dry forest old growth structures and the habitat these types of forests provide for certain wildlife species (e.g., flammulated owl). Alternative 2 proposes about 15 acres (MC10) of treatments in dry forest types within the roadless area. This treatment would significantly reduce the risk of severe fire in MC10, but this 15 acres of treatment would not be enough to significantly reduce the risk of stand-replacing fire in adjacent dry forest stands that are within the roadless area. Consequently, the greatest long-term cumulative impact on reference landscapes within the roadless area would be the indirect effects of increased risk of stand-replacing fire over time from Alternative 1 (no action) or Alternative 5, specifically on dry forest types.

Landscape character and scenic integrity

Only Alternatives 2 and 3 propose harvest treatments within the SMRA. The majority of the harvesting in the roadless area would be group selection treatments (MC23 and MC24). Regarding selection harvest, the 1999 Forest Plan Monitoring Report, p.14, states, “High visual quality can result from use of this approach to harvest. Through periodic removal of trees in 10-20 year intervals, individually or in small groups, natural appearances and high visual quality typically result.” Given that most of the units are proposed for helicopter logging this

would also further minimize visual impacts. Only Alternative 2 includes proposed regeneration harvesting within the roadless area. Unit M02, a 47-acre shelterwood harvest, would be located within a landscape that has been altered in the past by harvesting on private and National Forest lands. This harvest unit would include clumps and stringers of large leave trees that would blend with the surrounding landscape. The portion of the landscape that includes M02 currently has relatively low scenic integrity. Given the proximity to other past harvest activities this harvest unit would not detract from the existing landscape character and scenic integrity of the surrounding area. The long-term cumulative effect of harvesting this unit would be that it would eventually blend into a landscape that has been visually altered in the past through timber harvest.

Traditional cultural properties and sacred sites

Cultural resource surveys have been conducted within the Myrtle-Cascade project area, including proposed treatments within the roadless area. The cultural resource inventories are on file for selective review at the Bonners Ferry Ranger Station. Numerous sites have been recorded, and a determination made to the extent of protection required. These sites would be protected under all alternatives. Any future discovery of cultural resource sites would be inventoried and protected if found to be of cultural significance. A decision would be made to avoid, protect, or mitigate the impact to these sites in accordance with the National Historic Preservation Act of 1966. Currently, there are no known districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places that would be affected by the proposed actions. As such, the actions should not cause the loss or destruction of significant scientific, cultural, or historic resources. Consequently, there would be no direct, indirect, or cumulative effect on such resources.

Other locally identified unique characteristics

There are no locally identified ecological, social, cultural, or historical characteristics that are unique to roadless area within the Myrtle-Cascade project area. Consequently, there would be no direct, indirect, or cumulative effect on such characteristics.

CHAPTER 5 - LIST OF PREPARERS

The following individuals participated in the formulation and analyses of the alternatives and the subsequent preparation of the Environmental Impact Statement (EIS).

Pat Behrens - Silviculturist, Interdisciplinary Team Leader

Spike Loros - Document Display Specialist and GIS Analyst

Dale Deiter – Hydrologist

Matt Davis – Fisheries Biologist

Lydia Allen – Wildlife Biologist

Sandy Jacobson - Wildlife Biologist

Sandra Dekome - Fisheries Biologist

Anna E. Hammet - IPNF North Zone Botany Coordinator

Maridel Merritt - Writer Editor

Tom Sandberg – Archaeologist

Barry Wynsma – Visual Analyst

Pat Hart – Recreation Technician

CHAPTER 6 - PUBLIC INVOLVEMENT

Scoping is an integral part of the environmental analysis process and was used to identify issues associated with the proposed action. Elements of scoping include establishing the depth of analysis needed, initiating public involvement, identifying environmental issues, selecting an interdisciplinary team, exploring possible alternatives and their effects, and making task assignments (FSH 1909.15, Chapter 10).

Public scoping for this project was initiated in April 1997 with a proposed action to treat roughly 6,600 acres. At this time the project was titled the Myrtle-Ball Environmental Assessment (EA) and the assessment area encompassed nearly 49,000 acres. A scoping letter was mailed to individuals and agencies (including the Kootenai Tribe of Idaho) on the IPNF's Quarterly Schedule of Proposed Actions, and adjacent landowners, informing them that an EA to address vegetation management needs in the Myrtle-Ball project area was being prepared. In October 1997 the assessment area was reduced to 31,000 acres, the proposed treatment area reduced to 3,700 acres, and the project was renamed the Myrtle-Cascade EA. Based on scoping and changes in Agency direction the Forest Service determined that an EIS would be the appropriate level of documentation. A Notice of Intent (NOI) that the Bonners Ferry Ranger District would be preparing an EIS for the Myrtle-Cascade project area was published in the Federal Register on November 18, 1999. Several individuals and agencies have requested that they continue to be informed throughout the assessment process.

Informal consultation with the U.S. Fish and Wildlife Service (USWFS) began with a field trip to the Myrtle-Cascade Project area on September 25, 1998. Along with district personnel, members of the USFWS, Spokane office, attended the field trip. Discussions centered around potential effects on grizzly bear security, and woodland caribou and Canada lynx habitat.

Another field trip to Myrtle Creek drainage was conducted on October 6, 1998. The primary objective of this field trip was to provide participants with a common understanding of proposed projects in the Myrtle-Cascade area, in particular those in the Myrtle Creek watershed, which is the municipal watershed for the City of Bonners Ferry. In addition to Forest Service personnel, there were representatives from the city of Bonners Ferry, the Idaho Department of Environmental Quality, the Idaho Department of Lands, and the Kootenai National Wildlife Refuge.

District personnel met with representatives of the Bonners Ferry City Council on February 3, 2000, to update the Council on the progress of the Myrtle-Cascade EIS. The Council was mostly concerned with measures the Forest Service would be taking to protect the City's public water supply. The Council members made it very clear that their primary objective was maintenance of potable water for the City of Bonners Ferry. District personnel informed the Council of measures that would be implemented to address their concerns. These measures include, but are not limited to, winter logging on ground-based units in the Myrtle Creek drainage, applying INFISH buffers in proposed logging units, no new road construction, reconstruction and obliteration of several existing roads to reduce sediment production, and burning in the spring when soil moistures high enough to protect the soil from adverse effects. The District also had plans for a 190-acre wildlife habitat burn on the lower end of the drainage, but the City Council was unanimously opposed to this burn and the proposal was dropped from further consideration.

The Myrtle-Cascade Draft EIS (DEIS) was published in the Federal register June 30, 2000. Following a 45-day comment period the District received official comments from the Environmental Protection Agency (EPA),

Kootenai Environmental Alliance (KEA), and the Idaho Fish and Game. Based on comments we received two new alternatives, Alternatives 4 and 5, were developed and changes were made between the DEIS and FEIS. Changes made between the DEIS and FEIS are noted in individual chapters. Some of the more specific comments are addressed in the Record of Decision (ROD).

CHAPTER 7 - LITERATURE CITED

Allen, L. 1999. **The effects of 115 Years of Vegetation Change on Woodland Caribou Habitat in the Selkirk Mountains of Idaho.** December 1999, masters thesis. University of Idaho, Moscow, ID.

Allen, L. 2001. **Woodland Caribou Habitat on the Idaho Panhandle National Forests and the Idaho Department of Lands Selkirk Mountains: Status January 2001.** University of Idaho, Moscow, ID.

Almack, J. 1997. Personal communicaation.

Armleder, H.M., S.D. Walker, and S.K. Stevenson. 1992. **Estimating the Abundance of Arboreal Forage Lichens**. British Columbia Ministry of Forests.

Arno, Stephen F.; Davis, Dan H. 1980. **Fire History of western redcedar/hemlock forests in northern Idaho**. In: Proceedings of the fire history workshop; 1980 October 20-24; Tucson, AZ. Gen. Tech. Rep. RM – 81. Ft. Collins, CO: USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station: 21-26.

Averill, Robert D.; Larson, Louise; Saveland, James M.; Wargo, Philip; Williams, Jerry and Bellinger, Melvin. 1994. **Disturbance Processes and Ecosystem Mangement.** Directors of Forest Fire and Atmospheric Sciences Research, Fire and Aviation Management, Forest Pest Management, and Forest Insect and Disease Research. pp. 1-30.

Barret, Stephen W. 1982. **Fire's Influence on Ecosystems of the Clearwater National Forest: Cook Mountain fire history inventory**. Orofino, ID: USDA, Forest Service, Rocky Mountain, Clearwater National Forest Forest. 42 p.

Belt, G.H., J.O. O'Laughlin, and T. Merrill. 1992. **Design of forest riparian buffer strips for the protection of water quality:** Analysis of scientific literature. Id. Forest, Wildlife, Range Policy Group, Rept. 8, Univ. Idaho, Moscow, 35 pp.

Bilby, R.E., and G.E. Likens. 1980. **Importance of organic debris dams in the structure and function of stream ecosystems.** Ecology 61:5:1107-1113.

Bjornn T.C., and D.W. Reiser. 1991. **Habitat requirements of salmonids in streams.** American Fisheries Society Special Publication 19:83-138.

Bruna, John, 1994. **Best Management Practices for Nutrition.** Intermountain Forest Tree Nutrition Cooperative, Idaho Department of Lands, Couer d' Alene, Idaho, pp. 134-144. Annual meeting of Intermountain Forest Tree Nutrition Cooperative, April 12, 1994. Gonzaga University, Spokane, WA.

Bull, E.L.; Wright, A.L.; Henjum, M.G. 1990. **Nesting Habitat of Flammulated Owls in Oregon. Journal of Raptor Research. 24(3):52-55**. The Raptor Research Foundation, Inc.

Burroughs, E. and others. 1985. **Relative effectiveness of rocked roads and ditches on**

reducing surface erosion. In: Proceedings of the twenty-first annual engineering geology and soils engineering symposium, University of Idaho, Department of Civil Engineering, Moscow ID. pp. 251-263.

Chatters, James. 1992. **Pollen core and comparitive tree ring analyses.** Kootenai National Forest, Libby, MT.

Choquette, Wayne T. and Holstine, Craig. 1980. **A cultural resource overview of the Bonneville Power Administration proposed transmission line from Libby Dam, Montana, to Rathdrum, Idaho.** Washington Archaelogical Research Center Project Report 100.

Clark, Lance R. and Sampson, R. Neil. 1995. **Forest Ecosystem Health in the Inland West**. American Forests, Forest Policy Center, 1516 P Street, NW, Washington, D.C.

Cross, P.D. 1992. **Status of bull trout on the Idaho Panhandle National Forests**. USDA Forest Service, Coeur d'Alene, Idaho.

Compton, B., L. Allen-Johnson, and P. Zager. 1991. **Selkirk Mountain Caribou Transplant: June 1990-91**. Idaho Department of Fish and Game, Boise, ID.

Covington, W. W. and others. 1994. **Historical and anticipated changes in forested ecosystems of the Inland West of the United States**. Journal of Sustainable Forestry. 2(1/2): 13-64.

Ferguson, D.E. 1994. **Natural Regeneration Following Timber Harvest in Interior Cedar-Hemlock-White Pine Forests**. Reprinted from symposium proceedings, March 1993, Spokane WA. Department of Natural Resource Sciences, Washington State Univ., Pullman, WA.

Fileder, C.E., 1996. **The Use of Fire in Forest Restoration: Silvicultural Applications: Restoring Ecological Structure and Process in Ponderosa Pine Forests**. Gen. Tech. Rep. PNW-GTR-341. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station; U.S. Department of Agriculture, Forest Service, p.39-40.

Fowler, Philip M.; Aselsojn, David O. 1984. **The location of lightning-caused wildland fires, northern Idaho**. Physical geography. 5(3): 240-252.

Froehlich, H.A.; Aulerich, D.E. and Curtis, R. 1981. **Designating skid trail systems to reduce soil impacts from tractor logging machines.** Forest Research Lab, School of Forestry, Oregon State University, Research Paper 44.

Garten, J.K. 1991. Final Report - **Myrtle Creek Stream Segment of Concern**. Approved by Stan Hamilton, Idaho Department of Lands, Feb. 6, 1991.

Goetz, F. 1989. **Biology of the bull trout *Salvelinus confluentus*: a literature review**. Willamette National Forest, Eugene, Oregon.

Goggans, R. 1986. **Habitat use by flammulated owls in northeastern Oregon**. Thesis. Oregon St. University, Corvallis, OR

Gorman, O.T. and J.R. Karr. 1978. **Habitat structure and stream fish communities**. Ecology. 59:3: 507-515.

Graham, P. 1981. **Status of white sturgeon in the Kootenai River**. Montana Fish, Wildlife, and Parks. Kalispell, Montana.

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**. U.S. Dept. Agric. For. Serv. Intermountain Research Station. Research paper INT-RP-477.

Habeck, James R. 1985. **Impact of fire suppression on forest succession and fuel accumulations in long-fire-interval wilderness habitat types.** In: Lotan, James E.; Kilgore, Bruce M.; Fischer, William C.; Mutch, Robert W.; technical coordinators. Proceedings - Symposium and workshop on wilderness fire. November 15-18, 1983; Missoula, MT. Gen. Tech. Rep. INT-182. Ogden, UT: USDA, Forest Service, Intermountain Forest and Range Experiment Station: 110-118.

Harvey, A.E. 1994. **Interactions between forest health and the carbon cycle: inland northwest american and global issues.** Proceedings of the 1994 SAF/CIF convention, Anchorage, AK, pp. 86-91.

Henjum, M.G.; Karr, J.R.; Bottom, D.L. [and others]. 1994. In: Karr, J.R.; Chu, E.W., eds. **Interim protection for late-successional forests, fisheries, and watersheds**. National Forests East of the Cascade Crest, Oregon and Washington, Eastside Forests Scientific Society Panel. Bethesda, MD: The Wildlife Society: 129-168

Inland Native Fish Strategy (INFISH). 1995. **Environmental Assessment. Intermountain, Northern, and Pacific Northwest Regions**. USDA Forest Service.

Hunter, Malcom L., Jr. 1990. **Wildlife, Forests, and Forestry.** Prentice Hall Career and Technology, Englewood Cliffs, New Jersey 07632.

Jakober, M.J. 1995. **Autumn and Winter Movement and Habitat Use of Resident Bull Trout and Westslope Cutthroat Trout in Montana**. Master's Thesis. Montana State University, Bozeman.

Johnson, Charles G., Jr.; Clausnitzer, Roderick, R.; Mehringer, Peter J.; and Oliver, Chadwick D. 1994. **Biotic and abiotic processes of Eastside ecosystems: The effects of management on plant and community ecology, and on stand and landscape vegetation dynamics.** Gen. Tech. Rep. PNW-GTR-322. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 66 p.

Karr, J.P. and D.R. Dudley. 1981. **Ecological perspectives on water quality goals**. Env. Man. 5: 55-68.

Karr, J.R. and K.E. Freemark. 1983. **Habitat selection and environmental gradients: dynamics in the "stable" tropics**. Ecology. 64:6: 1481-1494.

Lehmkuhl, J.F.; Hessburg, P.F.; Ottmar, R.D. [and others]. 1993. **Historic and current vegetation pattern and associated changes in insect and disease hazard, and fire and smoke conditions in eastern oregon and washington**. in: hessburg, p.f., ed. **eastside forest ecosystem health assessment**--Volume III: assessment. Portland, OR: USDA, Forest Service, Pacific Northwest Research Station: p. 683.

Libby, W.J. 1994. **The role of production forestry in preventing tropical species extinctions.** Printed in "Nimbyism, Genetic Improvement and Plantation Forestry: Growing Wood for the 21st Century, The Inland Empire Tree Improvement Cooperative," Post Falls, ID, March 10, 1994.

MacDonald, L. 1989. **Cumulative watershed effects: The implications of Scale**. Paper presented at the 1989 Fall Meeting of the American Geophysical Union, San Fransisco, CA.

Markle, D.F., D.L. Hill Jr., and C.E. Bond. 1996. **Sculpin identification workshop and working guide to freshwater sculpins of Oregon and adjacent areas**. Revision 1.1. Department of Fisheries and Wildlife. Oregon State University, Corvallis.

McCallum, D.A. 1994. **Conservation of Flammulated Owls in the United States**. In: Hayward, G.D. and J. Verner, tech. editors. 1994. Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station.

McMahon, J.A. 1994. **Continuing Education in Ecosystem Mangement: structure, function, and changes in ecosystems (Proceedings)**. University of Idaho, Moscow, ID.

Meehan, W.R. 1991. **Influences of forest and rangeland management on salmonid fishes and their habitats**. American Fisheries Society Special Publication 17.

Mesa, Matthew G. 1991. **Variation in feeding, aggression, and position choice between hatchery and wild cutthroat trout in an artificial stream**. Trans. Amer. Fish. Soc. 120:723-727.

Morgan, Penelope. 1994. **Continuing Education in Ecosystem Mangement: historical range of variability (Proceedings)**. University of Idaho, Moscow, ID.

Morgan, P.; Aplet G.H.; Haufler, J.B.; Humphries, H.C.; Moore, M.M.; and Wilson W.D. 1994. **Historical range of variability: A useful tool for evaluating ecosystem change.** Journal of Sustainable Forestry. In Press.

Mutch, R.E. 1993. **Forest Health and Productivity: Fire Interactions.** Paper presented at the Forest Health and Productivity Concurrent Session at the SAF National Convention, Indianapolis, IN.

O'Laughlin, J., MacCracken J.G., Adams, D.L., Bunting S.C., Blatner K.A., and Keegan C.E. III. 1993. **Forest Health Conditions in Idaho.** Idaho Forest, Wildlife, and Ranger Policy Analysis Group, Report No. 11, University of Idaho.

Oliver, C.D., and B.C. Larson. 1996. **Forest Stand Dynamics.** John Wiley and Sons, Inc, pages 228-231.

Oliver, C.D., D.E. Ferguson, A.E. Harvey, H.S. Malany, J.M. Mandzak, R.W. Mutch, 1994. **Managing ecosystems for forest health: an approach and the effects on uses and values.** pp. 113-133.

Paragamian, Vaughn. **Idaho Department of Fish and Game**. Personal communication.

Pfister, Robert D. 1993. **Defining Sustainable Forestry.** Island Press, Washington, D.C. and Covelo, CA, pp. 217-215.

Reel, S., Schassberger, L., and Ruediger, W., 1989. **"Caring for Our Natural Communities: Region 1-Threatened Endangered and Sensitive Species Program"** USDA Forest Service, Northern Region, Wildlife and Fisheries.

Reeves, G. H., L. E. Benda, K. M. Burnett, P. A. Bisson, and J. R. Sedell. 1995. **A disturbance-based ecosystem approach to maintaining and restoring freshwater habitats of evolutionarily significant units of anadromous salmonids in the Pacific northwest**. American Fisheries Society Symposium 17:334-349.

Rieman, B., and K. Apperson, 1989. **Status and analysis of salmonid fisheries: Westslope cutthroat trout synopsis and analysis of fishery information.** Project F-73-R-11. Idaho Department of Fish and Game. of Fisheries and Aquatic Science 39:968-978.

Rominger, E.M., L. Allen-Johnson, and J.L. Oldemeyer. 1994. **Aboreal Lichens in Uncut and Partially Cut Subalpine Fir Stands in Woodland Caribou Habitat, Northern Idaho and Southeastern British Columbia.** U.S. Fish and Wildlife Service, National Ecology Research Center, Ft. Collins, CO.

Rominger, E.M. 1995. **Late Winter Foraging Ecology of Woodland Caribou**. Phd Dissertation, Washington State Univ., Pullman, WA.

Scott, W. B. and E. J. Crossman. 1973**.** **Freshwater Fishes of Canada**. Fisheries Research Board of Canada, Ottawa. Pages 837-838.

Schroeder, G.J. 1974. **Aboreal lichens: A Discussion of Their Importance in the Management of Selkirk Caribou**. Report to International Caribou Study Sterring Committee. University of Idaho, Moscow, ID.

Sedjo, Roger A. 1993. **Journal of Forestry.** Voulme 91, Number 4, April, 1993. pp 19-21.

Seyedbagheri, K. 1996. **Idaho Forestry Best Management Practices: Compilation of Research on Their Effectiveness**. General Technical Report INT-GTR-339. Ogden, UT, USDA Forest Service Intermountain Research Station, 89p.

Simpson, J.C and Wallace R.L., 1978. 1982. University Press of Idaho, Idaho Research Foundation, Inc. Moscow 237pgs.

Spurr, S.H., and B.V. Barnes, 1980. **Forest Ecology**. John Wiley & Sons, New York, p.108.

Stevens, W.K. 1990. **New eye on nature: the real constant is eternal turmoil.** New York Times. July 31, 1990.

Stevenson, S.K., H.M. Armleder, M.J. Jull, D.G. King, E.L. Terry, G.S. Watts, B.N. McClellan, and K.N. Child. 1994. **Mountain Caribou in Managed Forests: Preliminary Recommendations for Managers.** Research Branch of Ministry of Forests. Victoria, B.C.

Swift, L. 1984. **Gravel and grass surfacing reduces soil loss from mountain roads**. Forest Science, Vol. 30, No. 3, pp. 657-670.

Taylor, E. and O. Olson. 1956. **Report of Watershed Investigations – Myrtle Creek**. US Forest Service Unpublished report, 18 pgs.

USDA Forest Service, Agriculture Handbook 654, 1990. **Silvics of North America**, Volume 1. Conifers, pp. 168, 380, 391, and 535.

USDA Forest Service. 1996. **Status of the interior Columbia basin; summary of scientific findings.** Gen. Tech. Rep. PNW-GTR-385. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; U.S. Department of the Interior, Bureau of Land Management. 144 p.

USDA Forest Service, 1999. **Draft North Zone Terrestrial Vegetation Strategy**. Idaho Panhandle National Forests, North Zone Geographic Assessment.

Wakkinen, Wayne. 1999. Idaho Fish and Game, personal communication

Zack, Arthur C. 1994. USDA Forest Service, personal communication.

Zack, Arthur C. 1995. **Northern Idaho forest ecosystems: historic conditions and current trends in forest succession, fire, timber harvest, and landscape pattern.** USDA, Forest Service.

Zack, et. al. 1998. **IPNF North Zone Geographic Assessment.** USDA, Forest Service.

APPENDIX A - OTHER RESOURCE CONCERNS

Appendix A lists the resources concerns that were eliminated from detail study. These resources were elimintaed from detailed study because the alternatives listed in Chapter 2 will either have no effect on them, or not enough of an effect to warrant development of another alternative.

Changes Between Draft and Final EIS

Information was added to the "Air Quality" section under "Public Health and Safety" to better describe estimated emissions from project related activities. The "Decision Analysis for Smoke Modeling" (Figure A-1) was added, along with Tables A-2, A-3, and A-4, which describe potential emissions from each alternative.

BIODIVERSITY

A. Biological Factors

1. Noxious Weeds

Increased travel from both timber harvest activities and recreation use can introduce and distribute the seeds of noxious weeds. Ground disturbed areas, such as landings and especially road shoulders, provide suitable habitat for many weed species. Most of the noxious weeds are very aggressive and tend to dominate over natural vegetation for use of the habitat. A weed monitoring and control program would be implemented under the KV plan if funding is available. If this becomes a priority treatment area for noxious weeds the District will seek appropriated funds. Timber sale contract provisions would be used to guarantee treatment of haul routes and landings in the project area for noxious weeds. To prevent further infestation, only certified weed free seed would be used to seed road shoulders, temporary roads, skid trails, and landings. Identified existing weed infestations within the project area would be treated according to guidelines established in the Bonners Ferry Weed Control Projects EIS (USDA 1995). Monitoring and the environmental effects of weed control are also covered in the EIS. No significant direct, indirect, or cumulative effects from noxious weeds are expected from implementation of any alternative.

2. Wildlife

A summary of the determination of effects Threatened, Endangered, Sensitive, and Management Indicator Species is provided Table A-1. Detailed information regarding these species can be found in either Appendix B of the Myrtle Cascade EIS, or the Wildlife Report (project file).

a) Threatened or Endangered Species - **Threatened and Endangered Species** - There are four threatened and endangered wildlife species, one proposed for listing and one that has been delisted on the Bonners Ferry Ranger District. They include the grizzly bear, woodland caribou, gray wolf, bald eagle, peregrine falcon (delisted), and lynx. Effects on woodland caribou are discussed in Chapter 4. Refer to the attached T&E Biological Assessment, found in Appendix B, for further detailed information.

Grizzly Bear - Currently, appropriate management for grizzly bear recovery on the IPNF is guided by the Forest Plan and an Interim Access Management Guide (based on results of an Interagency Grizzly Bear

Committee's recommendations). The FP guidelines require each BMU to maintain secure habitat in the form of unroaded areas, barriered or gated roads. In addition to this FP standard, the IPNF has an interim access management agreement with the US Fish and Wildlife Service, 1997. The guidelines for this agreement contain four components: habitat security, core habitat, open road density and total road density. Priority 2 BMU's, which include both Myrtle and Ball-Trout, are required to work towards 55% core habitat; both BMU's have well above that level of core habitat (see Table 1). Habitat security is to be maintained at or above 70% of the BMU; both BMU's currently more than meet this standard. Open and total road densities are monitored at the end of each year, and are based on 33% or less of the area having an open road density of one mile per square mile or greater, and 26% or less of the area having a total road density (includes gated roads) of two miles per square mile or greater. Both BMU's fall well under these figures as well.

Table 1: Existing Condition Bear Year 1999 (based on latest complete monitoring data)

BMU	BMU Area (mi2)	Forest Plan Security (mi2)	Forest Plan Security (%)	Core Area (%)	Open Road Density (%)	Total Road Density (%)
Myrtle	99	73	73	61	28	18
Ball-Trout	91	82	85	72	16	10

The existing condition, Alternative 1, would remain essentially unchanged in both BMU's, with most of the annual disturbance resulting from activities of private landowners. Core habitat would remain unchanged, with no post-sale increase in potential core habitat, nor any increase in the 'quality' of the core habitat from roads that would be decommissioned with the action alternatives.

Under all of the action alternatives greater than 70 square miles of secure habitat would be maintained in the BMU, meeting Forest Plan standards. In addition, habitat security would be maintained above 70% in both BMU's, core habitat would be maintained above 55%, there would be no increase in open road densities, and total road densities would be reduced as a result of proposed road obliterations. Consequently, any of the action alternatives may affect, but would not be likely to adversely affect, grizzly bears or their habitat. Road decommissioning planned for the action alternatives would contribute to a larger amount of habitat for potential core over the long term.

Gray Wolf - Mortality risk is unlikely to change measurably in the project area because most of it is within the Myrtle Game Preserve. Road access is unchanged throughout the project except for a temporary road reconstruction. The net effect of any action alternative would be a reduction of total road densities. The likelihood of a wolf being in this unit during the time the road would be reconstructed would be virtually immeasurable. Therefore, the effect on wolves would be immeasurable. Even if a wolf were present during reconstruction, implementation of the grizzly bear recovery guidelines for habitat security would provide a larger proportion of secure habitat than is currently present in many locations where wolves have successfully bred in the recent past. The abundance of deer, moose and elk are unlikely to be measurably affected by treatments in this project. The ability of the wolf to successfully recover would not be affected by the abundance of these species because availability of prey is not limiting wolf recovery in the Selkirks. None of the alternatives affect denning or rendezvous habitat, because there is no habitat clearly identifiable as either denning or rendezvous habitat. Consequently, none of the alternatives are expected to have any negative direct, indirect, or cumulative effects to wolves or their habitat.

Bald Eagle - None of the action alternative units are closer than 1.25 miles from the nearest known bald eagle nest. This nest is well established in its location in the valley bottom, and foraging habitat is

surrounding the territory. The pair is habituated to a fairly large amount of human use around the territory because the auto tour route goes past it on three sides. It is unlikely that this pair uses the base of the Selkirks near the closest units because of the forage base elsewhere.

Direct effects from the action alternatives are non-existent because no known habitat is being affected. Indirect effects, primarily disturbance, are unlikely because of the distance from known use areas for this pair. In addition, winter disturbance would be unlikely because of the distance from known use areas.

Because bald eagles infrequently roost away from water bodies, such as the Kootenai River, it is highly unlikely there would be any impact to habitat located away from water. Furthermore, even if impacts did occur, there are numerous other locations that would meet the need for timbered cover away from these water bodies. Cumulatively, with other actions, it is unlikely that roost habitat limits the number of bald eagles in Boundary County.

Bonners Ferry Ranger District is heavily vegetated with many large trees, particularly around the lakes. This abundant cover provides ample nesting and winter roost habitat that is protected from the prevailing winds, both from topography and tree density. It is unlikely that eagles would travel far from the primary foraging areas to roost because of the abundance of habitat near the primary food source. During the annual mid-winter eagle count done for the past dozen years, eagles are almost always found within a mile or two of a known nest along the Kootenai River, implying that the pairs roost very near their nests. No cumulative effects are expected because of the unlikelihood of direct or indirect effects. For the reasons above, the Myrtle-Cascade project may effect, but would not likely adversely affect bald eagles.

Lynx: The following risk factors listed in the Lynx Conservation Assessment and Strategy (LCAS) are common to all alternatives: wildland fire management, recreation, forest roads and trails, competition and predation as influenced by human activities, land ownership pattern. Those that have the same effect in all alternatives are discussed in this section, and the remainders are listed by the alternative in which they have an effect.

Vegetation in the Selkirks has been molded by the intensity and severity of fires over a long period of time. In this century, the pattern has been changed from one of frequent fires to fire suppression. This has resulted in increased fuel loading, a general reduction in the number of acres of lower seral stages, and an increase in the amount of middle-aged trees. These changes have been the result of several decades of effective fire suppression. The Myrtle Cascade EIS proposes to trend some of the stands back towards a historical condition in both stand structure and acreage. However, because the magnitude of the changes caused by suppression are so large, it is not possible to make significant progress towards this end with one project. The incremental changes made towards historical conditions in the fire ecology are important to lynx cumulatively over time, but are almost immeasurable for this project given the LAU is nearly 21,000 acres and none of the action alternatives affect more than 0.6% (140 acres) of currently suitable habitat. Consequently, the no action alternative would have similar effects in the short term as the action alternatives with regard to fire management on lynx habitat. In the long-term, continued treatments would be needed to restore habitat proportions that more closely resemble historic conditions, and thus support long-term lynx recovery.

Recreation would not be measurably changed under any of the alternatives, so recreation would have no effect on lynx or its habitat. None of the alternatives proposes to increase the open road miles within the LAU. None of the alternatives would produce changes in the number of groomed snowmobile trails. Some

use may occur on roads used for winter harvesting for the duration of the project (i.e. a few weeks one winter). This level of use would probably be similar to previous years, in that the activity of the project for any alternative would not be likely to increase the use by its presence alone.

Competition and predation as influenced by human activities would be similar in all alternatives. All of the species that are suspected to be interference or exploitative competitors with lynx have been recorded in the vicinity of the project area (Ruggiero et al, 2000). Currently, there is winter use in the area along the roads and in open areas that could allow access by bobcats and coyotes. While the lynx conservation strategy (Ruediger et al, 2000) has an objective to maintain the natural competitive advantage of lynx in deep snow conditions, and recognizes plowed or created snow roads may be necessary to winter log, it does not recommend a standard to restrict winter logging activities. Winter logging in the Myrtle-Cascade project would most likely be a factor to lynx I this situation only in the Mack Creek area. The short duration and limited geographic extent of logging activity would be unlikely to adversely affect lynx measurably in the LAU.

Under the No Action alternative there would be no treatments to change existing stand age and structure. Preforaging (275 acres; 1.3%) and foraging (164 acres; 0.8%) habitat, which are currently limited in the LAU, would continue to decline in the absence of silvicultural treatments, or fire. The 275 acres of preforage habitat would grow into early foraging habitat in the next two decades, temporarily increasing foraging habitat. Because Myrtle Creek is a very important drainage for woodland caribou, wildfire would be aggressively suppressed to protect existing habitat. It is likely that some fires would occur in this time period, but it is unknown if adequate acreage would burn to compensate for the loss of stands growing into late successional forage.

Alternative 2: All action alternatives that include silvicultural treatments would increase the amount of preforaging habitat, and ultimately foraging habitat. However, the amount of increased foraging habitat under any alternative will increase the total in the LAU to no more than 2%, indicating that foraging habitat is likely to limit lynx ability to occupy this unit in the next few decades unless additional habitat is created.

Denning habitat is not limiting in this LAU or on the district as a whole. All action alternatives that include silvicultural treatments would decrease the amount of denning habitat, but would maintain habitat above desirable levels. This loss of denning habitat would be offset by an increase in the more limiting preforaging habitat.

Proposed treatments included in the Myrtle-Cascade EIS and the Bonners Ferry Small Salvage Sales EIS would result in slight reductions of lynx denning habitat. However, none of these treatments would reduce the amount of lynx denning habitat below the recommended levels in the Lynx Conservation Strategy.

The effects of the preferred alternative in the Forest Service RACP are represented in the range of alternatives analyzed for Myrtle-Cascade. Therefore, the analysis done for Myrtle-Cascade represents the reasonably foreseeable site-specific effects of the preferred alternative in the RACP on Canada lynx.

The loss of denning habitat and creation of foraging habitat would not limit lynx over the entire ranger district. On a mid-scale analysis of district-wide habitat there is more than minimum denning habitat available (15.5% of capable habitat on the district) and less than desirable preforaging (3.6%) and early foraging (3.8%) habitat. A high number of acres of mid-seral stage stands indicates that long-term denning will not be limiting in the short or long-term. Based on the previous analysis of risk factors, particularly

timber management, and habitat quantities, the Myrtle Cascade project is not likely to adversely affect lynx or their habitat.

Peregrine Falcon - Habitat for this species does not occur in the treatment areas, so no impacts would be expected. For these reasons, there would be no direct, indirect, or cumulative effects on peregrine falcon or their habitat.

b) Sensitive Species - The Bonners Ferry Ranger District contains habitat or populations for several sensitive wildlife species listed below. Refer to the attached Sensitive Species Biological Evaluation found in Appendix B, or Wildlife Report (project file) for further detailed information.

Black-backed Woodpecker - With no silvicultural treatments and fuels management the risk of stand-replacing wildfire would increase under the no action alternative as insects, disease, and natural fuels continue to build. These conditions are favorable to black-backed woodpeckers, and over time the habitat within the project area should improve for this species with no action.

Alternatives that include timber harvest have objectives in direct conflict with the increase of dead and dying stands of trees. These alternatives would reduce the amount of habitat available immediately and over time for this species. Some mitigation of this effect could occur because underburning is planned for several stands for the action alternatives. Underburning does not provide large areas of burned trees, but it does provide suitable habitat, as evidenced by the black-backed woodpeckers known to nest in these situations on the district.

The snag analysis conducted for the Myrtle-Cascade area indicated that the project area as whole is not snag deficient. To help meet future snag needs design criteria for all action alternatives have been included in Chapter 2 that follow “Regional Snag Management Protocol” (January 2000).

Currently, there is 4,900 acres of currently suitable black-backed woodpecker nesting habitat in the project area, and another 1,500 acres of foraging habitat. While the amount of habitat available for black-backed woodpeckers would be reduced in the project area, it is unlikely this will affect the viability of the species. The trend on the district towards reduced health and vigor of stands will result in many more stands becoming suitable habitat either through insect and disease effects or wildfire. The rate of habitat creation is accelerating while the rate of habitat removal is decelerating across the District. Alternative 3 would affect 6% of the currently suitable habitat in the project area, more than any other action alternative. This amount either absolutely or relatively would probably not be measurable to a population of black-backed woodpeckers in the analysis area. For these reasons, any of the action alternatives may affect individuals but will not trend the species towards listing.

Boreal Toad – Preliminary analysis shows that Inland Native Fish Strategy guidelines concerning riparian habitat conservation areas within 150 feet of the edge of wetlands would prevent sedimentation of toad breeding habitat. Because toads frequently breed in muddy-bottomed ponds (Nussbaum et al, 1983, p. 129), a small amount of sedimentation is not a great cause for concern for this species. Road removal or improvement would benefit toads by eliminating a potential sediment source near the wetland. Adequate design criteria and mitigation measures would be implemented under all the action alternatives to protect boreal toads and their habitat. For these reasons, there would be no direct, indirect, or cumulative effects on boreal toad or their habitat.

Coeur d'Alene Salamander - A habitat suitability and capability index model was developed for this species using known locations of salamanders in Montana and Idaho (Allen, 1996). Based on this model, the project area contains no suitable landtypes but several streams with suitable stream classification. Not all the areas identified as suitable are expected to harbor salamanders, because of the difficulty of colonizing some isolated patches, but the model gives an overview of the possible locations for management purposes. Coeur d'Alene salamanders have not been recorded in the Selkirks. It is unlikely that they would occur there given the geology of the range. In addition, the majority of the project area is above the elevational band that this species occupies. Elevation is also an important factor for this species because it is "cold-blooded" and is limited by the amount of time an area is significantly below freezing and the minimum temperatures reached. Surveys would not change management recommendations for this species because protection for streamcourses would automatically protect salamanders. For these reasons, there would be no direct, indirect, or cumulative effects on Coeur d'Alene salamander or their habitat.

Common Loon - Common loons are large lake-nesting birds. They require lakes with emergent vegetation that are at least 10 acres in size because of their need to have a large expanse of water to take off and land. There are no lakes near any of the proposed treatment units that meet this description, and at the present time no loons are known to nest in Boundary County. For these reasons, there would be no direct, indirect, or cumulative effects on common loon or their habitat.

Fisher - The no action alternative would not result in any significant short-term changes in habitat quality or quantity. In the long-term, there is a large amount of capable habitat in the middle seral age classes that would grow into suitable habitat in a few decades. However, it does not appear that habitat limits fishers at this time. Thus, it is likely that the no action alternative would continue on more or less the same trajectory of population trends that is now occurring. A possible change in this scenario would be if large amounts of capable or currently suitable habitat would be set back in succession by large stand-replacing fires. If large enough, such a fire may change the ability of the project area to hold fishers, and cumulatively, it could have an effect over the range.

Fishers are not as sensitive to human disturbance as some wildlife species, so it is unlikely that the operations of the timber sale or road work would adversely affect fishers.

Proposed treatments included in the Myrtle-Cascade EIS and the Bonners Ferry Small Salvage Sales EIS could be located in fisher habitat. However, salvage operations that would detrimentally impact fisher habitat would not be allowed.

The effects of the preferred alternative in the Forest Service RACP are represented in the range of alternatives analyzed for Myrtle-Cascade. Therefore, the analysis done for Myrtle-Cascade represents the reasonably foreseeable site-specific effects of the preferred alternative in the RACP on fisher.

The project area contains an estimated 7,000 acres of suitable fisher habitat. None of the alternatives that propose timber harvest would significantly alter currently fisher suitable habitat. Alternatives 2 and 4 would impact only 8 acres of primary habitat (less than 0.4% of the total) and no secondary habitat. Alterantive 3 would impact roughly 100 acres of primary fisher habitat (about 5%) and 45 acres of secondary habitat (less than 1%). None of the alternatives would result in significant direct, indirect, and cumulative effects on fisher habitat that would be likely to trend the species towards listing.

Flammulated Owl - Flammulated owl habitat is restricted to the lower elevations in the project area, with considerably more capable habitat than suitable habitat. The primary reason for capable habititat being more abundant than suitable habitat is high canopy cover. Also, the predictive habitat model used to determine suitable flammulated owl habitat tends to underestimate the amount of suitable habitat because of microsites within the stands. These microsites are not detected by the stand exams, and are not represented in the vegetation data base.

Under the no action alternative the risk of losing high quality large-diameter nest trees, especially ponderosa pine, will increase over time. The increased nutrient and water competition in the high density stands would eventually eliminate the oldest, largest ponderosa pines, thus reducing the ability of the stand to function as nesting habitat. In addition, the risk of stand-replacing fire will continue to increase in the long-term as natural fuels continue to build. Such fires would kill not only smaller diameter Douglas-fir and grand fir, but the large-diameter ponderosa pine as well.

Typical flammulated owl nesting habitat is mature ponderosa pine or Douglas-fir forest, with 2-3 canopy layers, 35-65% canopy closure with open understory, nesting trees of at least 15" diameter at breast height (DBH), and slopes of less than 45% (Bull et al. 1990). Goggans (1986) found that flammulated owls forage in stands with low to medium density. Suitable habitat on the Bonners Ferry Ranger District for flammulated owls is not common. The preferred habitat was more similar to presettlement forests than are the heavily stocked stands of the fire-suppression era (McCallum 1994).

Cumulatively, these effects are important over the range of the flammulated owl. Incrementally, it is important to try to treat these stands in order to restore flammulated owl habitat on a broader scale. The no action alternative does not accomplish this.

The action alternatives that include silvicultural treatments in flammulated owl habitat would increase the amount of suitable habitat by reducing stand densities to suitable levels. Treatments under these alternatives would retain large trees suitable for nest trees but remove competing undergrowth. Alternative 2 would generate the greatest increase in suitable flammulated owl habitat.

Indirectly, the decrease of vegetation in the undergrowth would increase the amount of lepidopteran prey for flammulated owls, making the moths more available for capture by owls. Reducing stand densities and retaining larger-diameter fire-resistant species will reduce the risk of a severe wildfire within treated stands, while reducing the risk of fire spread to neighboring untreated stands.

Private land activities were considered to the extent possible. Generally, timber harvesting or development on private land would have a disproportionate effect on dry site species, including flammulated owls, because of the greater occurrence of this cover type on lower elevations. Both private timber harvesting and development are occurring in Boundary County, some of it in flammulated owl habitat. This loss continues to be a large factor in the species' decline. Private land loss is more important and long-term than the proposed project's effects.

Cumulatively, while the number of acres treated in this project would not make a measurable difference in fire risk on a broader scale, it is an incremental step towards fire risk reduction that would help in the long-term if similar treatments are implemented in the next several years.

Proposed treatments in the Bonners Ferry Small Salvage Sales EIS are designed to remove relatively small pockets of standing dead trees or down trees. These treatments would not significantly alter vegetative condition and therefore not significantly alter flammulated owl habitat. These activities would have no negative effetcs on flammulated owls and their habitat.

The effects of the preferred alternative in the Forest Service RACP are represented in the range of alternatives analyzed for Myrtle-Cascade. Therefore, the analysis done for Myrtle-Cascade represents the reasonably foreseeable site-specific effects of the preferred alternative in the RACP on flammulated owl.

In summary, the direct, indirect, and cumulative effects of any alternative are not likely to trend the flammulated owl towards federal listing. The action alternatives in the Myrtle-Cascade project would have a beneficial effect on flammulated owls and their habitat.

Harlequin Duck - There is no suitable harlequin duck habitat near any of the proposed treatment areas. None of the proposed actions would alter riparian habitat (see Inland Native Fish Strategy guidelines). No new roads or trails are expected to be within 200 feet of any other suitable harlequin duck nesting stream. For these reasons, there would be no direct, indirect, or cumulative effects on harlequin duck or their habitat.

Northern Bog Lemming - Habitat for this species does not occur in the treatment areas, so no impacts would be expected. For these reasons, there would be no direct, indirect, or cumulative effects on northern bog lemming or their habitat.

Northern Goshawk - For all alternatives, the number of stands with nest sites remains well above the minimum necessary for maintenance of the goshawk as a nesting species in the project area. The concept of nest stands is somewhat difficult to consider on the IPNF because of the continuity of densely forested cover. Most stands are continuous, and provide nesting goshawks with the opportunity to choose many sites within a contiguous stand of up to thousands of acres in size. None of the alternatives affects enough stands or their continuity to pose an impact for this criterion. In all alternatives, the number of patches remains well above the minimum for maintaining a healthy goshawk population.

Alternative 1 would continue the stand conditions of the present, which is currently providing a large amount of suitable habitat. This situation is likely to continue in the absence of stand-replacing fire. There are, however, many stands that have a greater amount of understory vegetation than is suitable for goshawk nesting habitat. These stands would decrease in suitability over time because of the increasing trend of the understory vegetation.

Under Alternative 1 the risk of stand-replacing fire will increase over time. A stand-replacing fire has the potential to greatly reduce suitable habitat, or set back succession on capable habitat, such that it would reduce the value of these stands for up to a century. On the North Zone of the IPNF, there is a high proportion of old growth and older sawtimber relative to most of the Upper Columbia River Basin, so this effect may be less damaging to northern goshawks than it would be in an area of very limited old growth.

The cumulative effects of the no action alternative combined with human projects have resulted over time in a reduction in habitat for this species throughout its range. Considering all activities for this project (including private lands and the effects of other timber sales on the IPNF), cumulative effects would be minor, and viable populations would remain. There are adequate numbers of stands and acreage on public

lands to offset any reasonably foreseeable actions on private land in this analysis area. No additional cumulative effects are expected for this alternative.

Alternatives 2, 3, and 4 would result in a direct loss of nesting and foraging habitat. This is an inevitable result of returning stands to their historic condition. Some of the stands that are currently suitable for goshawk habitat are suitable because of their unnaturally dense condition resulting from fire suppression. Nesting habitat is increasing over time in this analysis area because the middle age class of trees is large in proportion to any other age class, thus providing for future nesting stands.

Proposed treatments in the Bonners Ferry Small Salvage Sales EIS are designed to remove relatively small pockets of standing dead trees or down trees. These treatments would not significantly alter vegetative condition and therefore not significantly alter northern goshawk habitat. These activities would have no negative effetcs on northern goshawk habitat and their habitat.

The cumulative effects would be greater for the action alternatives than for the no action alternative, because the loss of habitat is more. This loss has been factored into the loss of habitat faced by this species from other timber sales on the IPNF, and development and habitat loss on private lands. The cumulative effects of any alternative on suitable habitat may impact individuals, but would not be likely to trend the species towards federal listing. Some of the losses in nesting and foraging habitat are inevitable losses in order to trend conditions back towards historical conditions. This effect is recognized in the Idaho Bird Conservation Plan as likely to reduce some species while improving habitat for others, and is considered a reasonable tradeoff. There is also likely to be a loss of habitat from development on private lands in the area.

There is more than adequate nesting and foraging habitat to provide for an amount of habitat proportional to the land area on the Bonners Ferry Ranger District, and the amount of habitat loss resulting from any alternative is unlikely to trend the species towards listing, but it may impact individuals.

Northern Leopard Frog – Analysis shows that Inland Native Fish Strategy guidelines concerning riparian habitat conservation areas within 150 feet of the edge of wetlands would prevent sedimentation of frog breeding habitat. None of the proposed treatment units contain suitable habitat, nor are near suitable habitat. For these reasons, there would be no direct, indirect, or cumulative effects on northern leopard frog or their habitat.

Townsend's Big-eared Bat - Habitat for this species does not occur in the treatment areas, so no impacts would be expected. For these reasons, there would be no direct, indirect, or cumulative effects on Townsend's big-eared bat or their habitat.

Wolverine - Wolverines are likely to be transient in the area because of their wide-ranging nature. Consequently, the risk of human/wolverine interactions would be relatively low. None of the areas proposed for treatment include sites within many miles of suitable denning habitat, so the risk of disturbance during the sensitive rearing period is not a factor for this species. Access would remain as present, so the risk of mortality would remain the same. For these reasons, there would be no direct, indirect, or cumulative effects on wolverine or their habitat.

c) Management Indicator Species - The Bonners Ferry Ranger District contains habitat or populations for management indicator wildlife species listed below. Refer to the Wildlife Report (project file) for further detailed information.

American Marten – An analysis of the Selkirk Mountains indicates marten denning and foraging habitat indicate habitat is widespread and plentiful (project file). This is supported by field observations and trapping history. The compartments in the Myrtle Cascade project area have much more than the minimum recommended amounts of feeding and denning habitat. Over 22,000 acres of suitable marten cover habitat, and nearly the same amount of foraging habitat, occurs in the project area. Because the amount and distribution of habitat is so much higher than the minimum recommended none of the alternatives are expected to have negative direct, indirect or cumulative effects on American marten.

Pileated Woodpecker – The snag analysis conducted for the Myrtle-Cascade area indicated that the project area as whole is not snag deficient. To help meet future snag needs design criteria for all action alternatives have been included in Chapter 2 that follow "Regional Snag Management Protocol" (January 2000). In addition to this, there are numerous snags being created outside of the treatment units that would not be treated. This is true over the entire Idaho Panhandle as well as the North Zone. Thus, even if snags were reduced on a portion of the landscape, the total number of snags is increasing at a more rapid rate than they are being removed. Further, fuel reduction in the form of removal of some dying trees is beneficial in the long term to this species because of the reduction of fire risk. Although this project and the others proposed for the Idaho Panhandle National Forests would make only a small decrease in fuel loading, it is an incremental beneficial effect that cumulatively over time should assist in reducing the risk of stand-replacing fires. For pileated woodpeckers, stand-replacing fires are a negative impact because they reduce the canopy even though they also create large numbers of snags. No treatments are proposed that would reduce old growth structure or integrity. For these reasons, there will be no negative direct, indirect, or cumulative effects on pileated woodpecker or their habitat.

White-tailed Deer - Climatic factors affect the seasonal variation of forage quality and quantity, accessibility to foraging areas and the energetic requirements to the animal (Pfingsten 1984). Winter is the most limiting and stressful period for big game. It is during this period when forage is scarce and travel is energetically very expensive because of snow accumulations. Thermal cover is probably the most important component of this winter habitat (thermal cover is the collective arrangement of tree crowns that help moderate the effects of inclement weather. It also intercepts snow and reduces understory snow accumulation, thereby, increasing foraging opportunities). As winter temperatures decrease and snow depths increase, animals select these areas to minimize energy expenditures (Pauley 1990). At least 50 percent of the canopy structure is needed to provide the attributes of thermal cover. Optimal proportion of thermal cover on the winter landscape should be 50-70 percent (Jageman 1984). The stands that have the greatest use on the Bonners Ferry Ranger District for critical mid-winter snow interception are dense with a high proportion of cedar in the understory. There are no stands meeting this description of critical mid-winter in the project area. None of the stands proposed for treatment are capable of producing suitable critical mid-winter habitat. For these reasons, there would be no direct, indirect, or cumulative effects on white-tailed deer or their habitat.

d) Snag Dependent Species - Tree snags of varying species, size, and stages of decomposition are needed to provide habitat for a variety of wildlife species in the assessment area. A snag analysis was conducted for the Myrtle-Cascade project area and is contained in the project files. This analysis determined that snag densities far exceed Forest Plan standards at 100% population levels for cavity

nesting species of seven snags per acre (snags and snag replacements). The analysis showed that snag densities average an estimated 21 snags per acre greater than 10 inches DBH (diameter at breast height) and 3 snags per acre are greater than 20 inches DBH. Proposed silvicultural treatments would be designed to further create stand conditions that favor the development of large diameter trees, especially larch and ponderosa pine that are highly preferred by wildlife. Extended timber harvest rotations of 150-years and greater would also ensure maintenance of large diameter snags and replacement snags throughout the area. Snag management direction and the analysis describing the sustainability of snag dependent species is contained in Appendix X of the IPNF Forest Plan. All unmerchantable dead trees would be left, except those that are safety hazards to the logging operation. To further guarantee long-term, quality snags in the area, existing and replacement snags would be identified (marked with paint and/ or signs). These snags would typically be identified at least 200 feet from any roads to protect them from firewood cutters. Finally, prescription burning would likely create additional snags where applied.

Table A-1 Determination of Effects Summary for Analyzed Species

Species	Alternative 1	Alternative 2	Alternative 3
Endangered			
Bald Eagle	NE	NLAA	NLAA
Woodland Caribou	NE	NLAA	NLAA
Threatened			
Grizzly Bear	NE	NLAA	NLAA
Lynx	NE	NLAA	NLAA
Sensitive			
Black-backed Woodpecker	BI	NI	NI
Boreal Toad	NI	NI	NI
Coeur d'Alene Salamander	NI	NI	NI
Common Loon	NI	NI	NI
Flammulated Owl	NI	NI	NI
Fisher	NI	NI	NI
Harlequin Duck	NI	NI	NI
Northern Bog Lemming	NI	NI	NI
Northern Goshawk	NI	NI	NI
Northern Leopard Frog	NI	NI	NI
Townsend's Big-eared Bat	NI	NI	NI
Wolverine	NI	NI	NI
Management Indicator Species			
American Marten	NI	NI	NI
Pileated Woodpecker	NI	NI	NI
White-tailed Deer	NI	NI	NI

NE= No effect (T&E species)
NI = No Impact
NLAA= Not likely to adversely affect (T&E species)
MI = May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.
WI = would impact individuals or habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
BI = Beneficial Impact

3. Fish

a) Threatened, Endangered Species, and Sensitive Species - Refer to the attached Biological Assessment in Appendix B for more detailed information and the Watershed and Fisheries Report (project file) for more detailed information.

4. Plants - No endangered plant species are known or suspected in the Idaho Panhandle National Forests (IPNF) or in the assessment area. Habitat for two threatened species, **water howellia** and **Ute ladies'-tresses**, is suspected to occur in the IPNF. Habitat potential within the analysis area is low for both species. There is potential for occurrence of Ute ladies'-tresses downstream of the analysis area in the Kootenai River valley. However, no cumulative effects of any of the action alternatives on suitable habitat for Ute ladies'-tresses would be expected to occur. There would be no effect on either species or their habitat from implementation of any alternative. For further information refer to the Threatened and Endangered Plant Biological Assessment in Appendix B and the Threatened, Endangered and Sensitive Plants and Forest Species of Concern Report in the project file.

The IPNF has conducted a Forest-wide "coarse filter" assessment of habitat potential for **Spalding's catchfly**, which was recently proposed by US Fish and Wildlife Service for listing as Threatened (USDI 2000). This species has yet to be found in the Kootenai River subbasin ecosystem. Areas identified as having potential to support this species in the Myrtle-Cascade project area were surveyed, and no suitable habitat for Spalding's catchfly was identified in proposed harvest units, consequently, none of the action alternatives would affect the species.

Changes to the Regional Forester's Sensitive Species list occurred after initial field surveys were completed. Review of field survey notes and occurrence of suitable habitat for newly designated sensitive plants indicates that some areas of subalpine and cold forest guild habitat occur in proposed harvest units. These units were surveyed in September of 2000. A population of **Iceland moss-lichen** was discovered north of proposed unit 24. The species was not found within the proposed unit. No negative cumulative impacts are expected to occur, although undetected individuals of Iceland moss-lichen may be impacted.

Several sensitive plant species are known adjacent to the analysis area. They include **northern starflower**, **poor sedge**, **krushea** and **triangle moonwort**. No sensitive plants were identified within any proposed harvest units during field surveys. Habitat potential for northern starflower and poor sedge within the analysis area is considered low and is restricted to peatland habitats. Habitat potential for krushea is restricted to moist, mature riparian forest, which would be buffered from harvest activities. Habitat potential for triangle moonwort and other sensitive moonworts occurs in moist, mature forest and moist microsites within the analysis area, only one of which is proposed for harvest activities (unit M11 in Alternative 3). Undetected individuals of sensitive moonworts could be impacted under all action alternatives, with no negative cumulative effects expected.

The Forest species of concern **slender moonwort** is under status review by the US Fish and Wildlife Service and may subsequently be proposed for listing as Threatened or Endangered. This species has never been encountered in numerous surveys on the Bonners Ferry Ranger District, although one historical occurrence is documented from Upper Priest River on or near Priest Lake Ranger District. It was determined that, though suitable habitat for the species exists in the analysis area, current information indicates that no impacts to this species would occur from implementation of any of the alternatives.

For more detailed information refer to the Threatened, Endangered and Sensitive Plants and Forest Species of Concern Report in the project file and the Sensitive Plants Biological Evaluation in Appendix B.

5. Native Plant Species - In an effort to implement ecosystem management the regional office has issued direction on the use of native plant species for revegetation projects. The basic policy requires the use of native plant seed in erosion control, fire rehabilitation, riparian restoration, forage enhancement, and other vegetation projects, to the extent practicable. The purpose of this direction was to emphasize the importance of biodiversity, and to recognize the intrinsic value of native plant vegetation as a component of natural forest and rangeland ecosystems. This information is contained in a letter, dated June 8, 1993, written to the Region 1 Forest Supervisors by the Regional Forester. A copy of this letter may be found in the project file.

6. Neotropical Migrant Birds - There are a wide variety of Neotropoical migrant birds that breed in the United States and winter in Central or South America. Preferred habitats vary amongst the various species. Based on what is known, the best known management strategy is to maintain a distribution in the timber age classes. All of the alternatives would affect the birds in varying ways, depending on the type and amount of canopy left. All of the alternatives leave an adequate distribution of age classes. Alternatives 2 and 3 would promote development of more open grown stands of large diameter trees, primarily western larch, Douglas fir and ponderosa pine, that would undoubtedly be a benefit to the Neotropical migratory birds. Refer to the wildlife report (project file) for more detailed information.

7. Linkages - Cover linkages between forested habitats allow species to travel between suitable habitats. Species differ in their ability to move between fragmented habitats. Some move freely while others will not cross even rather narrow gaps of open habitat.

The proposed action would not have a measurable effect on any linkages within or outside the project area.

8. Range - There are no range allotments within the Myrtle-Cascade analysis area.

SOCIAL/ECONOMIC FACTORS

A. Cultural Resources

Cultural resource surveys of the project area have been completed as directed by the Cultural Resources Management Practices (Forest Plan, Appendix FF). The cultural resource inventories are on file for selective review at the Bonners Ferry Ranger Station. Numerous sites have been recorded, and a determination made to the extent of protection required. These sites would be protected under all alternatives. Any future discovery of cultural resource sites would be inventoried and protected if found to be of cultural significance. A decision would be made to avoid, protect, or mitigate the impact to these sites in accordance with the National Historic Preservation Act of 1966. Currently, there are no known districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places that would be affected by the proposed actions. As such, the actions should not cause the loss or destruction of significant scientific, cultural, or historic resources.

B. Economics/Community Stability

The proposed sale is on productive forestland and could be offered with minimal investment. Based on the past performance of similar timber sales on the Bonners Ferry Ranger District it would not be expected to be below cost, given that our most recent timber sales on the district have sold for well over $300 per thousand board feet, this is far in excess of the estimated $42/MBF it costs the district to prepare a sale. Alternative 2 would be the most economical, since it accesses the most acres and removes the highest volume per acre. Alternative 3 would be the second most economical alternative, and alternative 4 the third most economical. Alternatives 1 and 5, would produce zero revenue, to individuals, the county, or the federal government.

Given the proposed harvest volume, it is beyond the scope of this document to assess potential impacts to community stability in great detail. However, a general assessment could be made that the more volume of timber that is harvested within Boundary County the more jobs, both directly and indirectly related to the timber industry, would likely be created or sustained in Boundary County. Using these guidelines, the effects would be the same as in the previous paragraph. Again, implementation of the no action alternative would do nothing to help sustain community stability. Documentation of the analysis and considerations for community stability is contained in the Final Environmental Impact Statement for the IPNF Forest Plan.

C. Visual Quality

Openings created by regeneration harvests (shelterwood and group selection cuts) would include clumps and stringers of large leave trees that would blend with the surrounding landscape. Regarding selection harvest, the 1999 Forest Plan Monitoring Report, p.14, states, "High visual quality can result from use of this approach to harvest. Through periodic removal of trees in 10-20 year intervals, individually or in small groups, natural appearances and high visual quality typically result." Sanitation salvage and commercial thinning prescriptions would have very little effect on the visual surroundings of the landscape. The 1998 Forest Plan Monitoring Report, p.17, states, "…where salvage harvest methods were employed and only the dead, dying or deteriorating trees in a stand were removed, natural appearing landscapes have resulted. The variety of color, form, texture and size produced, results in a high level of visual quality." Given that many units are proposed for helicopter logging this would also further minimize visual impacts. None of the alternatives would have a negative effect on visual quality. For more detailed information the Myrtle-Cascade EIS Visual Analysis is available in the project file.

D. Recreation

The Myrtle-Cascade area offers some of the broadest range of recreational opportunities on the Bonners Ferry District. Lands extend from the Kootenai Valley floor to the rugged Selkirk Crest. Several of the highest peaks in the District are located along the Selkirk crest at the western end of the analysis area. More than eight lakes and ponds lie within the area boundaries. Trails access Myrtle Lake and Peak, Two Mouth Lakes, Harrison Lake, Burton Peak and Cooks Peak. Each of these trails utilizes closed roads as the initial access to standard designed trails. These road segments have been maintained and refurbished as part of the trail network for more than fifteen years. Burton and Cooks Peaks have old fire cabins at their summits. Some maintenance and reconstruction work has been done on Burton cabin for its preservation. Cooks Lake is on private land but is accessed by Forest Service maintained roads. Kent Lake is privately owned and receives use from recreationists accessing the lake and cabin from the Two Mouth trail system (both invited and uninvited use). Several abandoned trails remain open enough for occasional use. Myrtle Creek road is a moderate to high standard road that forms the northern segment of the Myrtle Creek-Snow Creek driving loop. Both developed

and dispersed recreation opportunities are easily accessed from Bonners Ferry in an hour or less. Recreation activities include: driving for pleasure, berry-picking, fishing and hunting (although hunting is not allowed in Myrtle Creek), cross-country skiing and snowmobiling. One special use permit has been issued to the Rocky Mountain Academy (RMA). The RMA is a special purpose school for adolescents. Backcountry use, winter and summer, is a significant part of their program. At this point the District tracks use without imposing restrictions. Recreation use in the Myrtle-Cascade area appears to be increasing substantially. In the past ten years use has changed from primarily local recreationists to non-local, destination-oriented tourist/recreationists. Currently, Myrtle Lake and Peak, Burton Peak, Cooks Peak and Kent Lake receive moderate summer use. Two Mouth Lakes receives high summer use and Harrison and Cooks Lake receive extremely high summer use. Winter use is low throughout the analysis area. The Burton-Cascade area is one of the most heavily hunted areas in the county for deer, bear, grouse and elk. Fishing pressure is light at Myrtle Lake, heavy at Two Mouth Lakes and extreme at Harrison Lake. National, Regional and local publications tout the Myrtle Creek area for a variety of recreational uses (rock climbing, mountain biking, hiking and camping, driving tours, wildlife viewing, and snowmobiling). None of the alternatives would change the recreational opportunities with the project area. The primary effects on recreationists would relate to the sights and sounds of timber harvest and roadwork operations. The sights and sounds of these operations would be short-term. In the long-term, cumulative effects would relate to overall improved scenic quality of the landscape. Harvest units would be designed to blend into the natural landscape, while dense, overstocked stands of small-diameter trees are replaced with open-grown stands of large-diameter trees, mostly ponderosa pine and larch.

E. Public Health and Safety

1. Air Quality - The basic framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act (CAA), as amended in 1999 and 1990. The CAA was designed to "protect and enhance" air quality. The primary means by which this is to be accomplished is through implementation of National Ambient Air Quality Standards (NAAQS).

Section 160 of the CAA requires measures "to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreation, scenic, or historic value." The Clean Air Act amendments of 1977 set up a process that included designation of Class I, II, and III areas for air quality management.

a) *Class I* - These areas include all international parks, national parks, greater than 6,000 acres, and national wildernesses greater than 5,000 acres that existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional manmade air pollution that can be added to these areas. The Cabinet Mountains Wilderness is the nearest Class I wilderness area to the project area. The Cabinet Mountains Wilderness area is located to the southeast of the project area. Smoke created from the Bonners Ferry Douglas-fir assessment area is normally carried to the northwest by the prevailing southwest flows aloft and would not affect the Class I airshed.

b) *Class II* - These areas include all other areas of the country. These areas may be upgraded to Class I. A greater amount of additional manmade air pollution may be added to these areas. All Forest Service lands which are not designated as Class I are Class II lands. The land within the Decision Area is designated as Class II.

c) *Class III* - These areas have the least amount of regulatory protection from additional air pollution. To date, no Class III areas have been designated anywhere in the country.

The Clean Air Act requires the Environmental Protection Agency (EPA) to identify pollutants that have adverse effects on public health and welfare and to establish air quality standards for each pollutant. Each state is also required to develop an implementation plan to maintain air quality (Sandberg, et al, 1988). The EPA has issued National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, lead, and particulate matter less than or equal to 10 microns (PM_{10}). The annual standard in the State of Idaho for PM_{10} is 50 $\mu g/m^3$ and 150 $\mu g/m^3$ for a 24-hour period. For $PM_{2.5}$ the annual standards are 15 $\mu g/m^3$ and 65 $\mu g/m^3$ for a 24-hour period. Three types of burning could be used that could produce these types of emissions:

a) *Underburning* - Would be used in seed tree, shelterwood, and group selection units. The objective would be to reduce fuel loading while protecting the residual overstory trees. Since the burning is deliberately slow, combustion is likely to be inefficient (Cramer, 1974); more smoke per acre of fire is often produced than with other methods.

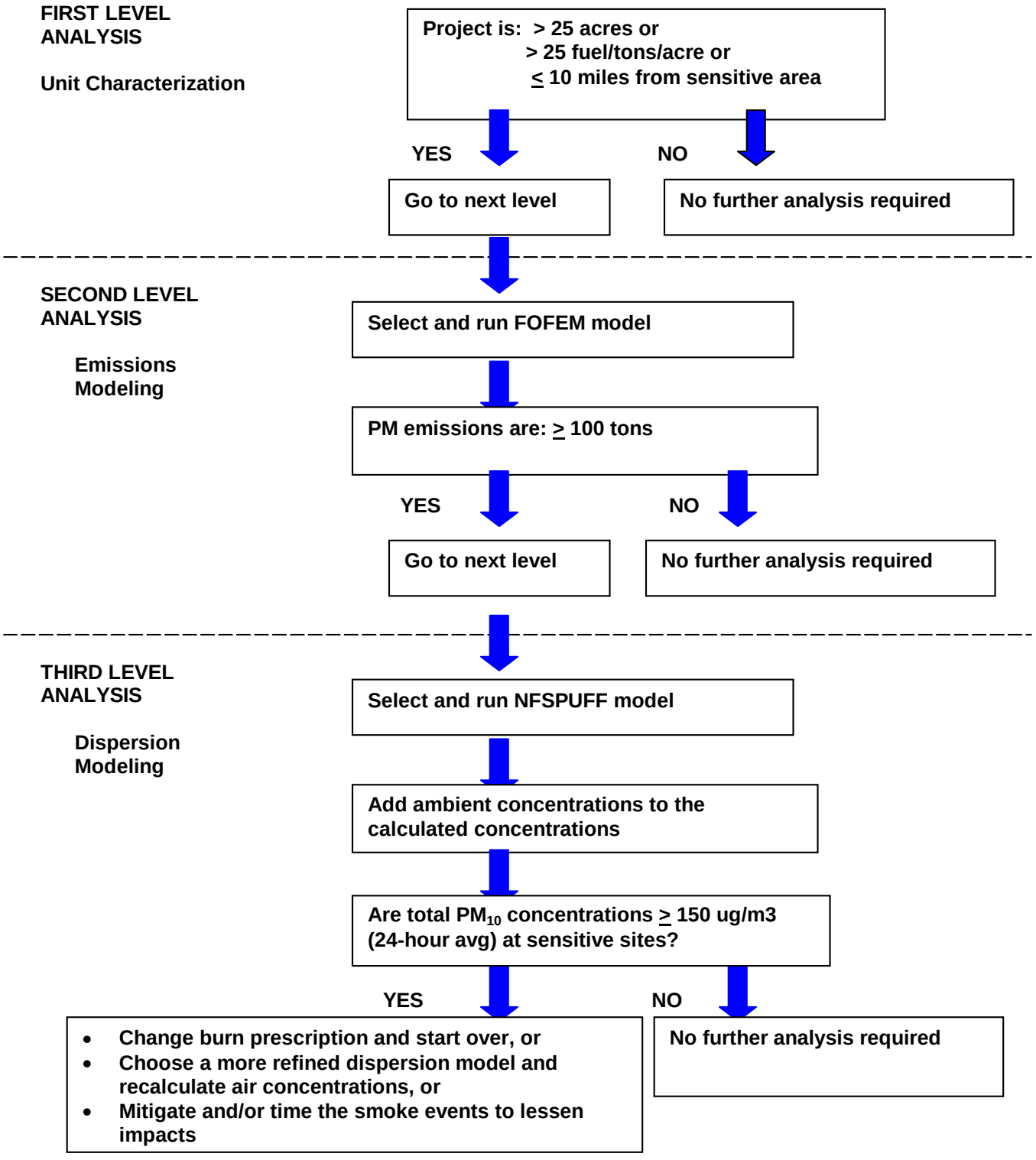
b) *Pile burning* - Has the least effect on air quality. Woody debris is gathered and piled either mechanically or by hand, and the piles are burned in the late fall when there is little competition in the airshed. Moreover, quick removal of smoke from the air can be accomplished by burning piles at such a time as to send the smoke into a precipitating rain cloud (Cramer, 1974).

c) *Landing Piles* - Is related to pile burning and the impacts are similar. These are piles generated from log landings. The slash in these piles is in excess of what is left in the woods to meet nutrient management guidelines. This type of burning concentrates enough logging residue at one place to eliminate the need to broadcast burn or underburn.

A "Decision Analysis" matrix (USFS 1998) shown in Figure A-1 is used to stratify burns based on levels of potential emissions. This matrix identifies the appropriate emissions and dispersion analysis to use. Given that PM (particulate matter) emissions are not expected to exceed the threshold of 100 tons for any single pollutant. A "Second Level Analysis" using FOFEM (First Order Fire Effects Model) was conducted. FOFEM is an emissions production model for pile or broadcast burns for $PM_{2.5}$, PM_{10}, and CO (Reinhardt, et. al, 1997). The FOFEM model inputs include fuel loading by size class, vegetation, density (herbaceous, shrub, and tree regeneration), anticipated fire intensity, fuel moisture, duff, depth, and season of burning. In theory, combinations of prescribed burns (especially underburns) if conducted during the same burning window would exceed the threshold of 100 tons, but in practice these types of burns are conducted in a manner where this threshold would not be exceeded. For example, unit MC18 (159 acres), expected to produce an estimated 84 tons of emissions, more than any other proposed unit, would take at least one day to burn. Under a typical scenario no other burns would be conducted during this time. A summary of the FOFEM analysis is displayed in Tables A-2, A-3, and A-4.

Airshed Groups are assembled in North Idaho and Montana to work cooperatively to "minimize or prevent" accumulation of smoke in Idaho and Montana to such degree as necessary to meet State and Federal ambient air quality standards when prescribed burning is necessary for the conduction of accepted forest practices, i.e., hazard reduction, regeneration site preparation and wildlife improvement (MOA, 1990). The U.S. Forest Service, Bonners Ferry Ranger District, is a member of this group and adheres to the group's restriction procedures. As monitoring units, the airshed groups may reduce burning, stop burning in specific areas, or cease burning entirely when meteorological or existing air quality conditions so warrant. Forest management burning is thereby regulated during the months of September through November (North Idaho Cooperative Smoke Management Plan)

Figure A-1. Decision Analysis for Smoke Modeling



The Forest Service is a party to North Idaho Cooperative Smoke Management Plan, which sets out procedures to regulate the amount of smoke produced by prescribed fire. A principal objective of the North Idaho Cooperative Smoke Management Plan is to, "minimize or prevent the accumulation of smoke in Idaho to such a degree as is necessary to protect State and Federal Ambient Air Quality Standards when prescribed burning is necessary for the conduct of accepted forest practices." The North Idaho group currently uses the services and procedures of the Montana State Airshed Group. The Montana Group uses procedures that are considered the best available control technology (BACT) by the Montana Air Quality Bureau for major open burning in Montana. A Missoula-based monitoring unit is responsible for coordinating prescribed burning in Idaho and Montana. This unit monitors meteorological data, air quality data, and planned prescribed burning and makes a decision daily on whether or not any restrictions on burning are necessary the following day.

A list of all prescribed burns planned for the spring, summer and fall burning season in the project area would be forwarded to the monitoring unit through the Idaho Panhandle National Forest fire desk before September 1. Then daily by 8:30 a.m. the Bonners Ferry Ranger District would inform the Forest fire desk of all burning planned for the next day and the fire desk would forward this information to the monitoring unit. By 3:00 p.m. the same day the monitoring unit would inform the Forest if any restrictions will be in effect the following day, and the fire desk would inform the District.

Design Criteria The Smoke Management Agreement is designed to prevent smoke intrusion problems from occurring. If smoke intrusion does occur the District would voluntarily shut down all planned burning operations until the airshed is cleared. In the interest of public safety the District would work with local, county, and state officials to notify the public of any potential health concerns and mitigation that can be taken, if any, to alleviate these concerns.

Table A-2 – Estimated Emissions (Alternative 2)						
Unit	Rx	Fuels Treatment	Acres	Total PM_{10} (tons)	Total $PM_{2.5}$ (tons)	Total Emissions (tons)
KP01	CT/SS	Landing pile burning	66	0.55	0.47	1.02
KP02	CT/SS	Landing pile burning	36	0.28	0.24	0.51
KP03	OSR	Landing pile burning	29	0.28	0.24	0.51
KP04	SWr	Underburning	39	11.08	9.40	20.48
KP05	OSR	Landing pile burning	37	0.28	0.24	0.51
KP06	CT/SS	Landing pile burning	14	0.14	0.12	0.26
KP07	OSR	Landing pile burning	17	0.06	0.05	0.10
KP08	CT/SS	Landing pile burning	35	0.28	0.24	0.51
M02	SWr	Underburning	47	13.54	11.47	25.00
M05	SWr	Underburning	135	38.34	32.54	70.88
M19	OSR	Landing pile burning	24	0.31	0.26	0.57
MC01	GS	Underburning	50	14.20	12.05	26.25
MC02	GS	Underburning	83	23.57	20.00	43.58
MC03	GS	Underburning	29	8.24	6.99	15.23
MC04	SWr	Underburning	22	6.25	5.30	11.55
MC05	GS	Underburning	24	6.82	5.78	12.60
MC06	GS	Underburning	30	8.52	7.23	15.75
MC07	SWr	Underburning	15	4.26	3.62	7.88
MC08	SWr	Underburning	28	7.95	6.75	14.70
MC09	SWr	Underburning	8	2.27	1.93	4.20
MC10	SWr	Underburning	34	9.66	8.19	17.85
MC11	SWr	Underburning	10	2.84	2.41	5.25
MC12	CT	Landing pile burning	9	0.14	0.12	0.26
MC13	CT	Landing pile burning	34	0.28	0.24	0.51
MC14	CT	Landing pile burning	16	0.14	0.12	0.26
MC15	GS	Underburning	35	9.94	8.44	18.38
MC16	CT	Landing pile burning	15	0.14	0.12	0.26
MC17	GS	Underburning	54	15.34	13.01	28.35
MC18	GS	Underburning	159	45.16	38.32	83.48
MC19	GS	Underburning	29	8.24	6.99	15.23
MC20	SWr	Underburning	27	7.67	6.51	14.18
MC21	GS	Underburning	37	10.51	8.92	19.43
MC22	SWr	Underburning	76	21.58	18.32	39.90
MC23	GS	Pile Burning	192	13.25	11.25	24.50
MC24	GS	Pile Burning	215	13.25	11.25	24.50
MC25	OSR	Landing pile burning	29	0.31	0.26	0.57
MC26	OSR	Landing pile burning	79	0.55	0.47	1.02
Alternative 2 Totals			1818	306.16	259.80	565.96

Table A-3 – Estimated Emissions (Alternative 3)						
Unit	Rx	Fuels Treatment	Acres	Total PM_{10} (tons)	Total $PM_{2.5}$ (tons)	Total Emissions (tons)
M01	SS	Landing pile burning	37	0.57	0.48	1.05
M02	CT/SS	Landing pile burning	49	0.57	0.48	1.05
M03	CT/SS	Landing pile burning	24	0.57	0.48	1.05
M06	SWr	Underburning	100	30.10	25.50	55.60
M07	SWr	Underburning	64	19.58	16.64	36.22
M08	CT/SS	Landing pile burning	27	0.27	0.23	0.49
M09	SWr	Underburning	29	7.69	6.53	14.21
M10	CT/SS	Landing pile burning	38	0.31	0.26	0.57
M11	SS	Landing pile burning	10	0.28	0.24	0.52
M12	SS	Landing pile burning	41	0.57	0.48	1.05
M13	SS	Landing pile burning	15	0.28	0.24	0.52
M14	CT/SS	Landing pile burning	20	0.28	0.24	0.51
M15	CT/SS	Landing pile burning	29	0.57	0.48	1.05
M16	CT/SS	Landing pile burning	27	0.28	0.24	0.51
MC01	SWr	Underburning	71	20.16	17.11	37.28
MC02	SWr	Underburning	69	19.60	16.63	36.23
MC05	SWr	Pile Burning	40	2.76	2.35	5.11
MC06	SWr	Underburning	25	7.10	6.03	13.13
MC18	SWr	Underburning	73	20.73	17.59	38.33
MC19	SWr	Underburning	25	7.10	6.03	13.13
MC21	CT/SS	Landing pile burning	40	0.28	0.24	0.51
MC22	SWr	Underburning	84	23.86	20.24	44.10
MC23	GS	Pile Burning	192	13.25	11.25	24.50
MC24	GS	Pile Burning	215	13.25	11.25	24.50
MC26	CT/SS	Landing pile burning	31	0.28	0.24	0.51
Alternative 3 Totals			1375	222.95	189.25	190.25

Table A-4– Estimated Emissions (Alternative 4)						
Unit	Rx	Fuels Treatment	Acres	Total PM_{10} (tons)	Total $PM_{2.5}$ (tons)	Total Emissions (tons)
KP01	CT/SS	Landing pile burning	66	0.552	0.470	1.02
KP02	CT/SS	Landing pile burning	36	0.276	0.235	0.51
KP03	OSR	Landing pile burning	29	0.276	0.235	0.51
KP04	SWr	Underburning	39	11.076	9.399	20.48
KP05	OSR	Landing pile burning	37	0.276	0.235	0.51
KP06	CT/SS	Landing pile burnnig	14	0.138	0.118	0.26
KP07	OSR	Landing pile burning	17	0.055	0.047	0.10
KP08	CT/SS	Landing pile burning	35	0.276	0.235	0.51
M05	SWr	Underburning	135	38.340	32.535	70.88
M19	OSR	Landing pile burning	24	0.306	0.260	0.57
MC01	GS	Underburning	50	14.200	12.050	26.25
MC02	GS	Underburning	83	23.572	20.003	43.58
MC03	GS	Underburning	29	8.236	6.989	15.23
MC04	SWr	Underburning	22	6.248	5.302	11.55
MC12	CT	Landing pile burnnig	9	0.138	0.118	0.26
MC13	CT	Landing pile burning	34	0.276	0.235	0.51
MC14	CT	Landing pile burning	16	0.138	0.118	0.26
MC15	GS	Underburning	35	9.940	8.435	18.38
MC16	CT	Landing pile burning	15	0.138	0.118	0.26
MC17	GS	Underburning	54	15.336	13.014	28.35
MC20	SWr	Underburning	27	7.668	6.507	14.18
MC21	GS	Underburning	37	10.508	8.917	19.43
MC25	OSR	Landing pile burning	29	0.306	0.260	0.57
MC26	OSR	Landing pile burning	79	0.552	0.470	1.02
Alternative 4 Totals			951	148.83	126.30	148.83

The following guidelines would be design features of any alternative. These guidelines are consistent with the Forest Plan and Clean Air Act.

- No burning would be done that is not needed to meet silvicultural, fuel management, or wildlife habitat objectives.
- Broadcast burning would be done in the spring if possible.
- Restrictions on prescribed burning for local air quality reasons may be implemented by the Bonners Ferry Ranger District in addition to those imposed by the smoke management monitoring unit.
- Roads may be watered or otherwise treated to reduce fugitive emissions.
- During logging activities signs would be posted to inform the public of log truck traffic. This requirement is automatically included in all timber sale contracts.

2. Effects on Minority Populations and Low-income Populations - The Kootenai Tribe of North Idaho was consulted and no cultural sites that have any importance to the Tribe were identified within the project area. In addition, no other low-income populations that could potentially be impacted by any of the alternatives are

located within the project area.

G. Minerals

There are no mining claims within the assessment area.

H. Water Resources And Aquatics

1. Microbial Contaminants: The presence of total or fecal coliform bacteria is an indicator of the potential presence of harmful bacteria to human health. If management increased the potential for humans or wildlife to defecate or die in or near stream courses then microbial contaminants could become an issue.

Wildlife populations and their use of the riparian areas are not expected to appreciably increase as a result of implementing any of the alternatives (personal communication with Sandy Jacobson). Past monitoring of fecal coliform counts by the City of Bonners Ferry indicates that levels of microbial contaminants in Myrtle Creek are well below EPA maximum standards. The Best Management Practice (BMP) promoting appropriate disposal of human waste, the goals of reducing sediment production and delivery, and protection of the Riparian Habitat Conservation Areas (RHCAs) are all consistent with preventing delivery of microbial contaminants to the stream network. Consequently, there will be no direct, indirect, or cumulative effects from microbial contaminants

2. Inorganic Contaminants: Water quality can be reduced by contaminants such as salts or metals. These elements can be naturally occurring or can be delivered from roads that are treated with magnesium chloride or calcium chloride, which is used for dust abatement on forest roads.

The prescriptions for reducing stream crossing and wildfire risk, and sediment production and delivery are consistent with preventing delivery of inorganic contaminants if any natural sources are present. If the "Required Design Criteria for All Action Alternatives" are applied, then magnesium chloride or calcium chloride, which is often used for dust abatement, would not create water quality concerns. Dust abatement would not be needed under the No Action alternative. Consequently, there will be no direct, indirect, or cumulative effects from inorganic contaminants.

3. Pesticides and Herbicides: These contaminants can pose health risks to humans and other organisms.

Pesticides are not used by the Forest Service or on private land within Myrtle Creek. Herbicides are used sparingly and judiciously in Myrtle Creek on noxious weeds in accordance with the requirements of the Bonners Ferry Noxious Weed EIS. Monitoring of water quality by the City of Bonners Ferry has not detected herbicide contaminants from this low level use in the past (City of Bonners Ferry, 1999; Likens 2000, personal communication). This project proposes the same level of use, consequently, there will be no direct, indirect, or cumulative effects from pesticides and herbicides.

4. Organic Chemical Contaminants: Water quality can be reduced by contaminants such as industrial solvents and petroleum products. The equipment that would be used for timber harvesting, and road construction, reconstruction, and obliteration uses the largest quantities of these products and pose the greatest risk.

The "Required Design Criteria For All Action Alternatives" would reduce the risk of spilling and delivering these contaminants to the stream network to acceptable levels. Under the No Action alternative, the potential for

spilling organic chemical contaminants would not change from the existing conditions, which are at a low level of risk. Consequently, there will be no direct, indirect, or cumulative effects from organic chemical contaminants.

5. Radioactive Contaminants: These contaminants pose obvious health risks to humans and other organisms. The levels of these contaminants can increase if management causes increased erosion of natural radioactive sources.

Natural sources are usually the primary source of radioactive contaminants. There are no known natural geologic sources of uranium or other potentially radioactive materials such as thorium or actinium in Myrtle Creek. The City reported low levels of radionuclides on 10-8-96, but the levels detected were at the minimum level that are detectable and were well below the maximum contaminant level goal established by the Environmental Protection Agency. The goals of reducing stream crossing and wildfire risk, and sediment production and delivery are consistent with preventing delivery of radioactive contaminants if any natural sources are present. The No Action alternative would not change the very, very low existing risk. Consequently, there will be no direct, indirect, or cumulative effects from organic radioactive contaminants.

6. Harvest Related Increases in Landslide Potential: Harvesting can increase landslide potential by increasing soil moistures and reducing the soil cohesion provided by tree root networks. Landslides can displace and deliver large volumes of soil and debris to stream channels in a short period of time, so they are an important concern to soil and water dependent resources. Road related increases in landslide potential are included under the principle issue of Sediment Production and Delivery. Landslide potential related to existing conditions and the No Action alternative are discussed directly under Sediment Production and Delivery and indirectly under Wildfire Risk.

The zone geo-technical engineer and the hydrologist visited proposed treatment areas with the greatest potential for landslides. The Level I Slope Stability Assessment (LISA) program (Hammond et. al. 1992) was used by the geo-technical engineer to model potential changes in slope stability on units MC10, MC11, MC18, MC19, and in Cascade and Burton Creek. Based on slope percent and landform, these units are expected to be representative of the more sensitive slopes where harvesting is being proposed in the Myrtle-Cascade project.

The units studied in Myrtle Creek are not inherently unstable, but the assessment was conducted because the Forest Service and the City of Bonners Ferry are willing to accept only low levels of risk to the municipal water use. The probability of failure related to the proposed alternatives would not change appreciably from the natural condition. The results from the modeling indicate that the proposed harvesting would result in a very low probability of slope failure (see project file). The only significant increase in slope failure potential resulted from modeling a clearcut with extremely saturated soil conditions and slopes steeper than 60 percent. None of the proposed units would be clearcut, and the extreme soil saturation (90 percent saturated) is unlikely to occur on these sites because the soils are relatively deep and permeable. Consequently, there will be no harvest related increases in landslide potential.

7. Changes in Stream Dynamic Equilibrium: Dynamic equilibrium describes a stream's ability to transport the variety of stream flows and sediment of the parent watershed while maintaining consistent relationships between channel dimension, pattern, and profile. If a stream does not maintain dynamic equilibrium, the resulting changes in channel condition and function may negatively affect support of the watershed beneficial uses.

Field and inventory data indicate that the channel networks within Myrtle Creek and the remainder of the project area are in good condition (see fisheries descriptions of existing habitat conditions and the project file) and that the parent watersheds are properly functioning, but at risk (Kootenai Basin Geographic assessment, work in progress). The proposed alternatives have been designed to minimize new effects while significantly reducing existing risks to slope and stream hydrology. In addition, the large cobble, boulder, and bedrock substrate that are common in the stream channels in the project area are inherently resistant to disturbance. Consequently, there will be no harvest related increases in landslide potential. Consequently, the direct, indirect, and cumulative effects of any alternative would not alter stream dynamic equilibrium.

8. Stream Survey Data: Stream survey data is collected on projects to obtain information on specific habitat variables as they relate to natural or man-related activities.

Forest Service personnel conducted surveys in Myrtle and its tributaries and Cascade, Lost and Clark Creeks in 1992 and 1993. Habitat was inventoried using the Forest Service, Region 5 methodology adapted by Idaho Panhandle National Forests (FSH 2609.23, revised by Dave Cross, April 1992). Fisheries habitat was identified based on 16 generalized habitat types and then summarized by comparing channels with similar physical characteristics (gradients, sinuosity, etc.; Rosgen 1996). For each habitat type encountered a series of measurements and estimates were made. In addition, Wolman pebble counts, riffle stability index, and Pfankuch channel evaluations were recorded.

The survey information was consolidated for each reach type, then based on the summaries, this information produced specific stream variable measurements (e.g. pool volume) it was then reviewed, interpreted and used accordingly for the project analysis. Specific information that met the goals of the principles issues generated in Chapter 2 (Tables 2.2-2.4) were further developed in the Fisheries discussion in Chapter 3 to address each issue accordingly. General information was not elaborated on within the document, these summary statistics are located within the project file for the project. The data is stored in district files.

9. Increases in Water Yield: Harvesting can increase water yield by reducing the amount of water intercepted and used by vegetation, and by changing snow distribution. The main issue with increasing water yields relates to the potential for increasing the size, frequency, and duration of peak flows. In addition to and in conjunction with harvesting, roads can increase peak flows by efficiently delivering intercepted ground water to stream channel networks In some cases the size, frequency, and duration of peak flows can be increased to a point that stream channel conditions and support of the beneficial uses can be negatively affected

The stream channels in Myrtle Creek and the remainder of the drainages within the project area maintained dynamic equilibrium even after extensive timber harvesting and road construction in the past, and recent 25 to 100 year return interval floods that occurred in 1996 and 1997. This is in part due to the naturally resistant stream channels and functioning riparian vegetation surrounding the stream corridors. The proposed alternatives were designed to reduce water yield increases from roads (through road reconstruction and obliteration) and minimize water yield increases from harvesting (see WATSED results in the project file). Stream dynamic equilibrium and support of beneficial uses was maintained at higher historic modeled peak flows and sediment yields than are predicted to occur for all of the proposed alternatives in this project. Mack Creek is one exception where predicted monthly peak flow under Alternative 2 is expected to increase to 3 percent above natural. This level is 1 percent above the predicted historic high and 2 percent above the existing condition, but is far less than the natural range of peak flows (for example that occurred in 1996 and 1997) and is not significant in this context.

The early 1980s are used as the reference for historic high peak flows and sediment yields which still supported beneficial uses. Lack of support of beneficial uses, which often occurred before 1975, was the result of surface and mass erosion from poorly designed roads and skid trails rather than from water yield and peak flow increases. Consequently, increases in water yield under any alternative are not expected to cause direct, indirect, and cumulative effects that would negatively affect the values at risk in the project area.

10. Increased rain-on-snow risk: Forest management activities can increase outflow of water from snowpacks during mid-winter rain-on-snow events by reducing snow interception and increasing heat transfer to the snow (Coffin and Harr 1991). In some cases the size, frequency, and duration of peak flows can be increased to a point that stream channel conditions and support of the beneficial uses can be negatively affected.

On the Idaho Panhandle National Forests (IPNF), the rain-on-snow zone is estimated to be between 3,000 and 4,500 feet. The percentage of a watershed that lies within the transient snow zone is an important factor of rain-on-snow flooding susceptibility (Kjelstrom and Moffatt 1981). Roughly 28 percent of Myrtle Creek falls within this zone. Typically watersheds that are responsive to rain-on-snow events have 40 percent or more of their watershed area in the rain-on-snow zone. A review of historic gauging data in the Kootenai Basin indicate that the largest percent of total flow and maximum instantaneous peaks occur during spring runoff events in April, May, and June. Thus flows derived from spring snowmelt (not rain-on-snow) comprise the dominant channel forming and maintenance events. Rain-on-snow does not rank out as one of the significant determinants of watershed conditions in the Kootenai Basin (Kootenai Basin Geographic Assessment - work in progress). Stream Crossing Risk and the processes described under Sediment Production and Deliver as principle issues are more relevant to stream and watershed conditions.

Even if vegetative changes result in a synchronization of snow melt during rain-on-snow periods, delivery rates to stream channels still may vary. Portions of roads that intercept, concentrate, and quickly route sub-surface water to stream channels and contributing areas are more likely than land use practices to contribute to increased rain-on-snow peak flows (Dunne and Leopold 1978).

Field reviews in 1977 and 1999 indicate that Myrtle Creek was able to recover from and maintain dynamic equilibrium after the associated flood flows, and elevated sediment levels that resulted from landslides and road failures following the 1974 and 1996 rain-on-snow floods. Consequently, direct, indirect, and cumulative effects from rain-on-snow events would not negatively affect the values at risk in the project area.

APPENDIX B
Biological Assessments (Wildlife, Fish and Plants)

Wildlife Biological Assessment (BA)

Listed Species

On October 28, 1999 the U.S. Fish and Wildlife Service provided the Idaho Panhandle National Forests with a listing of threatened, endangered and proposed wildlife species that may be present on the Idaho Panhandle National Forests (Re: #1-9-99-SP-483). The species pertinent for the Bonners Ferry Ranger District are gray wolf, woodland caribou, bald eagle, grizzly bear, and Canada lynx (proposed species).

Listed species were screened for their applicability or relevancy to the project. Relevancy is determined if there is evidence of species or habitat present within the affected area, and whether any such species or habitat could potentially be affected by the proposed action. Based on this review, all of the listed species will be analyzed for this project (see the following table).
Table 3. Summary of Habitat Status of Listed Species within the Project Areas.

Species	Species/ Habitat Present on District?	Species/Habitat Present in Project Area?	Species/Habitat Measurably Affected?
Endangered			
Gray Wolf	Yes	Yes	No
Woodland Caribou	Yes	Yes	Yes
Threatened			
Bald Eagle	Yes	Yes	No
Grizzly Bear	Yes	Yes	Yes
Lynx	Yes	Yes	Yes

Note: The peregrine falcon was delisted under the Endangered Species Act on August 25, 1999 because of recovery of populations.

Existing Condition

An important concept in the existing condition descriptions and analysis is the difference between *capable habitat* and *suitable habitat.* The following definitions are helpful in distinguishing between these two terms and the concepts they are based on.

Capable habitat: Refers to the inherent potential of a site to produce essential habitat requirements of a species. The vegetation on the site may not be currently suitable for a given species because of variable stand attributes such as unsuitable seral stage, cover type or stand density, but it has the fixed attributes that would enable it to provide those variables under appropriate conditions. Some examples of fixed attributes are slope, aspect, soil or elevation. In this analysis, suitable habitat is included as part of capable habitat, ie, they are not exclusive.

Suitable Habitat: Wildlife habitat that currently has both the fixed and variable stand attributes for a given species' habitat requirements. Variable attributes change over time and may include seral stage, cover type, stand density, tree size, stand age, or stand condition.

Gray Wolf

Habitat Requirements

Wolves are highly social animals requiring large areas to roam and feed. Conservation requirements for wolf populations are not fully understood, but the availability of prey and limiting risk of human-caused mortality are considered key components (USDI 1987, Tucker et al 1990). The risk of human-caused mortality can be directly related to the density and distribution of open roads. Wolves are predators of white-tailed and mule deer, elk and moose. In the Bonners Ferry Ranger District, white-tailed deer are the most numerous and widespread ungulate and would be considered the most important prey species. Elk are available in some areas of the district in moderate numbers.

Reference Condition

The northern Rocky Mountain wolf (a subspecies of the gray wolf) was listed as Endangered in 1973. However, based on enforcement problems and a trend to recognize fewer subspecies of wolves, the entire species was listed as Endangered throughout the entire lower 48 states, except Minnesota, in 1978 (USDI 1987). In the past, substantial declines in numbers of wolves resulted from control efforts to reduce livestock and big game depredations. By the 1940's, the Rocky Mountain wolf was essentially eradicated from its range.

In 1994, final rules in the Federal Register made a distinction between Idaho wolves that occur north of Interstate 90 and wolves that occur south of Interstate 90. Gray wolves occurring north of Interstate 90 are listed as Endangered species and receive full protection in accordance with provisions of the Endangered Species Act. Gray wolves occurring south of Interstate 90 are listed as part of an experimental population, with special regulations defining their protection and management.

Existing Condition

The Myrtle-Cascade project on the Bonners Ferry RD occurs north of Interstate 90. The project area is outside of lands designated for wolf recovery, but lies within the general region that provides linkage between recovery areas. Occasional unconfirmed sightings have been reported in and around the project area. However, these sightings seem to indicate transient individuals or lone wolves, detached from a resident pack. There is no evidence of resident wolf packs (i.e. there is a lack of sightings or observations of reproduction, den sites and rendezvous sites) on the Ranger District.

Several reports of wolves have occurred on the district. Two sightings have a high probability of being wolves. One was in the Brush Lake area along Highway 95 in winter 1996; the others were several photographed tracks in the Boulder Creek area in 1997. Other unconfirmed sightings have occurred spread throughout most of the district.

The Kootenai NWR and the immediately surrounding hillsides provides the most suitable denning habitat for gray wolves near the project area. Within the project area itself, steep sidehills and closed canopy forests provide less than optimal habitat for the majority of the area. Exceptions are

the drier faces that provide some winter habitat for elk and mule deer, and the upper cirque basins. The upper basins are not free of snow until very late spring to early summer, so they would provide good rendezvous habitat but not denning habitat. Wolves have not been recorded within the project area.

Wolves primarily prey on ungulates, particularly deer. The project area has moose, elk, white-tailed and mule deer, and woodland caribou as potential prey items. The Kootenai NWR provides some low elevation winter range that is scarce in the Kootenai River Valley immediately east of the Selkirks, where intensive farming extends to the steep faces of the mountains. Some winter range is present on the face by Cascade Ridge and along the south aspects of Myrtle and Snow Creeks. Although no specific population numbers are available, all harvestable species of ungulates are common and available enough to provide ample prey base for wolves. It is highly unlikely that the prey population limits wolf recovery in the Selkirks.

Illegal mortality results primarily from shooting deaths, occasionally associated with open roads. In Montana, wolves have been successfully increasing in areas with high open road density with very little illegal mortality. The productivity of the packs in Montana have not apparently been affected by near human disturbance based on the observation that numbers are increasing and at least one successful pack has denned within 300 yds of a dwelling (J. Fontaine, pers. comm. 1995). The Myrtle Cascade project area has a moderate road density, with the highest road density in the lower elevations and in the checkerboard ownership of Crown Pacific Ltd. Private lands adjacent to the project area have higher road density and usually homes. Because most of the project area is within grizzly bear recovery area (Myrtle Grizzly Bear Management Unit), the proportion of roading on NFS lands is likely to currently be at the maximum level it will be for the forseeable future (see discussion on grizzly bear). The Myrtle Creek Game Preserve encloses all of the Myrtle Creek watershed; because hunting is restricted in this area, mortality risk from shooting within the project area is probably somewhat lower than it is within the county at large where most other areas other than individual private lands are unrestricted.

WOODLAND CARIBOU

Habitat Requirements

The population is generally found above 4500 feet elevation in the Selkirk Mountains in Engelmann spruce/subalpine fir and western red cedar/western hemlock forest types. They are highly adapted to upper elevation boreal forests and do not occur in drier low elevation habitats except as rare transients. Seasonal movements are complex in this population and normally occur as altitudinal patterns moving to traditional sites for different seasons (USDI 1994, Allen 1998a).

Reference Condition

The Selkirk caribou population was emergency listed as Endangered in 1983 and a final ruling of its status appeared in the Federal Register in 1984 (USDI 1994). The recovery area for the population is located above 4,500 feet in the Selkirk Mountains of northern Idaho, northeastern Washington and southern British Columbia, Canada.

Existing Condition

As part of the plan for recovery, caribou were transplanted into the U.S. portion of the recovery area from source populations in British Columbia. It was hoped that this would result in creation of one or more herds in the ecosystem that could interbreed, but would generally function as separate caribou populations. Given the varying levels of access, habitat condition, land ownership and associated differences in land management emphasis across the recovery area, the necessity of having more than one herd for long-term viability of the 'southern Selkirk population' was deemed very important to the herd's recovery (USDI 1985). Subsequent efforts to meet this goal included three releases in Idaho (i.e. 1987,1988, 1990) to establish the 'Two Mouth Lakes' herd, two releases into Washington (i.e. 1995 and 1996), and one augmentation effort of the original B.C. 'Stagleap' herd (i.e. 1999). By 1990, the ecosystem-wide population (i.e. Stagleap and Two Mouth Lakes herd) had increased to approximately 55 to 70 animals. The population remained somewhat stable through the early 1990's but declined over the next decade as a result of predation by mountain lions and bears as well as additional mortalities from unknown causes. Caribou numbers continue to vary annually, and have been regularly followed with annual censuses and monitoring of radio-collared animals. The Two Mouth Lakes herd has consisted of only 3 individuals since 1999 (W. Wakkinen's 1999-2001 census).

Some 68.0 % of the project area is within the woodland caribou recovery area (**Map 1**). During the late 1980's and early 1990's, the Two Mouth Lakes herd home range was situated along a portion of the Selkirk Mountain crest that included the headwaters of Myrtle, Ball, Two Mouth, Lion, Long Canyon, Pack, and Smith Creeks. Caribou use within the project area during the last 13 years included consistent occupancy of the Slide, Peak, and Jim Creek drainages, as well as use of the Brooks and Little Harrison Lakes, from 1987-1994. Newly released caribou used the Mack, Burton, and Lost Creek basins in 1987-1988, and a caribou calved along the ridgeline above Mack Creek in 1990. Currently, the existing Two Mouth Lakes herd (n=3) uses areas just outside of the project area (i.e. Two Mouth Lakes and upper Pack River), although there are animals within the recent Washington augmentation group that occasionally travelled to the Myrtle Creek area in the last 4 years (J. Almack, pers. comm. 1997).

The Myrtle Creek Caribou Management Unit (CMU) is located above 4,500 feet within the project boundary. The U.S. Forest Service is the dominate landowner within this CMU; however Crown Pacific does own 3,899 acres (17.7%) of the land within this CMU. Currently, some 77.3% of the area capable of supporting spruce/fir forests in this CMU is currently dominated by mature (100-150 years old) and old growth (>150 years) spruce/fir forests. Some 46% of the area capable of supporting cedar/hemlock forests is currently dominated by mature and old-growth forests of this type (Table 3-1).

Table 3-1. Engelmann spruce/subalpine fir (SAF) and western red cedar/western hemlock (CH) distribution and successional stage (total acres/% of area capable of growing either forest type) by land owner within the 21,994.4 acre Myrtle Creek CMU. Some 13,943.2 acres of the CMU is capable of supporting SAF forests and 4,770.9 acres is capable of supporting CH forests (derived from Allen 1999).

Land Owner	Forest Type	Area Capable of Supporting Forest Type Acres / (% of Total CMU	EARLY SERAL SHRUB (post-burn or harvest) Acres / (% of Capable Forest Type	EARLY SERAL FORESTED (1-59 years) Acres / (% of Capable Forest Type)	IMMATURE (60-99 years) Acres / (% of Capable Forest Type)	MATURE (100-149 years) Acres / (% of Capable Forest Type)	OLD GROWTH (150+ years) Acres / (% of Capable Forest Type)	AREA Dominated by other CoverTypes -lodgepole -larch -Douglas fir -Grand fir (Acres/% of Capable Forest Type)
US Forest Service	SAF	11,996.2 (86.1)	609.5 (5.1)	385.6 (3.2)	295.4 (2.5)	5,609.8 [a] (46.8)	4,145.4 [e] (34.6)	950.4 (7.9)
	CH	3,336.2 (69.9)	684.7 (20.5)	66.0 (19.8)	64.4 (19.3)	722.3 [b] (21.6)	817.9 [f] (24.5)	981.6 (29.4)
Crown Pacific	SAF	2,106.4 (15.0)	936.1 (44.4)	0	29.1 (1.4)	676.8 [c] (32.1)	282.4 [g] (13.3)	182.1 (8.6)
	CH	1,620.7 (33.9)	962.1 (59.4)	0	0	93.7 [d] (5.8)	564.9 [h] (34.9)	0

[a] Mean stand age=128 years
[b] Mean stand age=131 years
[c] Mean stand age=123 years
[d] Mean stand age=143 years
[e] Mean stand age=192 years
[f] Mean stand age=216
[g] Mean stand age=183 years
[h] Mean stand age=241 years

Recreational use within the CMU is concentrated in the Two Mouth Lakes area during the spring, summer, and fall months and includes hiking, camping, and fishing. Two Mouth lakes and the headwaters of Slide, Myrtle, and Peak Creek have been closed to snowmobiling since 1994 to protect caribou. These areas have received consistent use by the Two Mouth Lakes herd during the last 13 years. Snowmobile use in the drainage is limited to the Myrtle Creek loop road (# 633 and 661). However, this road is located at or below 5000 feet and has not had documented caribou use from December-May.

Habitat management for woodland caribou management was originally provided by the Forest Plan (1987). However, these guidelines were amended internally in 1994 with the development of a caribou habitat capability (HCI)/suitability (HSI) model (Allen and Deiter 1994, and Allen 1998b), which was derived from habitat research on the translanted caribou as well as earlier research and a preliminary model developed by the recovery team in 1985 (Scott and Servheen 1985, Summerfield 1985, and Warren 1990, Allen 1998a). This mid-scale model uses existing timber inventory data to classify stands as to their *capability* versus *current suitability* for caribou use on a seasonal basis. Application of a mathematical equation for both capability and suitablity results in values from 0 to 1.0. Habitat capability is defined elevation, slope, and habitat type (after Cooper et al. 1991). Capability is set at HCI>=0.5. If the stand is evaluated as capable, then it is reviewed to determine if it has the right combination of vegetation characteristics to be suitable for caribou use. Habitat suitability is defined by elevation, slope, habitat type/existing timber cover type, mean size (diameter) of timber in the stand, overstory canopy closure, and overall stand age. Current suitability is set at HSI>=0.5. Unlike the Forest Plan which assumed habitat to have discrete seasons of use, this newer model may rank stands as high quality habitat for more than one season of use. Conversely, not all stands have high enough quality to rank as suitable habitat. In general, suitable habitat (HSI>=0.5) are those stands that are at elevations >5000 ft, <40% slope, in 81+ year-old stands of spruce/fir, or 4500-5000 ft, <40% slope, 120+ year-old stands of cedar/hemlock. This fits the definition of critical caribou habitat within the Forest Plan, pg V-3.

The 1994 woodland caribou recovery plan recognizes six seasonal habitats based on behavioral needs, movements, and habitat use, including: early winter (~November 1 – January 15), late winter (~January 16 – May 15), spring (~May 16 – July 15), calving (pregnant cows, June 1 – July 15, summer (July 16 – September 15), and rut (September 16 – October 31). However, subsequent research suggests that five seasonal habitats are appropriate, resulting in selection of similar habitats from July 15 to the end of October (i.e. summer and rut) (Allen 1998). In general, these seasonal habitats can be summarized as follows: 1) Early winter includes the use of mature to old growth cedar/helmlock (age >=120 years) and spruce/subalpine fir stands with >70% canopy closure, slopes < 40%, between the elevations of 3500-6200. Appropriate subalpine fir stands stands need to be within 1.0 mile of useable cedar/hemlock stands to be suitable (Allen 1998). Late winter includes the use of 80 year old and older subalpine fir/spruce stands on 'dry' habitat types with 11-70% canopy cover, and slopes of < 40% found between 5500-7000 ft. elevation. Summer/rut habitat is similar to late winter except caribou range between 5500-6500' elevation. Spring habitat includes 80 year old and older stands of subalpine fir/spruce with canopies ranging from 1-40%, and slopes of <40% found between 5000-6500 ft. elevation. Calving habitat includes 80 year old and older subalpine fir/whitebark pine and nonforest stands located at the highest elevations (5500-7400'), all slopes, and 1-40% canopy cover.

The project area has 7 types of caribou habitat, based on the above descriptions and including the combination 'key' habitat. Stands that have HSI>=0.5 for all seasons except early winter cedar/hemlock are considered key habitat, because they are mid-elevations that have the habitat quality to be useful for more than one season. Early winter habitats and key habitats are likely the most important habitats for woodland caribou. Research involving changes in woodland caribou habitat within the eastern portion of the U.S. recovery area during the last 115 years documented the ecosystems recovery from large fires in the 1800's (Allen 1999). The Myrtle Creek CMU is no exception. There is substantially *more* caribou habitat now for <u>all</u> seasons within this CMU then there was at the turn of the century (Table 3-2). There is a high level of linkages and traval corridors between suitable habitats in this CMU. This includes large, cohesive patches of suitable habitat for all subalpine fir seasonal habitats, including the early winter component.

Crown Pacific is actively harvesting in their sections in the Jim Creek and Toot Creek drainages. Upon completion this winter, timber harvest of these lands will result in the net reduction of 726 acres of early winter spruce-fir habitat, 427 acres in late winter habitat, 384 acres of calving habitat, 706 acres of spring habtitat and 631 acres of summer habitat. Some 262 acres of the area being harvested within Toot Creek drainage is considered key caribou habitat. CP owns 33% of the capable cedar/hemlock early winter habitat in the CMU. To date, CP is not planning harvest in its CH early winter habitat. This is likely due to the fact that these areas are located in the riparian zone for Myrtle Creek, which is the water source for the city of Bonners Ferry.

Table 3-2. Total forested area capable (Habitat Capability Index (**HCI**) >=0.5) (acres and percent of total CMU) of being woodland caribou habitat versus suitable (Habitat Suitability Index (**HSI**) >=0.5) (acres and percent of capable) in the **Myrtle Creek Caribou Management Unit** (CMU) by land owner (USFS and Crown Pacific (CP)). Assessment of habitat change includes three points in time over a 115-year period. Of the 21,994.4 acre CMU, 18,262.2 acres (83.0%) are capable of being woodland caribou habitat for one or several seasons (derived from Allen 1999).

SEASON	LAND OWNERSHIP	CAPABLE (HCI>=0.5) Acres / (% of total CMU)	1880 SUITABLE HSI>=0.5 Acres / (% of Capable for Season)	1935 SUITABLE HSI>=0.5 Acres / (% of Capable for Season)	1995 SUITABLE HSI>0.5 Acres / (% of Capable for Season)
LATE WINTER	Forest Service	9,762.6 (44.4)	422.4 (3.7)	4,324.8 (38.3)	7,913.2 (81.1)
	Crown Pacific	1,543.1 (7.0)			508.7 (32.9)
SPRING	Forest Service	11,640.3 (52.9)	322.6 (2.2)	4,849.3 (33.3)	8,344.1 (61.9)
	Crown Pacific	2,932.5 (13.3)			1,139.7 (38.9)
CALVING	Forest Service	7,953 (36.2)	372.7 (4.7)	3,187.8 (36.9)	7,280.3 (91.5)
	Crown Pacific	689.9 (3.1)			459.9 (66.7)
SUMMER/RUT	Forest Service	0,013.9 (45.5)	296.8 (3.0)	4,609.8 (37.8)	7,217.8 (72.1)
	Crown Pacific	2,189.4 (9.9)			703.9 (32.2)
KEY[1]	Forest Service	4,963.6 (22.6)	296.8 (1.3)	2,248.0 (40.9)	4,479.2 (90.2)
	Crown Pacific	538.2 (2.4)			329.6 (61.2)
EARLY WINTER (cedar/hemlock)	Forest Service	3,341.8 (15.2)	1,137.6 (22.5)	1,613.6 (31.9)	1,516.8 (45.4)
	Crown Pacific	1,720.6 (7.8)			541.1 (3.1)
EARLY WINTER (subalpine fir)	Forest Service	9,966.3 (45.3)	201.9 (1.7)	4,463.3 (38.0)	8,033 (80.6)
	Crown Pacific	1.770.1 (8.0)			807.2 (45.6)

[1]Key habitat are those areas with Habitat Suitability Index (HSI)>=0.5 for late winter, spring, calving, and summer/rut.

Bald Eagle

Habitat Requirements

Bald eagles are winter visitors and year-long residents of northern Idaho. They are attracted to the area's larger lakes and rivers which provide most of their foraging opportunities (e.g. fish, waterfowl). Accordingly, bald eagles select shoreline areas with larger trees to pursue such activities as nesting, feeding, loafing, etc. Nesting habitat include proximity to sufficient food supply, dominant trees, and within line-of-sight of a large body of water (often within 0.25 mile of water). Nest trees typically are large ponderosa pine, Douglas-fir, or cottonwood trees with open crowns in areas that are relatively free from human disturbance (Montana Bald Eagle Working Group 1991). However, several new territories in recent years have been located in high density human areas, including several in the Idaho Panhandle.

Reference Condition

Bald eagles were undoubtedly common in the Idaho Panhandle historically because of the abundance of large water bodies with ample prey. The two major factors affecting the decline of the eagle in this area were probably the pervasiveness of the organochlorine pesticide DDT, and the loss and disturbance of nesting areas.

Existing Condition

At the time of federal listing, bald eagles were uncommon in this zone as designated in the Pacific States Bald Eagle Recovery Plan (page 29). Recovery areas in northern Idaho have contributed enough new territories to reach and exceed goals listed in the Recovery Plan. Originally, there was a target of zero territories in the area covered by the Bonners Ferry Ranger District. In Boundary County alone, there are now at least 11 territories, most of them discovered in the last decade. The majority of these nests are along the Kootenai River, outside of National Forest System lands. One of these territories is close enough to the proposed project to analyze effects.

Nesting, feeding and roost areas are protected on National Forest Lands through implementation of Forest Plan standards in accordance with the Pacific Bald Eagle Recovery Plan and the Montana Bald Eagle Management Plan. The entire district is within bald eagle recovery area. There is no suitable habitat within the project area, except for possibly some winter roosting habitat along the lower faces of the Selkirks. Eagles choose areas with larger trees for protection against wind.

Winter roosts are relatively uncommon in the Idaho Panhandle. The majority of wintering eagles leave their nesting areas and congregate on unfrozen open water because of forage availability. These include Lake Pend Oreille, Pend Oreille River, Kootenai River, and Lake Coeur d'Alene. Most of the eagles associated with nests along the Kootenai River stay within a mile or two along the river of their nest sites, according to the annual mid-winter bald eagle counts conducted along the Kootenai River for the past decade and a half.

Only a limited number of winter roost sites are known in the entire Idaho Panhandle area, despite annual aerial, ground or water winter counts. The highly vegetated shorelines are likely to provide adequate protection such that habitual roosts appear to be generally unnecessary. Of the three known roosts associated with Lake Coeur d'Alene, two roosts are within 0.5 miles, and one is 1 mile from the associated water body (pers. comm. with S. Robinson, BLM wildlife biologist, to S. Jacobson, April 14, 1999). Of the three known winter roost sites associated with Lake Pend Oreille, two sites are less than 0.1 mile from shoreline and the other is approximately 0.1 mile from shoreline (Crenshaw 1987).

Eagles are known to winter in moderate numbers in the Kootenai River Valley. Virtually all this use is along the shorelines of the Kootenai River, which remains unfrozen. There are no known winter roosts, although limited circumstantial evidence indicates there may be some use above McArthur Lake. Winter roosts are associated with a source of winter forage, which for the McArthur site is the highway and railroad carrion. The only forage site near a potential roost in the project area w ould be the Kootenai River, or possibly occasional winter-killed ungulates. Because large ungulate herds do not occur in the project area, it would be an unreliable source of forage for roosting eagles.

No regularly used areas are known in the project area. Because eagles are very common winter residents at the Kootenai National Wildlife Refuge at the base of Myrtle Creek, and along the Kootenai River, it is reasonable to expect that they have some specific areas that are used along the base of the Selkirks or the first mile or so up Myrtle or Ball Creeks. Some use that is greater than interrmittent is known to occur around the Kootenai National Wildlife Refuge (NWR). (L. Napier, pers. comm. 1992 for Snow Creek EA). None of the proposed units for either action alternative fall within one mile of the base of the valley.

Grizzly Bear

Habitat Requirements

Populations of grizzly bears persist in those areas where large expanses of relatively secure habitat exist and where human-caused mortality is low. Grizzly bears are considered habitat generalists, using a broad spectrum of habitats. Use patterns are usually dictated by food distribution and availability combined with a secure environment. Grizzlies commonly choose low elevation riparian areas and wet meadows during the spring and generally are found at higher elevation meadows, ridges, and open brush fields during the summer. During the late summer and fall, mesic timber habitat types become increasingly important for bears (Volson, 1994).

Grizzly bears den for the winter from approximately November 1 through April 1 each year.

Reference Condition

The grizzly bear was listed as Threatened in 1975. The bear was originally distributed in various habitats throughout western North America. Today, it is confined to less than 2 percent of its original range, represented in five or six population centers south of Canada, including the Selkirk

ecosystem. Habitat loss and direct and indirect human-caused mortality is related to its decline (USDI 1993).

Noted naturalist Murie commented that the Priest Lake Area was one of the last strongholds for grizzly bears within northern Idaho (Layser 1978). Although it is unclear, it can be gleaned from this historical information that grizzly bears were undoubtedly more plentiful in the past than they are today. From the arrival of the first settlers into the area through the late 1970's, human access into areas occupied by grizzly bears has steadily increased, precipitating an increase in the frequency of human/bear encounters. These encounters have resulted in the death of some grizzly bears. The population estimate for the entire Selkirk ecosystem is unknown, but between the years 1985-1990, 26-36 bears were known to occur within a study area that composed approximately one-third of the ecosystem (USDI 1993).

Existing Condition

The project lies in the Selkirk Mountain Ecosystem within two BMU's: Myrtle BMU and Ball Trout BMU. Myrtle BMU is 99 square miles with a high proportion of private landownership (13%). Crown Pacific, Ltd owns about 13 square miles (about 8320 acres) of commercial timberlands within the BMU, in the Myrtle and Snow Creek drainages. Ball Trout BMU is 99 square miles of almost entirely NFS lands, including 3 square miles (1920 acres) along Ball Creek recently acquired from Crown Pacific, Ltd. Most of the project currently lies within the Myrtle BMU, and only the Burton Creek portion of the project area projects into the Ball Trout BMU.

Sightings of grizzly bears are becoming increasingly common in both BMU's, particularly in the Pack River area of Myrtle BMU. There is evidence of a breeding pair of bears in this BMU, and sows with cubs have been observed (W.Wakkinen, pers. comm. 1997).

Currently, the IPNF is being guided by its Forest Plan and an Interim Access Management Guide (based on results of an Interagency Grizzly Bear Committtee's recommendations) in determining appropriate management for grizzly bear recovery. The FP guidelines require each BMU to maintain secure habitat in the form of unroaded areas, barriered or gated roads. In addition to this FP standard, the IPNF has an interim access management agreement with the US Fish and Wildlife Service, 1997. The guidelines for this agreement contain four components: habitat security, core habitat, open road density and total road density. Priority 2 BMU's, which include both Myrtle and Ball-Trout, are required to work towards 55% core habitat; both BMU's have well above that level of core habitat (see Table 1). Habitat security is to be maintained at or above 70% of the BMU; both BMU's currently more than meet this standard. Open and total road densities are monitored at the end of each year, and are based on 33% or less of the area having an open road density of 1 mile per square mile or greater, and 26% or less of the area having a total road density (includes gated roads) of 2 miles per square mile or greater. Both BMU's fall well under these figures as well.

Myrtle BMU has had private timber operations occur in every year since the grizzly bear was listed under the Endangered Species Act. According to the IPNF Forest Plan Monitoring Report, one year since the Forest Plan was approved in 1987 activity occurred in excess of the minimum required by the Forest Plan as a result of private activities. Forest Service activities are planned in

advance to meet Forest Plan standards and assume a reasonable amount of private land management activities.

The bear units do not have designated core habitat, but an analysis of potential core (ie, areas without passable roads within .3 miles of an open road) has been completed. The results are in Table 2. Both BMU's are included in the cumulative effects analysis area for grizzly bear, because both units are affected by the action alternatives. The following table represents the last year for which data were calculated.

Table 2: Existing Condition Bear Year 2000

BMU	BMU Area (mi2)	Forest Plan Security (mi2)	Forest Plan Security (%)	Core Area (%)	Open Road Density (%)	Total Road Density (%)
Myrtle	100	75	75	61	28	18
Ball-Trout	91	82	85	72	16	10

Mortality is a continuing concern for the recovery of the grizzly bear. One of the functions of road security is to decrease the opportunity for illegal mortality. The Myrtle BMU contains the Myrtle Creek Game Preserve where hunting is not permitted. Some illegal hunting does occur in the Game Preserve, although the numbers are a small fraction of the numbers of legal hunters in most other areas of Boundary County (W.Wakkinen, pers. comm. 1997, and G. Johnson, pers. comm. 1997). However, those people who do hunt the area are already in violation of the law, so there may be a slightly greater propensity to illegally take a grizzly bear by these people. At this time, there is no known incidence of grizzly bear mortality in Myrtle or Ball Trout BMUs. The project area includes two areas not enclosed by the Myrtle Creek Game Preserve. These are the Cascade and Burton Creek drainages and the Kootenai Point area. The Cascade and Burton Creek drainages are normally behind closed gates, which would vary by alternative (see Analysis of Effects). The Kootenai Point area is on a currently open road, and the units are outside of the Myrtle BMU.

Habitat quality is not quantitatively considered in any of the IPNF guidelines for bear management. The Selkirk Ecosystem has an abundance of high quality bear habitat because of the amount of mesic habitat types that produce abundant bear forage plants. Huckleberries are the most important plant food for grizzly and black bears in the Selkirks. Huckleberries of more than one species are abundant in both bear units. The large Sundance Burn occupies about a third of the Myrtle BMU. It provides huckleberries as well as other preferred species such as mountain ash. The burn has high quality forage, and is increasing in available cover as vegetation grows. Spring habitat is present in greater proportions than other BMU's because of the presence of the Kootenai National Wildlife Refuge at the base of Myrtle Creek. The Ball Trout BMU has many hundreds of acres of spring habitat in the form of steep easterly aspect slopes that provide greenup early in the year. Both BMU's provide an abundance of alpine open habitat with huckleberries as well as other succulent forage plant species. None of the Selkirk BMU's provide a concentration of big game to forage for carrion or calves.

The presence of recreational human use has been considered a possible reason for the low numbers of bears in this area prior to the early 1990's (Wakkinen, 1992), but it appears this is local in the Roman Nose Lakes and Harrison Lakes areas rather than the entire Myrtle BMU (W. Wakkinen, pers. comm. 1997). The Roman Nose Lakes area is discounted from the security calculations because of this effect. The Ball Trout BMU has a large proportion of unroaded habitat,

with several popular trails. Management restrictions based primarily on the level of human use possible before resource damage occurs have limited the number of users in this backcountry area to a level deemed to be compatible with bear recovery.

Canada Lynx

Habitat Requirements

Lynx occupy regions in North America of arctic or boreal influence. They are restricted to forested habitats within this region and are found from western Alaska to the eastern edge of Newfoundland. The northern boundary of this range coincides with the northern extension of the boreal forests. The southern boundary of lynx range is along the high elevation or boreal forested areas of the Cascades and Rocky Mountains into Washington, Idaho, Montana, Wyoming, Colorado, and Utah.

Lynx are considered a low density species with home ranges averaging 24 square miles, depending on prey abundance. They occur primarily in moist, cold habitat types, where snow depths generally maintain depths of 3 ft or greater throughout the winter. On the Bonners Ferry Ranger District, these are generally above 4000 feet elevation. Even though lower elevations can be important in some instances, evidence suggests lynx tend to use these areas less because of competition with other predators and overheating in the summer. Although it is noted that lynx rely heavily on snowshoe hare as a primary food source, it is believed that other species such as red squirrels and grouse may play an important role in lynx ecology. Red squirrels are moderately common on the district, and three species of grouse plus one species of ptarmigan occur commonly above 4000' on the district.

Lynx habitat consists primarily of two structurally different forest types occurring at opposite ends of the stand age gradient, although they also use other habitats. Lynx require early successional forests that contain high numbers of prey (especially snowshoe hare) for foraging and late-successional forests that contain cover for kittens (especially deadfalls) and for denning (Koehler and Aubrey in Ruggiero et al., 1994, p. 86). The highest use occurs when these are in close proximity. Like most wild cats, lynx require cover for security and stalking prey; they avoid large open areas. Although lynx may cross openings less than 100 meters in width, they generally do not hunt in these areas (Koehler and Aubrey in Ruggiero et al., 1994, p. 88). In North Central Washington, lynx used areas with gentle slopes (less than 10%) in winter (McKelvey et al, page 307 in RMRS-GTR-30, 1999) and moderate to gentle slopes (less than 40%) in the southern Rocky Mountains (Apps, page 352. in RMRS-GTR-30, 1999).

The Lynx Conservation Assessment and Strategy defines risk factors. Risk factors for this project are in four general categories: factors affecting lynx mortality, factors affecting lynx productivity, factors affecting lynx movement, and other large-scale risk factors. The risk factors and notes if each applies to this project are listed below. Those risk factors that do not apply to this project will not be further discussed in this document.

Risk Factors Affecting Lynx Recovery (Those pertinent to Myrtle Cascade Project Area are starred):

Factors affecting lynx productivity
- Timber management*****
- Wildland fire management*****
- Recreation*****
- Forest/Backcountry Roads and trails*****
- Livestock Grazing
- Other human developments

Factors affecting lynx mortality
- Trapping
- Predator control
- Incidental or illegal shooting
- Competition and predation as influenced by human activities*
- Highways (vehicle collisions)

Factors affecting lynx movements
- Highways, railroads and utility corridors
- Land ownership pattern*
- Ski areas and large resorts

Other large-scale risk factors
- Fragmentation and degradation of lynx refugia
- Lynx movement and dispersal across shrub-steppe habitats
- Habitat degradation by non-native invasive plant species

Reference Condition

The lynx is one of the three species of wild cats that occur in the temperate forests of North America. Lynx populations in Alaska and most of Canada are generally considered stable to slightly dropping. The conservation of lynx populations is the greatest concern in the western mountains of United States because of the peninsular and disjunct distribution of suitable habitat at the southern periphery of the species' range. Both historic and recent lynx records are scarce, which makes identifying range reductions and determining the historical distribution of stable populations in the region difficult (Koehler and Aubrey in Ruggiero et al., 1994, p. 79).

Existing Condition

Lynx have been documented in three areas of Bonners Ferry Ranger District as of fall 1999. One of these areas was the Cascade Creek drainage. The other two areas are several miles distant from the Cascade Creek area.

There are 19 Lynx Analysis Units (LAU's) on the district. The Idaho Panhandle National Forests are currently in the process of developing models to evaluate the amount of lynx habitat present on the district. As these models are refined and verified, the acreages are expected to change to

better reflect known conditions. The values presented here are probably within 5% of the true values. The estimated amount of area designated for lynx management on the district is just over 350,000 acres within all LAU's, of which roughly 274,000 acres are capable of producing suitable habitat, and 106,000 acres are currently suitable. Lynx habitat occurs in areas proposed for treatment in 1 of these 19 Lynx Analysis Units on the district, the Myrtle Cascade LAU. This LAU contains roughly 20,940 acres of capable habitat.

Snowshoe hare are the primary prey species of lynx. In Washington, hares are most abundant in young forests (approximately 20 years), usually lodgepole pine or other habitats with dense tree or shrub understory (Koehler, 1990, p. 845-851). New studies in several areas are being conducted to determine the presence of lynx and hare in several types of tree densities. Vegetation is considerably different in the Selkirks than in other areas studied for lynx-hare relationships, with different silvicultural needs and associated densities of shrubs and saplings (D.Gunter, pers. comm. Aug 1998).

Analysis and Determination of Effect

Methodology

Level of Analysis

The level of analysis is dependent on a number of variables including but not limited to: the existing condition, the cause and effect relationship, the magnitude or intensity of effects, the contrast in effects between alternatives, the risks to resources, and the information necessary for an informed decision. The analysis is commensurate with the importance of the impact (CEQ 1502.15), the risk associated with the project, the species involved, and the level of knowledge already in hand (USDA Forest Service, 1992).

The geographic scope for the wildlife analysis varies by species. This analysis uses the following sources, which provide the primary direction, foundation and methods used to develop the analysis for potential effects on wildlife.

- Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin.
- IPNF Forest Plan, including Forest Plan Monitoring.
- Available Conservation Assessments and Strategies for wildlife species, or Management Plans. For this project, these include specifically, Grizzly Bear Recovery Plan, Montana Bald Eagle Recovery Plan, Woodland Caribou Recovery Plan, Lynx Conservation Assessment and Strategy, Idaho Bird Conservation Plan, Townsend's Big-eared Bat Conservation Assessment, and draft Harlequin Duck Conservation Assessment and Strategy. (Some of these do not apply to threatened or endangered species, but provide overall conservation guidelines.).
- Additional scientific literature as appropriate, including predictive habitat models.

Indicators Used to Measure Effects

The table below displays the indicators that are used to measure effects on wildlife species. Indicators for each species varies and is based on those factors that could result in a measurable adverse or beneficial effect. For most species analyzed, appropriate habitat parameters were measured to distinguish suitable habitat (specific parameters for individual species are located in the project file).

Table 3. Indicators used to measure effects

Species	Indicator
Endangered	
Gray Wolf	Measurable reductions in prey species or increases in access
Woodland Caribou	Changes to habitat
Threatened	
Bald Eagle	Disturbance during breeding season
Grizzly Bear	Impacts to security habitat and core habitat
Lynx	Risk factors listed in LCAS and pertinent to project area
	Habitat parameters summarized below*

- ***Within lynx habitat, no more than 30 percent of lynx habitat can be within a unsuitable (preforage) habitat condition at any time. Management activities would not change more than 15 percent of lynx habitat into a preforage condition within a 10 year period.

- Within lynx habitat, maintain denning habitat on a least 10 percent of the area that is capable of producing stands with these characteristics. Denning habitat should be well distributed and in patches larger than 5 acres.

- Manage for no net increase in open road miles in lynx habitat. Allow no net increase of regularly used or groomed over-the-snow routes and play areas.

- Maintain vegetative structure that facilitates movement of lynx along important connectivity corridors (e.g. riparian areas, saddles, ridges).

Cumulative Effects Analysis Areas

For each species analyzed in this chapter, the cumulative effects area has been determined (Table 2). This determination is based on the species' relative home range size in relation to its available habitat, topographic features (watershed boundaries) which relate to how species move and utilize their home range, and boundaries that represent the furthest extent of affects. For woodland caribou, grizzly bear and lynx, cumulative effects areas are established.

The existing condition is a culmination of past activities, whether they are human-caused or natural events. The expected changes in habitat conditions (i.e. stand structure) resulting from present and reasonably foreseeable future actions were included in the information databases or were interpreted qualitatively. Therefore, the following analyses of species are a cumulative representation of past, present and reasonably foreseeable future actions, including these incremental actions. Other cumulative actions not represented (i.e. projects on industrial private forest lands and State lands) would be discussed in the cumulative effects area. The analyses assume that other ownerships do not contribute to the needs of the species except where

specifically mentioned. Therefore, for purposes of this analysis, the burden of achieving habitat needs and species viability rests on National Forest lands.

The analysis cumulative effects areas are depicted in Table 4, by species.

Table 4. Analysis areas	
Species	Analysis Areas
Endangered	
Gray Wolf	Ranger District
Woodland Caribou	Caribou Management Unit (CMU 6)
Threatened	
Bald Eagle	Area within 2 miles of known territories and Ranger District
Grizzly Bear	Bear Management Units (Myrtle and Ball Trout BMU's)
Lynx	Lynx Analysis Units (Myrtle Cascade LAU)

Field and Prefield Reviews

Five professional wildlife biologists with about 49 years total experience have provided input to this environmental assessment. These biologists visited the project area on the ground and from the air intensively over 7 years. A contract for the EA several years ago provided some additional wildlife input from a consulting firm, Biosystems, Inc. The project area has been under intensive research for woodland caribou and grizzly bear issues for over a decade, with state and university biologists participating in focused research on site specific caribou and grizzly issues. All of these biologists have contributed significant detailed and broad-scale information about the wildlife resources in the project area from ground and aerial perspectives. Information collected from district wildlife atlas and Conservation Data Center were also considered in the analysis.

Predictive models. Predictive models have been used to determine broad scale habitat suitability and capability for all species for which the methods were appropriate. Habitat was mapped using timber stand data base information and geographic information systems. Habitat modeled include that for most of the sensitive species, management indicator species, and woodland caribou. Further details on grizzly bear and woodland caribou are included in their individual accounts.

Surveys. Surveys have been done for most of the emphasis species on the Bonners Ferry Ranger District, to varying degrees. The project file contains a list of surveys done on the Bonners Ferry Ranger District in the last 10 or so years.

Gray Wolf

Effects Common to All Alternatives

Mortality risk is unlikely to change measurably in the project area because most of it is within the Myrtle Game Preserve. Road access is unchanged throughout the project except for a temporary road reconstruction. Because the likelihood of a wolf occurring in this unit during the time that the road would be reconstructed would be virtually unmeasurable, the effect of this on wolves would be unmeasurable. Even if a wolf was present at this time, because of the grizzly bear recovery

guidelines for habitat security, there would always be a larger proportion of secure habitat than is currently present in many locations where wolves have successfully bred in the recent past.

The abundance of deer, moose and elk are unlikely to be measurably affected by treatments in this project. Because availability of prey species is not limiting wolf recovery in the Selkirks, it would therefore not affect the ability of the wolf to successfully recover.

None of the alternatives affect denning or rendezvous habitat, because there is no habitat clearly identifiable as either denning or rendezvous habitat**.**

Direct, Indirect, and Cumulative Effects

There are no additional direct or indirect effects to wolves or their habitat, based on the discussion above. Cumulative effects are also not a concern because of the lack of direct and indirect effects.

Determination of Effect

Based on the lack of mortality risk in the project area and immediate vicinity (including the Kootenai National Wildlife Refuge), and the maintenance of adequate prey base and habitat security, the project alternatives would be ***unlikely to adversely affect wolves or their habitat***.

Woodland Caribou

Throughout the discussion on effects of this project on woodland caribou, it should be kept in mind that the HCI/HSI model used to identify suitable habitat is a mid-scale model and can not distinguish canopy covers at a fine scale by tree species. Ground-truthing has been done to determine if a given treatment would reduce the suitability of a stand based on the prescription, the existing and residual condition, seasonal habitat, and configuration of tree species in the stand. For instance, the model will likely rate a stand as suitable (HSI>=0.5) even if the canopy cover required to achieve that rating includes a high proportion of lodgepole pine or other tree species that do not contribute to the overall structural characteristics required by caribou. This is because the model differentiates current cover type suitability if the desired cover types (i.e. spruce/fir or cedar/hemlock) dominate the stand's total basal area (i.e. >=50% basal area). So, a stand with 48% lodgepole/52% spruce/fir in the basal area will still be rated by the model as suitable (HSI>=0.5) for caribou (all other variables being suitable). In reality, however, caribou generally avoid lodgepole stands in this ecosystem. The discussion of effects is further complicated by the fact that HCI/HSI ratings are run at the stand level—not for an entire harvest unit. This is because the best data is available for timber stand vegetation plots is done at the stand level. Hence, the overall harvest unit can have sections of high and low HSI ratings. So, in the example concerning lodgepole, when this species is removed during a harvest operation, a stand will likely increase in suitability--particularly if it is managed to protect and enhance the remaining spruce/fir trees. As long as the canopy is not reduced to levels below typical caribou use (i.e. generally < 25%), the stand generally remains suitable for all spruce/fir seasons. If lodgepole pine is clustered in a given area, that microsite (which would be too small to be detected in the database or model) is not suitable habitat anyway, so harvesting it would not reduce suitability. Finally, the small openings may be beneficial to caribou because these sites can produce attractive caribou forage used during the spring and summer seasons (Allen 1998a).

Effects Common to All Alternatives

• Disturbance and/or Increased Mortality

Disturbance and/or increased mortality for caribou due to human activities (i.e. harrassment, poaching and/or legitimate hunting) will remain the same under any of the alternatives. Existing road access, or mechanical activities associated with road obliteration or timber harvest will not increase the likelihood of displacing animals in the existing Two Mouth Lakes herd, largely because these access points and proposed activities are 2-6 miles away from the herd's activity centers. Furthermore, it is extremely unlikely that the existing small population would alter their center of activity to areas closer to the proposed activities. Hence, roads opened for planned harvest activities or associated harvest activities pose little-to-no threat of increased mortality or displacement to the remaining caribou herd.

The existing Two Mouth Lake herd is currently afforded good winter security from snowmobiling activity by the 1994 snowmobiling closure. Levels and distribution of snowmobiling activity are unlikely to increase within this CMU with any of the alternatives in the near future. More specificially, road reconstruction and/or obliterations will not increase the access or attractiveness of these areas for snowmobiling above current use.

• Available Caribou Habitat

For all alternatives, the CMU trend in currently suitable seasonal habitat is towards larger, older trees. This is particularly important for early and late winter spruce/fir habitat because of the increased amount lichen available for caribou on older trees. However, the majority of suitable high elevation habitat in the eastern Selkirks is currently rated as mature (100-149 years old) and old growth (150 years and older). Arno and Davis documented stand-replacing fire intervals in spruce/fir types in the western Selkirks of >150 years. Hence, this forest cover type is likely at increasing risk for catastophic wildfire stand replacement throughout the ecosystem. This is substantiated by the IPNF wildfire risk assessment (Harkin et al. 1998). Although some stand replacement is necessary in order to maintain caribou habitat across the landscape in the long-term, distribution and size of these stands needs to provide quality habitat in a suitable mosaic across the landscape.

Direct and Indirect Effects

Alternative 1:

The no action alternative would retain the amount and quality of habitat currently available. In the the short-term, this would result in no net-change in habitat conditions. In the long-term, stands proposed for treatment to reduce fire danger would not be treated. This would continue an incremental trend towards increased fire risk in all caribou habitat, and particularly in the spruce/fir cover type. Increasing stand age and associated fuel build-up will ultimately result in increased fire risk and the likelihood of catastrophic stand replacing fire. The SIMPPLLE model predicted that risk of stand replacing fire would increase by about 10% in the short-term under no action. In the long-term, the model predicts the risk of stand replacing fire would be roughly 25% higher under no

action versus a scenario of continued silvicultural treatments. These conclusions appear to be supported by fire research. Although lightning strikes are frequent in the subalpine forest types (Arno and Davis 1980; Fowler and Asleson 1984), where much of the key caribou habitat is located, few large fires apparently originated in these stands (Barrett 1982). Most large fires probably moved in from drier sites during severe fire weather. Therefore, treatments that reduce the risk of severe fire in drier stands could reduce the risk of severe fire in neighboring stands, as predicted by the SIMPPLLE model.

An indirect effect of implementing this alternative would be to perpetuate the loss of western larch throughout the treatment areas. This species is a frequent component of cedar/hemlock stand structure and is also found in many spruce/fir habitat types (Cooper et a. 1991). Western larch produces a long-lasting snag which can serve as lichen seed sources for surrounding trees (Schroeder 1974). This could be ecologically significant in terms of severe fire events, which typically remove most conifer species, with the exception of western larch, the most fire resistant species in northern Idaho (Smith and Fischer 1997). Distance from a lichen propagule seed source is often a key limiting factor in germinating lichen growth in second-growth stands (Stevenson et al. 1994).

Alternative 2: Ten of the proposed units have capable habitat that is not currently suitable. In general, treatments proposed for this alternative would increase the habitat suitability (HSI) of capable stands over time by reducing/eliminating competing and undesireable forest cover types and/or increasing forest stand size class.

Proposed regeneration unit M05 is located within capable early winter cedar-hemlock habitat. This unit is located adjacent to mature and old growth forests. Past regeneration harvests are also part of the forested matrix, but are not adjacent to proposed regeneration harvests. This unit meet all of the requirements for suitability (i.e., elevation, slope, habitat type, canopy cover and age) with the exception of tree size, which averages less than 7 inches (dbh). When average tree size is below 9 inches (dbh) for a given stand, the habitat suitability index (HSI) rating will default to zero. Such is the case for this unit. Essentially this unit is considered overstocked and would not respond favorably to intermediate treatments, such as commercial thinning, due to poor live crown development. In such stands where thinnings are conducted, decades may pass between the release of trees with small live crowns and their increase in diameter and height growth – if they increase at all. A previously crowded tree is physically susceptible to stem buckling or tipping immediately after release because of its small diameter relative to height. Severely repressed trees are not usually considered capable of responding to release because periodic strong winds, freezing rains, wet snows, or other factors can exacerbate their instability long before they grow stable (Oliver 1996). Historically, these forests were characterized by mixed severity fire regimes and small, nonlethal burns. Stand replacing fires occurred every 200-250 years in these forest types (Smith and Fischer 1997). Consequently, dense stands have developed in the absence of low severity fire, which is linked to a decrease in vigor and crown volume of western larch and thus a reduction in fire resistance (Zack 1992). Proposed regeneration harvests would reduce canopy cover to below 30% in the short-term, but subsequent silvicultural treatments (thinnings, weedings, cleanings, etc.) would allow for better control of stand density and species composition, factors that cannot be controlled without treatments.

Portions of unit MC23 are currently rated as suitable for early and late winter (HSI>=0.5).

However, the majority of this unit has HSI ratings of 0 - 0.4. Average size (less than 7 inches dbh) and average stand age (less than 120 years) are the factors that are limiting suitability at this time. Spruce and subalpine fir are the dominant species in this unit, but lodgepole pine is also a significant component. Some openings will be created, up to three acres in size, where lodgepole pine is the dominant species. Based on the HSI model for caribou these areas dominated by lodgepole pine would actually receive a habitat rating of zero. Following harvest, canopy coverage in these openings would be less than 25%, and given there would be no underburning for site preparation understory would be primarily spruce and fir (Ferguson 1994), with a scattered overstory of western larch. Total area in openings would be about one quarter of these stands. In areas where lodgepole is only a minor component of this unit, residual canopy coverage would be in excess of 60%. Overall, average canopy coverage after harvest would be about 50%. In order to significantly lower the existing suitability the overall canopy cover in these stands would have to be reduced below 25%. Combined with the fact that the major species and average age of the unit would not change, and that average size would change very little, no short-term changes in suitability are expected for this unit. However, long-term improvements in suitability would be expected as these stands grow older, average size increases, and the openings created with this entry convert to spruce and fir.

As for lichen production, research demonstrates that opening stands generally results in altered lichen growth and species composition. Aboreal lichens, both *Alectoria* and *Bryoria*, are the main winter food of woodland caribou (Stevenson 1992), although Rominger (1995) documented a preference for the latter. Rominger et al. (1994) studied the impacts of partial cut stands versus uncut stands in British Columbia and northern Idaho. The percent canopy coverage in uncut stands was 77% and the canopy coverage in partial cut stands ranged from 24% to 60%. Their research showed that lichen biomass per centimeter of branch did not differ between uncut and partially cut stands. However, it did appear that the decrease in *Alectoria sarmntosa* was compensated by an increase in *Bryoria*. The proposed treatments in caribou habitat, under all action alternatives, would maintain canopy coverage between 25-60%, within the range observed by the 1994 Rominger study. Consequently, implementation of this alternative is expected to maintain lichen loads at current levels, although the mix of lichen species is likely to vary depending on the site.

Indirect effects of this alternative would bbe to incrementally reduce fire danger throughout the treated units. Wildfire in suitable caribou habitat is currently rated as high risk and this will increase over time, so incremental reductions are appropriate (Harkins et al. 1998). Unfortunately, the amount of acres proposed to be treated to reduce fire risk is so small proportional to the amount increasing in risk annually that it is unlikely to be a measurable benefit, at least in the short term and in the absence of continued similar efforts. The SIMPPLLE model was also used to predict the risk of stand replacing fire in key woodland caribou habitat. The model estimated that risk of stand replacing fire would be reduced by about 8% with treatments prescribed under Alternative 2.

Addlitional indirect effects are the likelihood of disturbance caused by the timber harvesting operation. Nine units are proposed for helicopter removal. Helicopters are loud for a relatively short period of time while the operation is occurring (usually a maximum measured in days or weeks), then the disturbance is removed. Historically, helicopter logging operations have not occurred more frequently than once per drainage per 5-10 years (including private operations), so this disturbance is minimal. The Selkirk caribou are somewhat habituated to aerial disturbance, because they have

been monitored by both fixed-wing and rotorwing aircraft up to once per week for well over a decade. The few animals currently present are in habitat more than 6 miles away. This decreases the likelihood of disturbance unless an ususual movement was made towards the harvested units. It is unlikely that the disturbance caused by helicopter logging would pose more than a temporary, insignificant disturbance to them.

This project does not propose to improve ungulate habitat significantly. While forage habitat is likely to improve to some extent whenever stands are opened up, the number and distribution of other ungulates in the Myrtle Cascade area is not likely to dramatically change. Because mountain lions have been a significant mortality source for caribou in the Selkirks, a generally steady status of ungulates would continue with the existing condition. Mountain lion predation is a complex situation that is based on several factors besides ungulate habitat conditions in mid-elevations such as is present in the Myrtle Cascade project.

Alternative 3: Some of the units for Alternative 3 differ from Alternative 2. Twenty of the units proposed for this alternative contain capable but not currently suitable caribou habitat. The majority of capable habitat (930 acres) is capable of becoming spring habitat. The unit with the greatest amount of capable habitat is MC24. The proposed prescription for this unit would trend stand conditions towards an increase in HSII rating.

Alternative 3 would treat nine units with currently suitable habitat (HSI>=0.5). This alternative would reduce the total amount of suitable caribou habitat by 42 common acres for early winter spruce/fir, late winter, spring and summer habitat, and by 149 acres in early winter cedar/hemlock habitat. While this does not represent a large decrease in the proportion of suitable habitat available (0.5 to 4.6% change depending on season), two seasonal habitats affected are important. Both early winter spruce/fir and cedar/hemlock are critical seasonal habitats in the Selkirks. Caribou use these two habitats in tandem by using the closed-canopied cedar/hmelock forests to escape accumulations of deep, soft snow but moving into associated spruce/fir types to forage on the heavier biomass of arboreal lichens in between snow storms. Suitable cedar/hemlock early winter habitat is more limited in this CMU—and at greater risk for reduction due to the high percentage of capable habitat (i.e. 33%) that is privately owned.

Alternative 3 would also treat MC23 as in Alternative 2, which would retain its suitability.

The SIMPPLLE model estimated that risk of stand replacing fire would be reduced by about 16% with treatments prescribed under Alternative 3. This alternative is predicted to reduce the risk of stand replacing more than any other action alternative. This reduction of fire risk can possibly be explained by the fact that Alternative 3 would treat more acres in upper Myrtle Creek adjacent to key caribou habitats than the other alternatives.

Alternative 4: This alternative would have the same effects as listed for Alternative 2 except that 14 units would be excluded. Except for Unit MC23, these units do not have any suitable caribou habitat. If not harvested, the lodgepole pine in unit MC23 will continue to reduce habitat quality (HSI values) over time due to the dominance of lodgepole in the overstory and reduced timber size-class resulting from overstocking. While suitable caribou habitat is not currently limiting caribou recovery, it is also important to manage for younger successional stages where risk to the

herd's current habitat use is low. This will help produce a mix of spruce/fir size classes for the long-term maintenance of caribou habitat.

This alternative proposes very little treatments adjacent to woodland caribou habitat. Consequently, the SIMPPLLE model estimates the risk of stand replacing would be reduced by less than 5% under this alternative.

Alternative 5: This alternative would not harvest any timber and would retain the road treatment. Because most of the roads treated for obliteration are already undriveable or gated, the effective difference in disturbance to caribou would be negligible. Further, most of the roads are not in the locations currently favored by caribou. Thus, the effects of this alternative would be similar to the no action alternative in its vegetation effects.

Cumulative Effects

Cumulative effects for Alternative 2 would continue on a similar pathway as the no action condition in overall trend. However, treated areas would contribute to an incremental decreases in fire risk over the recovery area, there would be a small decrease in fire risk or severity.

Determination of Effect

The preferred alternative **may affect but would not be likely to adversely affect** woodland caribou or their habitat for the reasons outlined above.

Bald Eagle

Effects Common to All Action Alternatives

None of the action alternative units is closer than 1.25 miles from the nearest known bald eagle nest. This nest is well established in its location in the valley bottom, and foraging habitat is surrounding the territory. The pair is habituated to a fairly large amount of human use around the territory because the auto tour route goes past it on three sides. It is unlikely that this pair uses the base of the Selkirks near the closest units are because of the forage base elsewhere.

Direct And Indirect Effects for Both Action Alternatives

Direct effects from the action alternatives are non-existent because no known habitat is being affected. Indirect effects, primarily disturbance, is unlikely because of the distance from known use areas for this pair. In addition, winter disturbance would not be likely because of the season of use for project for the units nearest the known territory.Because of the low necessity of having roost sites away from water bodies such as the Kootenai River or Robinson Lake, it is highly unlikely there would be any probability of impacting habitat that is used but unknown. Further, even if this was the case, there are numerous other locations that would meet the need of timbered cover away from these water bodies, and even cumulatively with other actions it is unlikely that roost habitat limits the number of bald eagles in Boundary County.

Nesting habitat is likely close to limiting at this point, because the spacing of known eagle nests is consistent along the river, and nests are present at all other water bodies where there is likely to be adequate forage to support a territory. For example, the only two lakes in the county that support eagle territories are Robinson and McArthur Lakes. These lakes freeze over in the winter while providing adequate forage during summer. During the freezeover time period, which occupies about 3 months of the incubation and early nestling phases in this area, numerous road kills are readily available at these two sites. All the other lakes in the county that are of adequate size for summer forage do not have ready access to roadkills during the freezing period. Therefore, any new nests would be unlikely, particularly away from the Kootenai River.

Bonners Ferry Ranger District is heavily vegetated with many large trees, particularly around the lakes. This abundant cover provides ample nesting and winter roost habitat that is protected from the prevailing winds, both from topography and tree density. It is unlikely that eagles would travel far from the primary foraging areas to roost because of the abundance of habitat near the primary food source. During the annual mid-winter eagle count done for the past dozen years, eagles are almost always found within a mile or two of a known nest along the Kootenai River, implying that the pairs roost very near their nests.

Cumulative Effects

No cumulative effects are expected because of the unlikelihood of direct or indirect effects.

Determination of Effect

For the reasons above, the Myrtle-Cascade project ***may effect, but would not likely adversely affect*** bald eagles.

Grizzly Bear

Effects Common to All Alternatives

Mortality risk would remain essentially the same in all alternatives because of the presence of the Myrtle Creek Game Preserve. This is true for all proposed units except those in the Cascade Creek drainage and the units of the Kootenai Point road. The Kootenai Point units that are outside of the Game Preserve are also outside of the Grizzly Bear Recovery Area. There is no evidence in the Selkirk ecosystem that timber sales themselves are causative of increased bear mortality. New roads or roads open due to any activity that allows increased public access may increase the risk of mortality. Mortality is the probable limiting factor to grizzly bear recovery in the Selkirks (Wielgus, Bunnell, Wakkinen and Zager, 1994).

Quality vegetation habitat for all alternatives would remain high and unlimiting. Treated acres in either action alternative represent less than 3% of the Myrtle BMU and well under 1% of the Ball Trout BMU. These BMU's have large quantities of high quality habitat, as described in the Existing Condition section of this report, so either of these figures is a small proportion of habitat available.

Some timber harvesting can produce an increase in bear forage plants. Since the percent benefit or reduction is small, in either case it is not limiting bear recovery.

For all action alternatives, post-sale treatments would be necessary for some units. These are normally low-level administrative use activities such as burning and planting, or moderate level uses such as cull tree removal and grapple piling. Other expected administrative uses are post sale exams and possible pruning. Administrative uses are determined annually and coordinated with the district wildlife biologist to ensure that uses comply with current administrative use guidelines. In the last 5 years, most administrative use is well under an average of 4-5 trips per road per BMU. Administrative uses would still occur outside of post-sale treatments under the no action alternative. The most common and widespread administrative use on the Bonners Ferry Ranger District is noxious weed control. Other uses are vegetation inventories and landbird monitoring. Altogether these uses would be at a reduced rate of 1-4 trips per road per BMU.

For all action alternatives, the obliteration of roads would cause a temporary disturbance to grizzly bears. The degree of impact of obliteration depends on three factors: where the disturbance is relative to good habitat, what season it is accomplished (all of the planned obliteration would be in summer or fall), and the cumulative effects from all activities in the BMU combined. This effect can be reduced by ensuring that the amount of disturbance in any given year is within the Forest Plan security standards. A review of likely implementation scenarios (see attached project scheduling worksheet) indicates that this is readily accomplished by annual planning, with Forest Plan security levels ranging from a low of 70.5 square miles to a high of 71.6 square miles. Although it is not possible to predict every activity likely to occur in any future year, there is adequate security available for each year to account for the likely security losses considering any of the action alternatives as well as an anticipated amount of security lost because of activities on private lands in the BMU. An annual implementation plan would be prepared to determine the maximum amount of obliteration activity possible each year prior to contracts being awarded. The roads obliterated would contribute to potential core habitat, although 30 of the 36.1 miles are undriveable at this time. Obliteration has the benefit of reducing the potential for resource damage from roads the Forest Service cannot afford to maintain, thereby making the bear unit more ecologically robust in the larger picture. Alternatives 2, 4 and 5 would obliterate 32.7 miles of road, Alternative 2 would obliterate 23.4 miles of road.

Recreational use would not be expected to change as a result of any of the alternatives. No new roads or trails are proposed to be opened, and existing roads would continue to be maintained in approximately the same condition as currently.

Direct and Indirect Effects

Alternative 1: The existing condition would remain essentially unchanged in both BMU's, with most of the annual security disturbance resulting from activities of private landowners. Potential core habitat would remain as currently, with no post-sale increase in potential core habitat, nor any increase in the 'quality' of the core habitat from roads that would be decommissioned with the action alternatives.

Alternative 2: Habitat security would be maintained above 70 square miles (square miles are essentially equal to % in Myrtle BMU) in both BMU's. Myrtle BMU would be maintained at or above

72.2% for one year of the sale, and at or above 72.1% for the last year. For the second year, the security has an option to be increased by the inclusion of winter logging (outside of the bear's active period) of the Mack Creek units. The level of security for both years has a buffer of about 2% security that would allow for some activities of CPI without reaching below minimum security levels (however, the Forest Service is not obligated to offset security losses caused by private landowners outside of its control or reasonably foreseeable planning horizon). CPI plans activities in the next 5 years that would approach the 2% buffer, depending on location (personal communication with K. McClintock, March 1, 2000). The Ball Trout BMU would also be maintained at well over the minimum security level, 85% during the year that the Myrtle drainage would be helicopter logged, and 83.6% during the year Cascade is logged. Most of the security loss is because of the impact of helicopter logging compared to road-based logging, at ½-mile versus ¼-mile zone of influence. This loss is somewhat offset by the shorter duration of the activity, typically much shorter than ground-based harvesting. Typically the activity occurs preferentially during summer for economic reasons; summer is the least critical time of the year for bears because food is widespread and mortality risk is the least of all the active seasons.

All of the Kootenai Point units are outside of the Myrtle BMU and do not contribute to a security loss in the BMU. The units are along a currently open road, and disturbance effects to any bears outside the BMU would be limited to the activities within the units during harvesting and post-harvest activities.

Core habitat has not been defined for any bear management units in the Selkirk Ecosystem. However, both Myrtle and Ball Trout BMU's contain habitat that could be designated core above the minimum levels recommended by the IGBC Access Task Force (Interim Guidelines, 1999) (61.8 and 71.5% respectively). Helicopter access would result in no net loss of core because no new roads will be created, although there would be a temporary loss of core habitat during the season that it occurs. At this time, gated roads in Myrtle BMU would be barriered to provide for a temporary increase in core habitat adequate to offset the amount lost through helicopter logging. Gated roads likely to be used for this purpose are unavailable for public access, so the public would not notice a decrease in access. Potential core was increased in the Ball Trout BMU in 1998 in the amount that would be lost temporarily by helicopter logging, so there would be no net loss of potential core habitat. Potential core at the end of the project would increase for both BMU's, and some roads that are currently eligible for core habitat would be in better condition for long-term storage. Post sale potential core would increase for Myrtle BMU to 62.0% from 61.8%. Ball Trout BMU would increase over the beginning of 1999 when a road was decommissioned, for a net increase to 72%. Both of these amounts are well over 55%.

One road would have reconstruction and a short (.25 mile) temporary road (MC17). This road is currently not driveable (thus is considered potential core habitat), but is not in an appropriate condition to remain unroaded without additional work. This road would be decommissioned, and would then be in appropriate condition to be designated as core habitat. A second road to access Unit M05 in the Mack Creek subdivision is a similar situation. The road currently is considered as core potential because it is vegetated and undriveable. It would require some additional work to make the road in its best position to be decommissioned. The road would be driveable while the unit is harvested, then decommissioned. After decommissioning, it is available to be designated as core habitat for a longer term than would be possible without the planned roadwork. A removeable bridge is planned for this road, which would also allow a second portion of the road to be

designated as core. Overall, the amount of potential core would increase by the end of the project by 0.2% from 61.8% to 62.0%, without a reduction below the 55% minimum at any time. Both of these reconstructed roads occur mostly outside of a buffer for core or Forest Plan security at this time.

Alternative 3: Habitat security would remain above 70% for both BMU's. Security would be the same for Ball Trout BMU as Alternative 2. This would be accomplished in a similar manner to Alternative 2, in that some units would be winter logged, or two years would be used to complete harvesting with security discounts in different portions of the BMU. Fewer helicopter units would require less duration of helicopter harvesting, even though the security discount would be similar to Alternative 2.

Similar effects to bears from decommissioning roads would occur as in Alternative 2, except Mack Creek Road would extend for a longer distance as a driveable road during the harvesting operation. This also has the benefit of decommissioning a longer amount of road than Alternative 2.

Alternative 4: This alternative would have effects similar to Alternative 2 but the security loss would be less because fewer units would be harvested. Because Alternative 2 has more than adequate security to allow for implementation as planned, implementing in a similar configuration as the other action alternatives would provide approximately 2-3% more security than Alternative 2. The largest portion of this would be in the Myrtle BMU. Road obliteration security losses would remain.

Alternative 5: Forest Plan security losses would be wholly attributable to the road obliteration activities. A small amount of security loss would occur in the Ball Trout BMU.

Cumulative Effects

The cumulative effects analysis conducted for habitat security for each action alternative indicates that the security level, especially combined with other BMU's in the Selkirk Ecosystem maintained at or above guidelines, would be adequate to meet grizzly bear's security needs cumulatively. Some security loss may be anticipated with the activities of private timber landowners (Crown Pacific Inland, Ltd). Anticipated harvesting by this company within the timeframe expected for operation of Myrtle Cascade would not result in less than 70% habitat security. Most, but not all, of the harvesting expected by CPI is from open roads.

Over the ecosystems designated for grizzly bear recovery, numerous road obliteration projects are being implemented, including several in the last few years on the Bonners Ferry Ranger District. These, combined with the planned obliterations for this project cumulatively have and will result in a greater security situation. Compared to the bear security present at the listing of the species, there has been a considerable amount of progress made towards reducing disturbance and mortality risk. Other factors involved in this include positive trends in control and monitoring of gates, increased security and core, reduced administrative use and reduced known mortality. Cumulatively, the outlook for bear recovery is definitely brighter than at the time it was listed under the Endangered Species Act.

No other cumulative effects to bears would be anticipated for this project.

Determination of Effect

Based on the previous rationale for maintenance of Forest Plan security standards and habitat quality, the preferred alternative ***may affect, but would not be likely to adversely affect, grizzly bears or their habitat***. The project would maintain all Forest Plan standards relative to grizzly bear direction.

Canada Lynx

Effects Common To All Alternatives

Risk Factors: The following risk factors listed in the Lynx Conservation Assessment and Strategy (LCAS) are common to all alternatives. Wildland fire management, recreation, forest roads and trails, competition and predation as influenced by human activities, land ownership pattern. Those that have the same effect in all alternatives are discussed in this section, and the remainder are listed by the alternative in which they have an effect.

Fire ecology and wildfire management has been discussed extensively in the EIS and will not be repeated here. To summarize the situation, vegetation in the Selkirks has been molded by the intensity and severity of fires over a long period of time. In this century, the pattern has been changed from one of frequent fires to fire suppression. This has resulted in increased fuel loading, a general reduction in the number of acres of lower seral stages, and an increase in the amount of middle-aged trees. These changes have been the result of several decades of conscious and effective fire suppression. The Myrtle Cascade EIS proposes to trend some of the stands back towards a historical condition in both stand structure and acreage. However, because the magnitude of the changes caused by suppression are so large, it is not possible to make significant progress towards this end with one project. The incremental changes made towards historical conditions in the fire ecology are important to lynx cumulatively over time, but are almost immeasurable for this project. Thus, the no action alternative would have similar effects in the short term as either of the action alternatives with regard to fire management on lynx habitat. In the longer term, and with continued similar projects, action alternatives would have the benefit of trending the conditions towards habitat proportions that are more likely to support lynx over the long term. See discussion below on direct and indirect effects also.

Recreation would not be measurably changed by any of the three alternatives, so the projects' effects with regards to recreation would have no effect on lynx or its habitat. None of the alternatives proposes to increase the open road miles within the LAU. None of the alternatives would produce changes in the number of groomed snowmobile trails. Some use may occur on roads used for winter harvesting for the duration of the project (i.e., a few weeks one winter). This level of use would probably be similar to previous years, in that the activity of the project for any alternative would not be likely to increase the use by its presence alone.

Competition and predation as influenced by human activities would be similar in all alternatives. All of the species that are suspected to be interference or exploitative competitors with lynx have been recorded in the vicinity of the project area (Ruggiero et al, 2000). Currently, there is winter use in

the area along the roads and in open areas that could allow access by bobcats and coyotes. None of the alternatives would be expected to change this situation appreciably, because there will be no difference in the number of open roads before and after the project.

Land ownership pattern would not change as a result of any alternative. Crown Pacific Inland owns all or portions of 7 sections in the Myrtle Cascade LAU. Many of those acres are in lower seral stages, currently providing foraging habitat. Roading access to the CPI section 13 would remain possible before and after the project.

Habitat parameters: The Myrtle Cascade LAU has far below the maximum amount of preforage (unsuitable) habitat of 30%. In fact, the existing condition is of concern because it is too low to provide for a continued amount of forage habitat in the next decades. None of the alternatives proposes to create prehabitat condition greater than 30%, but both of the action alternatives propose to create some in this class (see each alternative description below). None of the alternatives proposes to harvest more than 15 percent of lynx habitat into a preforage condition within this entry or any foreseeable entries within the next 10 years. As noted in land ownership patterns above, CPI lands contribute foraging habitat to the unit but are not represented in these figures. If all of CPI's land was both capable and in early foraging habitat, it would represent a maximum of approximately 14% of the LAU. This is an overestimate because it is neither all capable nor all in early foraging habitat, therefore even considering private land the LAU has less than the maximum amount of preforage habitat. The amount of late seral foraging habitat does not change with any alternative. Late seral stage foraging habitat is not considered to be as high quality as younger stands.

The Myrtle Cascade LAU has greater than twice the minimum amount of denning habitat (22% of capable habitat). Denning habitat is not limiting to lynx in this LAU, and based on the number of acres of habitat throughout the Bonners Ferry Ranger District, does not appear to be limiting in any LAU on the district. Generally, the typical stand on the Bonners Ferry Ranger District is in one of the middle age classes, indicating that denning habitat will not limit lynx recovery in the next several decades. None of the alternatives propose to reduce the amount of denning habitat to near the minimum amount of denning habitat recommended in the LCAS.

The Idaho Panhandle National Forests in the three northern districts have mesic, dense forests. Dense forests are particularly common after the suppression of wildfires that has occurred in the last several decades. Thus, vegetative structure for connectivity is not limiting lynx travel in almost any circumstance, including in the Myrtle Cascade LAU. None of the alternatives proposes changes to vegetative structure that would measurably reduce a lynx' ability to readily travel under forested cover from a large or small-scale topographic feature to another.

Direct and Indirect Effects

Timber management is the only risk factor differing among alternatives. This is similar to the analysis criteria regarding acres of habitat change, so it will be discussed in the same section. This section does not quantitatively address changes on private land.

No Action: No Action would continue the existing condition of stand age and structure until stands age or burn. This would convert these stands into another category of stands. This will be most

evident in the short-lived seral stages represented in the preforage and early foraging habitat age classes. The No Action alternative would result in 275 acres of stands (1% of the capable habitat in the LAU) growing into early foraging habitat from the preforage category. This would temporarily increase the amount of forage in the next two decades. In the absence of fire, or in the event of successful fire suppression, after these stands come on line for forage there would be little continued early seral stage foraging habitat. It is likely that some fires would occur in this time period, but it is unknown if adequate acreage would burn to compensate for the loss of stands growing into late successional forage. Because Myrtle Creek is a very important drainage for woodland caribou, wildfire would be aggresively suppressed to protect existing habitat.

Alternative 2: Eleven units containing lynx habitat would be treated in this alternative, of which three would alter habitat into a changed habitat category (eg., forage to preforage). Alternative 2 proposes to increase the number of acres of preforage habitat from 1.3% to 2.1%, a change of 159 acres. Within 15-20 years, this would increase the relatively small number of acres of early foraging habitat. Only 0.8% of the LAU is currently in early foraging habitat (excluding the CPI land, which contributes another several percentage points). This low amount of preforage habitat combined with the limited amount of existing forage habitat indicates that foraging habitat is likely to limit lynx ability to occupy this unit in the next few decades unless additional habitat is created soon. Alternative 2 contributes a minor amount to habitat creation, although it is a small amount and is unlikely to be adequate over time.

Unit MC24 is a large unit with varying configurations of tree distribution. Group selection in this unit would reduce the amount of late successional hare habitat if the distribution allows for openings in excess of 100 meters wide. According to field reviews and timber stand database information, the maximum amount of acreage in this entire 215 acre unit would be about 9-10 acres in an unsuitable condition if all the trees removed would result in openings greater than 100 meters. The amount of openings actually greater than 100 m across is so small as to be untrackable in the current database, which has a cutoff of 5 acres minimum size. It is likely that the maximum opening is smaller than 3 acres, and was unidentifiable on aerial photographs because of the mixed distribution of tree species. However, US Fish and Wildlife Service has requested that this area be considered unsuitable for purposes of lynx habitat (i.e., in preforage condition immediately after harvesting), so it is considered here as unsuitable but will not be recorded in our database because it is too small to be identified or tracked. It is probable that the next project in this area will have greater tracking precision and this amount could then be identified and tracked if necessary.

Denning habitat would be reduced by 100 acres, or 2.2% of the LAU. This loss of denning habitat would be offset by an increase in the more limiting preforage habitat. Denning habitat is not limiting in this LAU or on the district as a whole.

Alternative 3: Seventeen units containing lynx habitat would be treated in this alternative; 4 of these units would have habitat altered sufficiently to recategorize them. Similar effects as alternative 2 would occur in alternative 3, except the number of acres vary. Preforage habitat would increase by 116 acres, which is a long-term benefit to foraging habitat, at the expense of denning habitat. Because denning habitat is not expected to be limiting in the short or long term, a loss in this functional type of habitat to increase an increasingly limited foraging habitat would be positive over the long term.

Alternative 4: This alternative would be similar to Alternative 2 except that fewer units would be harvested. Of those, three units contain denning habitat (M02, M05, and MC22) that would not be harvested for a total of 137 acres of denning harvested instead of 237 acres harvested in Alternative 2. This results in a reduced amount of habitat changing to preforage unsuitable condition in the short term, and a reduction in foraging habitat in the mid-term. Because denning habitat is not apparently limiting in this LAU, the retention of denning habitat is less of a benefit in the long-term than the loss of the future foraging habitat in the mid-term.

Alternative 5: This alternative would not change any vegetation because it intends to only deal with road treatment issues. These roads are mostly undriveable currently, so the effects to lynx would be the same as under current conditions except for the short term implementation phase. Otherwise, the effects of this alternative would be the same as the no-action alternative.

Cumulative Effects

The loss of denning habitat and creation of foraging habitat would not limit lynx over the entire ranger district. On a mid-scale analysis of district-wide habitat there is more than minimum denning habitat available (15.5% of capable habitat on the district) and less than desirable preforaging (3.6%) and early foraging (3.8%) habitat. A high number of acres of mid-seral stage stands indicates that long-term denning will not be limiting in the short or long-term.

Each alternative contributes to the cumulative effect of future foraging habitat in differing amounts. It is obvious in the absence of a large stand replacing fire in this LAU, that there will be a serious lack of foraging habitat in proportion to the amount harvested. The no action alternative has the greatest predictable lack of foraging habitat, and Alternatives 2 and 4 have the least predictable loss over time.

Determination of Effect

Based on the previous analysis of risk factors, particularly timber management, and habitat quantities, the Myrtle Cascade project is not likely to adversely affect lynx or their habitat.

Summary of Cumulative Effects for the Myrtle-Cascade Project

Table 5: Determination of Effects Summary, Bonners Ferry Ranger District, Analysis Area Scale.

Species	Alt. 2	Alt. 3
Endangered		
Gray Wolf	NLAA	NLAA
Woodland Caribou	NLAA	NLAA
Threatened		
Bald Eagle	NLAA	NLAA
Grizzly Bear	NLAA	NLAA
Lynx	NLAA	NLAA

NE= No effect
NLAA= Not likely to adversely affect

Conservation Requirements

The following conservation requirements are mandatory for the determination of Not Likely to Adversely Effect for the species analyzed in this Biological Assessment.

Gray Wolf: None

Woodland Caribou: None

Bald Eagle: None.

Grizzly Bear:

1) Barrier reconstructed roads with an earthen berm and a brush pile in front of it to conceal entry.
2) Post-sale administrative use would comply with administrative guidelines in effect at the time of the treatments.
3) Barrier an equivalent amount of currently gated roads to offset temporary potential core loss from annual timber harvesting operations. This would equate to 0.9% core in the year Cascade Creek is helicopter logged, and 0.5% in the year Myrtle Creek is helicopter logged. One potential road to accomplish this might be FS 1309 in the vicinity of Unit M19. Other roads are also available. Enough roads were decommissioned in the Ball-Trout BMU prior to the onset of this project to compensate for any losses in core habitat because of helicopter operations, consequently, no further road closures will be needed in this BMU.
4) Schedule the road obliteration in phases such that no portion of the implementation phase would exceed Forest Plan standards for security. Schedule must be worked out annually prior to awarding contract for work for that season.
5) This Biological Assessment will no longer be current 5 years from the date of concurrence with US Fish and Wildlife Service. Except for post-sale activities, which typically are either consulted on annually or fall under previously agreed consultation guidelines, activities must be completed prior to this date.

Lynx: None

_____

SANDRA L. JACOBSON
District Wildlife Biologist

Literature Cited

Allen, L. 1996 Coeur d'Alene Salamander habitat suitability/capability index. Bonners Ferry Ranger District. unpublished.

L. Allen, draft, 1998

Allen, L. Woodland Caribou Habitat Suitability Index Model. Unpublished. 1999

J. Almack, pers. comm. 1997

Apps, C. D. 1999. Space-use, diet, demographics and topographic associations of lynx in the southern Canadian Rocky Mountains: a study. Pp. 351-372 *in* Ruggerio, L. F., K. B. Aubrey, S. W. Buskirk, G. M. Koehler, C. W. Krebs, K. S. McKelvey, and J. R. Squires (eds.) Ecology and conservation of lynx in the United States. RMRS-GTR-30. Ft. Collins, CO. USDAFS Rocky Mountain Research Station.

Crenshaw, J. G. 1987. Effects of the Cabinet Gorge Kokanee Hatchery on wintering bald eagles in the lower Clark Fork River and Lake Pend Oreille, Idaho. U.S. Department of Energy, Bonneville Power Administration, Portland, OR. 82 p.

J. Fontaine, pers. comm. With Sandra Jacobson, 1995

D.Gunter, pers. comm. With Sandra Jacobson, Aug 1998

Harvey et al 1994

Jageman, H. 1984. White-tailed deer habitat management guidelines. Forest, Wildlife, and Range Experiment Station, University of Idaho, Moscow, Idaho. 14 p.

G. Johnson, pers. comm. With Sandra Jacobson, 1997

Koehler, Gary M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology 68(5):845-851.

Koehler, G. M. and K. B. Aubrey. 1994. Lynx. p 74-98 *in* Ruggiero, L. F.; K. B. Aubrey, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski. Scientific Basis for Conservating Forest Carnivores in the Western United States: American Marten, Fisher, Lynx and Wolverine. USDA Forest Service, Rocky Mountain Forest and Range Exp. St. Gen Tech. Report RM-254. 184 p.

Layser, E. F. 1978. Grizzly bears in the southern Selkirk Mountains. Northwest Science. Vol (52) pp. 71-91.

K. McClintock, pers. comm. with Sandra Jacobson, March 1, 2000

McKelvey, K. S., Y. K. Ortega, G. M. Koehler, K. B. Aubrey, and J. D. Brittel. 1999. Canada lynx habitat and topographic use patterns in north central Washington: a reanalysis. Pp. 351-372 *in*

Ruggerio, L. F., K. B. Aubrey, S. W. Buskirk, G. M. Koehler, C. W. Krebs, K. S. McKelvey, and J. R. Squires (eds.) Ecology and conservation of lynx in the United States. RMRS-GTR-30. Ft. Collins, CO. USDAFS Rocky Mountain Research Station.

Montana Bald Eagle Working Group. 1991. Habitat management guide for bald eagles in northwestern Montana. 29 p.

L. Napier, pers. comm. With Sandra Jacobson, 1992 for Snow Creek EA

Nussbaum, Ronald A., Edmund D. Brodie Jr., and Robert M. Storm. 1983. Amphibians and reptiles of the Pacific Northwest. University of Idaho Press, Moscow, ID.

Pauley, G. 1990. Habitat use, food habits, home range, and seasonal migration for white-tailed deer in the Priest River Drainage, Northern Idaho. M.S. Thesis, University of Idaho, Moscow. 153 p.

Pfingsten, B. 1983. Evaluating wild ungulate habitat: use of forage quality as a relative index. Western Wildlands. 9: 24-27 p.

pers. comm. with S. Robinson, BLM wildlife biologist, to S. Jacobson, April 14, 1999

Ruggerio, L. F., K. B. Aubrey, S. W. Buskirk, G. M. Koehler, C. W. Krebs, K. S. McKelvey, and J. R. Squires (eds.) Ecology and conservation of lynx in the United States. RMRS-GTR-30. Ft. Collins, CO. USDAFS Rocky Mountain Research Station.

Tucker, P. A., D. L. Davis, and R. R. Ream. 1990. Wolves: Identification, documentation, population monitoring and conservation considerations. Northern Rockies Natural Resource Center of the National Wildlife Federation, Missoula, MT.

USDA Forest Service. 1992. Interim management recommendations: Sensitive species. Bill Ruediger: Region 1 TES Species Program Manager. USDA Forest Service, Missoula, MT.

USDI Fish and Wildlife Service. 1987. Northern Rocky Mountain wolf recovery plan. Denver, CO. 119 pp.

USDI Fish and Wildlife Service. 1993. Selkirk Mountain Woodland Caribou Recovery Plan. Portland, OR. 59p.

USDI Fish and Wildlife Service. 1993. Grizzly Bear Recovery Plan. Missoula, MT. 181p.

USDI Fish and Wildlife Service. 1994. Selkirk Mountain Woodland Caribou Recovery Plan. Portland, OR. 63 p.

Interim Guidelines, IGBC Access Task Force Interim Guidelines, 1999

USDA-USDI 1996

Volson, David P. 1994. Habitat Use of a Grizzly Bear (*Ursus arctos*) Population in the Selkirk Mountains of Northern Idaho and Southern British Columbia. Thesis, University of Idaho, Moscow, ID. 106 pp.

W.Wakkinen, pers. comm. 1997

W. Wakkinen's 1999 census

Wakkinen, 1992

Wielgus, Bunnell, Wakkinen, and Zager. 1994. Population dynamics of Selkirk Mountain grizzly bears. Journal of Wildlife Management.

Zack et al, Fire Risk Assessment on the Idaho Panhandle National Forests, 1998

Fisheries Biological Assessment (BA)

Introduction

The U. S. Fish and Wildlife Service (USFWS) lists two fish species that occur, potentially occur, and/or habitat exists within the Kaniksu portion of the Idaho Panhandle National Forests as endangered or threatened under the Endangered Species Act (ESA) of 1973 (Biannual Forest Wide Species List: FWS 1-9-99-SP-483; October 28, 1999). The Kootenai River population of the white sturgeon (*Acipenser transmontanus*) is listed as "endangered" (Federal Register, Volume 59, No. 171, September 6, 1994) and the Columbia River Distinct Population Segment of bull trout (*Salvelinus confluentus*) is listed as "threatened" (Federal Register, Volume 63, No. 111, June 10, 1998). Four additional fish species are listed as "species of concern" by USFWS and as "sensitive" by the Regional Forester.

The purpose of this document is to analyze the effects of the proposed project, described below, on the six fish species. It was prepared in accordance with Section 7(c) of ESA, and manual direction to review all Forest Service activities to ensure that such activities do not contribute to a downward trend in population numbers or density of sensitive species and/or a downward trend in habitat capability, either of which might ultimately result in the need for federal listing (FSM 2672.1 and 2672.4).

Summary of Activity

Approximately 1818 acres are proposed for treatment under this alternative. The proposed harvest treatments will include: regeneration cuts (75.8%), partial cuts (12.4%) and removal cuts (11.8%). The focus of these prescriptions will be three-fold, encompassing three areas for treatment:

- Area 1: Dry forest types where ponderosa pine and western larch are being overcrowded by Douglas-fir and grand fir. Treatments would be designed to favor the development of large, open grown stands of ponderosa pine and western larch.

- Area 2: Mixed conifer and subalpine forests of very similar size and age. Also, western white pine is gradually dying out because of white pine blister rust. Treatments would be designed to improve the size and age diversity of these forests and re-establish western white pine as a primary component.

- Area 3: This area contains high percentages of overmature lodgepole pine at high-risk to mountain pine beetle infestation. Treating these stands prior to a beetle epidemic would significantly reduce fuel loadings and therefore reduce the risk of severe fires in these forest types.

Treatment Type	Alt 2
Regeneration Cuts	
Irregular Shelterwood (even-aged)	441
Group Selection (uneven-aged)	937
Total	1378
Partial Cuts	
Commercial Thin/Sanitation Salvage	151
Commercial Thin	74
Total	225
Removal Cuts	
Partial Overstory Removal	215
Total Acres Harvested	1818
Logging System	
Ground-based	767
Skyline	354
Helicopter	741
Fuels Treatment	
Underburn	895
Grapple Pile	483
Lop and scatter	440
Total Acres Treated	1818
Transportation Miles	
New Construction	0.2
Reconstruction	32.7
Obliterated	36.1

No harvest will take place within Riparian Habitat Conservation Areas (RHCAs). A short (≤ 0.2 miles) temporary road is planned for construction, it will not be located within any known RHCA in the project area and is planned for obliteration when harvest is complete. Activities within RHCAs are limited to those that are expected to benefit fish habitat and watershed health; specifically, replacement of high risk culverts at stream crossings (Myrtle Drainage: White Pine, Yellow Pine, Adverse, Mack, and Jim Creeks; Clark, Lost and Cascade Creeks) and other improvements on existing roads within the project area (graded rolling dips, additional relief pipes, and spot graveling).

Location: Harvest units are located in five tributaries to the Kootenai River system: Clark, Lost, Cascade, Myrtle and Snow Creek drainages (see attached maps). Fish-bearing streams in the project area include Cascade and Myrtle Creek (Kootenai River drainages) and Snow Creek (Deep Creek drainage).

Duration: Variable dependent on weather and other unforeseen factors, but should be approximately four months for timber harvest in each summer and winter; and harvest unit burning would occur within the necessary windows of opportunity in early spring and late fall. Road reconstruction, obliteration and new construction would occur from July 15th – September 15th to avoid critical spawning and rearing times for bull trout.

Time period: The time period for the completion of activities as listed in the Myrtle-Cascade EIS, which would be approximately five to eight years.

Prefield/Field Review

Prefield information was utilized from district fish/hydrology files, stream inventories, field reviews, historical records, aerial photographs, analysis of watershed conditions, published scientific literature, discussions with Fisheries Biologists and electrofishing/stocking data from the Idaho Department of Fish and Game (IDF&G), the United States Fish and Wildlife Service (USFWS), electrofishing data from the Idaho Division of Environmental Quality (DEQ) and comprehensive knowledge of the fisheries resources in the Kootenai River Basin. Descriptions are limited to historic natural (i.e., wildfire) and human-caused (i.e., timber harvest and roading) disturbances, overall conditions, and habitat connectivity (migration barriers).

Several roads and streams were reviewed in the field by Dale Deiter (hydrology) and myself (fisheries) during the 1998 and 1999 field season. In addition, a field crew in 1998 electrofished Myrtle, Peak and Jim Creeks in the same locations surveyed in 1994. Also, Forest Service personnel conducted stream surveys in Myrtle Creek and its tributaries and Cascade, Lost and Clark Creeks in 1992 and 1993.

Existing Habitat Condition:

The following are general descriptions of the watersheds within the analysis area. Detailed descriptions of existing conditions of bull trout populations and habitat conditions for Myrtle, Cascade, Lost and Clark Creeks are part of the project file (Watershed and Fisheries Report – Bull Trout Matrices). No known bull trout populations exist, either historic or current in the tributary watersheds for Myrtle Creek above the falls, therefore no matrices were completed for these areas. Snow Creek and Burton Creek both have minor amounts of proposed activities, which would create site affects, but would not result in cumulative impacts. The projects in Snow and Burton Creek are on non-sensitive landtypes and would reduce the potential for interception, concentration, and re-routing of water and would reduce delivery of erosion off site into streams and tributaries for each watershed. As a result, no matrices were completed for Burton and Snow Creeks.

Clark Creek (Kootenai River): Clark Creek is a high-gradient stream with many small pools that does not support a fisheries, but may historically have had bull trout spawning and rearing in the lower basin. Access during low flows (e.g. late summer) at its confluence with the Kootenai River and several waterfalls (13-17 meters), approximately 0.35 km upstream of Westside Road crossing are migration barriers. Habitat in the headwaters is steep and relatively shallow and likely does not support fish. Past logging and roading activities have removed woody debris from the riparian and contributed to increase sediment into the stream.

Lost Creek (Kootenai River): Similar to most small Kootenai River drainages, Lost Creek is a high-gradient stream with many step pools, cascade and waterfall habitat, but may have had historic bull trout spawning and rearing in the lowermost portion of the basin. Headwater reaches are mainly groundwater–fed, having many small springs with relatively shallow depths and lack of supporting fish habitat; mid- and low elevation reach characteristics are composed of debris jams,

step pools, waterfalls and cascade habitat types. Past logging and roading activities have removed woody debris from the riparian area and contributed to increased sediment into the stream. Road densities are high because of the size of the drainage and pose a risk to instream sedimentation if road fills fail, which can cause habitat degradation.

Cascade Creek (Kootenai River): Past logging and roading continue to affect this watershed as may be evident by the relatively high embeddedness (mean = 41.5%) and fines/sand within pool habitat. Cascade is a small creek that has multiple migration barriers, these include: 1) An improperly placed culvert at the confluence with Myrtle Creek (refuge); 2) An old weir/flow diversion device below the West Side road crossing; 3) The culvert crossing for the West Side Road; 4) And lastly a series of cascade/falls upstream of the West Side road crossing, which one falls is $\geq$ 13 meters high.

Myrtle Creek (Kootenai River): A multiple series of steep cascade/falls and a large barrier falls, approximately 120' high and 300-500 feet in length, and located approximately four miles upstream of the WestSide road crossing. Past logging and roading continue to affect this watershed as may be evident by the relatively high substrate embeddedness (mean = 52.0%; range 16-84%), however, Myrtle Creek has relatively high pool/riffle ratios (4:1 overall). Road density in the Myrtle Creek watershed area is 2.4-mi./ sq. mi.; a majority of these are roads/skid trails located at mid-elevation and headwater locations. Resident forms of bull trout appear to be absent in the Myrtle Creek watershed and fluvial forms are perilously low, but habitat connectivity remains available. Historical levee construction and channelization of Myrtle Creek for refuge purposes has altered stream dynamics and potential spawning and rearing habitat, which have changed bed load movement and sediment depositional areas. Also, bull trout habitat in this lower valley reach is influenced by Kootenai River level and temperature fluctuations. Re-establishment of healthy bull trout populations in Lower Myrtle Creek watershed is unlikely for two reasons: 1) brook trout are present through-out the system, having the potential to out-compete bull trout for limited food and rearing and spawning habitat; and 2) the Kootenai River populations remain perilously low.

Jim, Peak and Cooks Creeks: These streams are tributaries to Myrtle Creek and do not support bull trout since they exist above the large barrier falls. However, they are in the cumulative affects area for the project and are the only known tributaries in the Myrtle Creek watershed that support fisheries. All of these have known eastern brook trout inhabitance and may contain slimy sculpin.

Snow Creek (Deep Creek): Past logging and road building have led to some habitat degradation in Snow Creek. Sediment levels are excessive and pool filling is occurring in all pool types. Table 3-2 illustrates a summary of the fish distribution in Snow Creek. Fish migration into the Snow Creek drainage is blocked by a waterfall, 0.8 km upstream from the Deep Creek confluence.

Analysis of Effects

Species	Habitat Present	Habitat Absent	Species Present	Species Absent
White sturgeon *Acipenser transmontanus*		X		X
Bull trout *Salvelinus confluentus*	X		X	
Burbot *Lota lota*	X			X
Interior redband trout *Oncorhynchus mykiss gairdneri*	X			X
Westslope cutthroat trout *Oncorhynchus clarki lewisi*	X		X	
Torrent sculpin *Cottus rhotheus*	X		X	

Further explanations for above table:

- White sturgeon are found only in the main Kootenai River, outside of the cumulative effects areas for this project;
- Bull trout are known to occur in lower Snow and Myrtle Creeks, below the falls barriers. Telemetry work on bull trout in the Kootenai River in 1999 by the IDF&G, found a 6-pound female bull trout overwintering in lower Myrtle Creek (C. Downs, personal communication). On all streams within the analysis area there are falls barriers that are complete migration barriers to all fishes migrating upstream from the Kootenai River;
- Burbot historically spawned in lower Snow Creek, but are not currently occupying habitat within the cumulative effects area (V. Paragamian, IDF&G, personal communication);
- Genetic studies on rainbow trout inhabiting Myrtle Creek (above the falls barrier) were determined to be of the coastal form, which is consequently introduced. Also, interior redband trout inhabit some tributaries to the Kootenai River, but are not known to occur in any of the fish-bearing streams within the cumulative effects area;
- Westslope cutthroat trout inhabit Cascade and Snow Creeks within the cumulative effects area;
- Torrent sculpin inhabit the Kootenai River Basin; however, data on distribution by stream is limited. This species primarily inhabits larger streams (Scott and Crossman 1973; Markle et al. 1996). In 1994, "BURP" (Beneficial Use Reconnaissance Process) studies by DEQ (Idaho State Division of Environmental Quality) identified torrent sculpin below the falls barrier in Myrtle Creek. It is unknown whether they inhabit any of the remaining fish-bearing streams potentially affected by this project.

Determination of Effects and Rationale

In this project, Standard Widths Defining Riparian Habitat Conservation Areas (RHCAs) as outlined in the Inland Native Fish Strategy (INFISH 1995; Appendix D) will be applied. No harvest will take place in riparian areas. As a result, there will be no loss of riparian trees. Ground-disturbing activities within the RHCA are limited to those that are expected to benefit fish resources and watershed health (e.g. road obliteration, culvert-fish barrier replacement or removal).

Direct/Indirect Effects (General):

Timber Harvesting:

All harvest units are located outside of RHCA's. No direct or indirect effects are expected from harvest because of the distance between the activity and the riparian. There may be localized increases in water yield at harvest sites; however, these will not lead to changes in channel flow.

Road Construction/Landing Construction:

The temporary road (approximately 0.2 miles in length) will be constructed as an outsloped road that follows the natural terrain. Following its use, the purchaser will completely obliterate this road by restoring natural slope contours. No roads or landings will be located in RHCAs (Chapter 4 – "Direct and Indirect Effects Common to All Alternatives—Road Construction"); therefore no direct or indirect effects are expected from road or landing construction.

Watershed Restoration Activities:

The proposed road reconstruction and obliteration activities are displayed on Figure 3.1. Ground-disturbing activities in the RHCA are restricted to watershed restoration and may include the following (not all of these activities will occur in RHCA's):

Obliteration includes removal and recontour of all stream crossings and, as needed, recontour of unstable fill slopes, cutslope stabilization, ripping the road tread, installation of no-maintenance cross ditches, and revegetation. Obliteration also includes some kind of road closure method such as an earthen berm.

Road reconstruction and maintenance will be a critical part of both alternatives in order to comply with BMP's and the Forest Plan related to road maintenance and water quality protection. However, none of this work is mitigation for the proposed activities. The reconstruction will include increasing pipe sizes or changing design on many of the stream crossings (to safely pass 100 year flood discharges), installation of additional relief culverts (to more frequently cross drain the road), bypass dips to prevent streamflow from traveling down road prisms and ditchlines, gabion or bin walls (to stabilize road cutslopes), spot gravelling (to reduce surface erosion - especially near stream crossings), installing graded rolling dips, drivable dips, or drivable waterbars (to cross drain surface water), brushing, blading, shaping, ditch cleaning (to maintain drainage).

Direct and indirect effects from watershed restoration activities include short-term increases in sediment delivery to streams during culvert and encroaching road removals, and culvert

upgrades. However, there will also be an immediate reduction in risk of sediment delivery from crossing failures. In the Myrtle Creek watershed culvert upgrades or removals will allow fish migration to habitat that is currently inaccessible.

Prescribed Burning for Fuel Reduction:

On the south facing dry site units, the prescribed burns would only be done in the spring when fuel and soil moisture would not result in a severe burn that could produce hydrophobic soils or eliminate the soil duff layer. Higher elevation snow could also be used for control lines. Firelines would be frequently waterbarred to prevent erosion. The proposed burns are located on slopes with a low potential for sediment production and delivery with the use of riparian buffers (INFISH 1995) on prescribed burn units. Direct and indirect effects from prescribed burning activities include a low potential that sediment from firelines, released nutrients, or water foaming agents (if used outside of Myrtle Creek) would be delivered to streams and tributaries. There will also be an immediate reduction in risk of severe fire from this type of fuel reduction activity.

Mechanical Slash Disposal and Site Preparation:

Proposed units for grapple piling would be accessed from existing roads, skid trails, and firelines below or within the proposed units. Only areas that could be reasonably accessed would be treated. Erosion from these treatments is not anticipated. The proposed grapple piles are located on slopes with a low potential for sediment production and delivery with the use of riparian buffers (INFISH 1995) on grapple pile units. Direct and indirect effects from prescribed burning activities include a low potential that sediment from grapple piles, firelines, released nutrients, or water foaming agents (if used outside of Myrtle Creek) would be delivered to streams and tributaries. There will also be an immediate reduction in risk of severe fire from this type of fuel reduction activity.

Reforestation, Reinforcement and Riparian Planting:

Planting would be done by hand crews and would be accessed from existing system roads. This activity would reduce the amount of time needed for vegetative and hydrologic recovery following regeneration harvesting, which would reduce potential for sediment production and delivery. There would be no direct or indirect effects to fisheries or other cold water biota from this activity.

Noxious Weed Control:

Implementation of this project is dependent on funding that is not certain. Most of the noxious weed controls used in Myrtle Creek have been biological. However, herbicides have been used sparingly and judiciously in Myrtle Creek on noxious weeds in accordance with the requirements of the Bonners Ferry Noxious Weed EIS. Monitoring of water quality by the City of Bonners Ferry has not detected herbicide contaminants from this low level use in the past. There would be direct or indirect effects from noxious weed control during the use of spray chemicals using the prescribed INFISH (1995) buffers for activities within RHCAs in the project area. This activity is not expected to add to sediment production and delivery.

Cumulative Effects

Federal Actions: In consideration of potential influences from direct and indirect effects associated with the proposed project, the cumulative effects are not expected to change the existing condition or trend for fisheries resources in the cumulative effects areas. Cumulatively, this analysis indicates that threatened and sensitive fish are not anticipated to be adversely affected by the project activities analyzed in this document, and long-term benefits if the proposed activity were to occur.

Private Actions: Some level of harvest and road construction could reasonably be expected on private lands. The magnitude of this activity is unknown.

Direct/Indirect/Cumulative Effects to Population and Stream Habitat Components are found in the in the project file (Watershed and Fisheries Report – Bull Trout Matrices). No matrices were completed for Snow and Burton Creeks, both have minor amounts of proposed activities, which would create site affects, but would not result in cumulative impacts. The projects in Snow and Burton Creeks are on non-sensitive landtypes and would reduce the potential for interception, concentration, and re-routing of water and would reduce delivery of erosion off site. As a result, Burton and Snow Creeks are not analyzed in detail.

Effects on Species

White sturgeon: This project will have ***no effect*** on white sturgeon because there is no habitat within the effects areas.

Bull trout: This project ***may affect, but will not likely adversely affect*** bull trout or their habitat.

Burbot: This project will have ***no effect*** on burbot or their habitat. Burbot do not currently inhabit any of the streams within the effects areas.

Interior redband trout: This project will have ***no effect*** on interior redband trout or their habitat. Interior redband trout inhabit none of the streams potentially affected by this project.

Westslope cutthroat trout: Aspects of this project in the short term ***may affect individuals, but will not lead toward a trend to federal listing of westslope cutthroat trout***.

Torrent sculpin: Aspects of this project in the ***short term may affect individuals, but will not lead toward a trend to federal listing of torrent sculpin***, if they are present in streams potentially affected by this project.

Conditions, Mandatory Conservation Requirements and Recommendations

The Conditions of this Biological Assessment must be met to preserve the determination stated in this document unless otherwise agreed and documented by the appropriate personnel. The Conditions are also listed within the Final EIS (Chapter 4) under “Required Design Criteria for all Action Alternatives” within the documentation of the Final EIS. The Mandatory Conservation Requirements are as listed in the BMPs within the project file; the Standards and Guidelines of the

Forest Plan and INFISH, located in Appendix D and re-emphasized here. Finally, the Watershed and Fisheries Recommendations are located within the text of Chapter 2 of the Final EIS. Major points are listed here and are as follows:

1. Road Activities:

    - Road activities will be accomplished using the design criteria as established in Chapter 4 – "Road Construction, Reconstruction, Maintenance and Obliteration";
    - No road construction within RHCAs (INFISH);
    - Activities within RHCAs must be beneficial to aquatic resources (e.g. culvert fish barrier replacement/removal);

2. BMPs (Best Management Practices):

    - BMPs for watershed resources will be adhered to (see the Watershed-Fisheries Report – Appendix B).

3. Timing:

    - Replacement of culverts, road obliteration, and/or reconstruction will take place after July 1st to reduce risk of effects from sediment during spring runoff; and will be completed prior to September 15th in tributaries to bull trout streams to avoid critical spawning periods.

Recommendations of this Biological Assessment include fisheries enhancement opportunities that were identified during the assessment of the cumulative effects area. These opportunities do not need to be implemented to preserve the determination stated in this document.

Literature Cited

Bonners Ferry Noxious Weed Environmental Impact Statement. 1996. Noxious Weed Management Projects. United States Department of Agriculture, Bonners Ferry Ranger District, Bonners Ferry, Idaho.

Downs, Chris. Personnel Communication. Idaho Department of Fish and Game.

Markle, D.F., D.L. Hill Jr., and C.E. Bond. 1996. Sculpin identification workshop and working guide to freshwater sculpins of Oregon and adjacent areas. Revision 1.1. Department of Fisheries and Wildlife. Oregon State University, Corvallis.

Paragamian, Vaughn. Personnel Communication. Idaho Department of Fish and Game.

Rosgen, D. L. 1996. Applied River Morphology. Wildland Hydrology Books. Pagosa Springs, CA.

Scott, W. B. and E. J. Crossman. 1973. Freshwater Fishes of Canada. Fisheries Research Board of Canada, Ottawa. Pages 837-838.

U.S.D.A., Forest Service. 1989. Caring for the natural community: Region 1 - Threatened, Endangered and Sensitive Species Program. U.S.D.A. Forest Service, Northern Region.

U.S.D.A. Forest Service. 1995. Inland Native Fish Strategy Environmental Assessment Decision Notice and Finding of No Significant Impacts.

List of Preparers

Prepared by:_____ Date:_____

Matthew A. Davis
North Zone Fisheries Biologist

Reviewed by:_____ Date:_____

Shanda Fallau Dekome
North Zone Fisheries Biologist

Plants Biological Assessment (BA)

I. Introduction

The purpose of this assessment is to evaluate and describe potential effects of Alternative 2 (the preferred alternative) of the Myrtle Cascade Timber Sale Project on threatened or endangered plant species, and to determine whether any such species or habitat is likely to be affected by the proposed action. This assessment was prepared in accordance with USDA Forest Service policy (FSM 2672.4).

On October 28, 1999 the US Fish and Wildlife Service provided the Idaho Panhandle National Forests (IPNF) with a listing of species (FWS 1-9-99-SP-483) which may be present in the Bonners Ferry Ranger District. The threatened species **water howellia** (*Howellia aquatilis* A. Gray) and **Ute ladies'-tresses** (*Spiranthes diluvialis* Sheviak) are suspected to occur in the district. **Spalding's catchfly** (*Silene spaldingii* Wats.) was proposed for listing as threatened in December of 1999. The extent of suitable habitat for this species in extreme north Idaho is unknown. No endangered or proposed Endangered plant species are known or suspected to occur within the district.

II. Proposed Action

Approximately 1,818 acres are proposed for treatment under this alternative. The proposed harvest treatments will include: regeneration cuts (75.8%), partial cuts (12.4%) and removal cuts (11.8%). The focus of these prescriptions will be three-fold, encompassing three areas for treatment:

- Area 1: Dry forest types where ponderosa pine and western larch are being overcrowded by Douglas-fir and grand fir. Treatments would be designed to favor the development of large, open grown stands of ponderosa pine and western larch.

- Area 2: Mixed conifer and subalpine forests of very similar size and age. Also, western white pine is gradually dying out because of white pine blister rust. Treatments would be designed to improve the size and age diversity of these forests and re-establish western white pine as a primary component.

- Area 3: This area contains high percentages of overmature lodgepole pine at high-risk to mountain pine beetle infestation. Treating these stands prior to a beetle epidemic would significantly reduce fuel loadings and therefore reduce the risk of severe fires in these forest types.

Numbers don't match with fish section

Treatment Type	Alt 2
Regeneration Cuts	
Irregular Shelterwood (even-aged)	441
Group Selection (uneven-aged)	937
Total	1378
Partial Cuts	
Commercial Thin/Sanitation Salvage	151
Commercial Thin	74
Total	225
Removal Cuts	
Partial Overstory Removal	215
Total Acres Harvested	1818
Logging System	
Ground-based	767
Skyline	354
Helicopter	741
Fuels Treatment	
Underburn	895
Grapple Pile	483
Lop and scatter	440
Total Acres Treated	1818
Transportation Miles	
New Construction	0.2
Reconstruction	32.7
Obliterated	36.1

No harvest will take place within Riparian Habitat Conservation Areas (RHCAs). A short (≤ 0.2 miles) temporary road is planned for construction, it will not be located within any known RHCA in the project area and is planned for obliteration when harvest is complete. Activities within RHCAs are limited to those that are expected to benefit fish habitat and watershed health; specifically, replacement of high risk culverts at stream crossings (Myrtle Drainage: White Pine, Yellow Pine, Adverse, Mack, and other unnamed tributaries; Clark, Lost and Cascade Creeks; and some smaller drainage crossings in Snow Creek) and other improvements on existing roads within the project area (graded rolling dips, additional relief pipes, and spot graveling).

Location: Harvest units are located in five tributaries to the Kootenai River system: Clark, Lost, Cascade, Myrtle and Snow Creek drainages (see attached maps). Fish-bearing streams in the project area include Cascade and Myrtle Creek (Kootenai River drainages) and Snow Creek (Deep Creek drainage).

Duration: Variable dependent on weather and other unforeseen factors, but should be approximately three months for harvest in summer and winter; and burning would occur within the necessary windows of opportunity in early spring and late fall.

Time period: Over the length necessary for harvest, these activities will occur from June 15th – September 15th and December 15th - March 15th.

III. Listed Threatened Plant Species

Water howellia - a member of the family Campanulaceae, is suspected to occur in the Priest River subbasin Ecosystem. According to the Conservation Strategy for *Howellia aquatilis* - Flathead National Forest (USDA 1994), there are currently 110 known occurrences of the species; most occurrences are in Montana and Washington, with only one known occurrence in Idaho.

Water howellia is an annual aquatic species restricted to small pothole ponds or the quiet water of abandoned river oxbows. It occurs at elevations from 10 feet in Washington to 4,420 feet in Montana. The species reproduces only by seed; germination occurs in October, presuming the plant's habitat has dried sufficiently to expose the seeds to oxygen. Because of this restrictive habitat requirement, population numbers in a given year are directly influenced by the extent of pond drawdown at the end of the previous growing season (USDA 1994).

Potentially suitable habitat for water howellia may occur outside of the Decision area in shallow ponds and in old oxbows along the Kootenai River. Any suitable habitat likely occurs on lands in the ecosystem under other ownership. An 1892 sighting approximately 60 miles south of the Decision Area has not been relocated and is presumed to have been extirpated (Shelly and Moseley 1988).

There is no proposed treatment within or adjacent to potentially suitable habitat for water howellia.

Ute ladies'-tresses - a member of the plant family Orchidaceae, is a Great Basin species. In north Idaho, the steppe zone of the Palouse Prairie, Rathdrum Prairie and canyon grasslands are considered potentially suitable habitat (Moseley 1998). Montane coniferous forest, subalpine coniferous forest and alpine zones are not likely places to find Ute ladies'-tresses (Moseley 1998). Its habitat in the Priest, Pend Oreille and Kootenai River subbasins is considered restricted to low-elevation, low-gradient streams and rivers and open, broad alluvial valleys dominated by mixed conifer/cottonwood, shrub and wet meadow grass and forb communities (Mousseaux 1998). Most such habitat in the Kootenai River ecosystem is under private or other ownership.

Although lower elevation riparian habitats within the Decision area may possess some geophysical characteristics considered to represent high potential habitat for the species, these habitats are generally characterized by cold, moist boreal plant communities, which have low potential to support the species. In addition, as elevation within the Decision area increases, most streams generally become moderate- to high-gradient. They are conifer-dominated, with narrow riparian influence and abrupt transition from riparian to upland plant communities. Such conditions generally hold low potential to support Ute ladies'-tresses (Mousseaux 1998).

Ute ladies'-tresses, a perennial terrestrial species, is currently known from Colorado, Idaho, Montana, Nebraska, Utah, Washington and Wyoming; total population for the species is approximately 25,000 to 30,000 individuals (Mousseaux 1998).

There are no proposed harvest or project-related activities in or adjacent to potentially suitable habitat for Ute ladies'-tresses.

IV. Proposed Threatened Plant Species

Spalding's catchfly - a member of the family Caryophyllaceae, is suspected to occur in the IPNF. Its habitat is in dry grassland habitats and grassland inclusions in ponderosa pine and Douglas-fir forest. Suitable habitat for this species is typically dominated by fescues (*Festuca* species) and other bunchgrasses, but also has a high density of forbs. Soil types on which it has been found include loam, silty loam, granitic, loamy basaltic and loess (USDI 2000). Soils in its habitat are characterized as deep to moderately deep.

Spalding's catchfly is a long-lived perennial species, which reproduces only by seed (Lichthardt 1997). Individual plants often exhibit long periods of dormancy (one to three years), and may even experience dormancy within a growing season (Lesica 1997).

Because habitat for Spalding's catchfly cannot be accurately determined using Timber Stand Database information, a Forest-wide habitat analysis was conducted using Satellite Imagery Landtype Classification (SILC). This reflection of the species' habitat occurrence and distribution is an approximation and serves as a coarse filter for habitat suitability. Further review of areas identified by SILC, such as aerial photograph interpretation and field verification, is necessary to determine the true extent of suitable habitat for Spalding's catchfly.

Based on evaluation of SILC and aerial photographs of the Decision area, habitat for Spalding's catchfly is likely limited to small microsites surrounded by dry forest habitats. Portions of units KP01, MC03, MC10, MC12, MC13, MC14, MC18, MC20, MC25 and MC26 may contain suitable habitat for the species. Of these units, MC03, MC 10, MC18 and MC 20 are proposed for underburning. All others are proposed for lop and scatter fuels treatment. Units MC10 and 18 are proposed for helicopter harvest; units KP01, MC03, MC12, MC14 and MC20 are proposed for skyline harvest; all others are proposed for ground-based harvest systems.

V. On-Site Inspection

Floristic surveys of proposed harvest units were conducted in June of 1996. All plant species encountered were recorded during the surveys. The surveys targeted areas proposed for harvest activities. No occurrences of **water howellia** or **Ute ladies'-tresses** or suitable habitat for either species were identified. As mentioned above, any potentially suitable habitat for water howellia or Ute ladies'-tresses is outside the Decision area and is likely under private ownership.

No occurrences of **Spalding's catchfly** were identified during initial surveys. Deeper-soiled dry grasslands were not encountered during the surveys. However, because the surveys were performed prior to the proposal for listing, potentially suitable habitat for this species was not identified or targeted for survey; floristic inventory of dry, open areas was incidental and by no means thorough. Subsequent habitat assessment surveys in September of 2000 indicated that no suitable habitat for this species is present in proposed harvest units. The areas identified by SILC contained mesic to xeric shrub-dominated understory with a component of bunchgrasses and forbs, but could not be classified as grasslands.

VI. Analysis of Effects

Water howellia - Water howellia has yet to be found in the Kootenai River subbasin ecosystem. The Kootenai River valley has previously experienced habitat alteration from ditching, draining, farming and other activities that have likely reduced habitat capability for water howellia. Such activities are likely to continue.

The project hydrologist determined that implementation of the Preferred Alternative would have a low probability of affecting wetlands associated with the Kootenai River (specialist's report in the Project File). No cumulative effects would be expected from project implementation.

Ute ladies'-tresses - Ute ladies'-tresses has yet to be found in the Kootenai River subbasin ecosystem. The Kootenai River valley has previously experienced habitat alteration from ditching, draining, farming and other activities that have likely reduced any habitat capability for Ute ladies'-tresses. Such activities are likely to continue.

The project hydrologist determined that implementation of the Preferred Alternative would have a low probability of affecting wetlands associated with the Kootenai River valley (specialist's report in the Project File). No cumulative effects would be expected from project implementation.

Spalding's catchfly –This species has yet to be found in the Kootenai River subbasin ecosystem. Critical habitat has not yet been designated for this species; therefore, project implementation would have no effect on critical habitat.

Since no suitable habitat for Spalding's catchfly was identified in proposed harvest units, the species would not be affected by implementation of the preferred alternative.

VII. Determination of Effects

No sightings of water howellia or Ute ladies'-tresses have been documented in the Decision area or anywhere within the Kootenai River subbasin. All potentially suitable habitat for both species would be protected from direct and indirect effects through implementation of INFS guidelines. Because of the scope and intensity of the proposed project and features designed to protect water quality in the Kootenai and Moyie River systems and Round Prairie Creek, no cumulative effects from project implementation would be expected to occur.

Based on the above considerations, implementation of Alternative 2 would have **no effect** on water howellia or Ute ladies'-tresses or their habitats.

Based on results of habitat assessment surveys, implementation of Alternative 2 would **not jeopardize** Spalding's catchfly within its range.

IX. Literature Cited

Mousseaux. 1998. Letter to Forest Supervisor discussing management of Ute ladies'-tresses and its habitat within the Idaho Panhandle National Forests (IPNF) from Mark Mousseaux, IPNF Botanist. March 6, 1998.

USDA. 1994. Conservation Strategy for *Howellia aquatilis*. Flathead National Forest. USDA Forest Service Northern Region. Missoula, Montana. April, 1994; updated November 17, 1994.

Shelly, J. Steven and Robert K. Moseley. 1988. Report on the Conservation Status of *Howellia aquatilis*, a Candidate Threatened Species. Montana Natural Heritage Program. Helena, MT. Pages 29-30.

Lesica, Peter. 1997. Demography of the endangered plant *Silene spaldingii* (Caryophyllaceae) in northwest Montana. Madrono 44(4):347-358.

Lichthardt, J. 1997. Revised report on the conservation status of *Silene spaldingii* in Idaho. Idaho Department of Fish and Game Conservation Data Center. Boise, Idaho. Unpublished technical report.

USDI Fish and Wildlife Service. 1999. Bi-annual Species List, SP# 1-9-99-SP-483, dated October 28, 1999.

USDI. 2000. Section 7 guidelines - *Silene spaldingii* Spalding's catchfly (proposed Threatened). United States Fish and Wildlife Service Snake River Basin Office. Boise, Idaho.

Moseley, Robert K. 1998 Ute ladies tresses (*Spiranthes diluvialis*) in Idaho: 1998 status report. Idaho Department of Fish and Game Conservation Data Center. Boise, Idaho. Unpublished technical report.

Prepared by:

Anna E. Hammet
IPNF North Zone Botanist

APPENDIX C - Site Specific Best Management Practices

Introduction

The Forest Service is required by law to comply with water quality standards developed under authority of the Clean Water Act. The Environmental Protection Agency and the States of Idaho are responsible for enforcement of these standards. The Idaho Panhandle National Forest Plan states (Chapter II, p. 27) that the Forest will "maintain high quality water to protect fisheries habitat, water based recreation, public water supplies and be within state water quality standards". The use of BMP's is also required in the Memorandum of Understanding between the Forest Service and the State of Idaho as part of our responsibility as the Designated Water Quality Management Agency on National Forest System lands. The State's water quality standards regulate nonpoint source pollution from timber management and road construction activities through application of Best Management Practices (BMPs). The BMPs were developed under authority of the Clean Water Act to ensure that Idaho's waters do not contain pollutants in concentrations, which adversely affect water quality or impair a designated use. State recognized BMPs that will be used during project design and implementation are contained in these documents:

a. Rules and Regulations Pertaining to the Idaho Forest Practices Act, (IFPA), as adopted by the Idaho Land Board; and
b. Rules and Regulations and Minimum Standards for Stream Channel Alterations, as adopted by the Idaho Water Resources Board under authority of the Idaho Stream Channel Protection Act (ISCPA).

Many of the rules and regulations for stream channel alterations are contained, in slightly different forms, in two Memorandum of Understandings (MOU) between the USFS and the State of Idaho. These MOUs are incorporated into the Forest Manual and R-1 Supplement 31, contains provisions which are not currently state recognized BMPs.

The practices described herein are tiered to the practices in FSH 2509.22. They were developed as part of the NEPA process, with interdisciplinary involvement, and meet state and Forest water quality objectives. The purpose of this appendix is to: 1) establish the connection between the Soil and Water Conservation Practice (SWCP) employed by the Forest Service and BMP's identified in Idaho Water Quality Standards (IDAPA 16.01.2300.05) and 2) identify how the SWCP Standard Specifications for the Construction of Roads, and the Timber Sale Contract provisions meet or exceed the Rules and Regulations pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code. The relevant portions of the Rules and Regulations developed under the Idaho Stream Protection Act are also covered.

The objective of this appendix is to provide conservation practices for use on National Forest Lands to minimize the effects of management activities on soil and water resources. The conservation practices were compiled from Forest Service manuals, handbooks, contract and permit provisions, to directly or indirectly improve water quality, reduce losses in soil productivity and erosion, and abate or mitigate management effects, while meeting other resource goals and objectives. They are of three basic forms: administrative, preventive and corrective. These practices are neither detailed prescriptions nor solutions for specific problems. They are purposely broad. These practices are action initiating process mechanisms, which call for the development of requirements and considerations to be addressed prior to and during the formulation of alternatives for land management actions. They serve as checkpoints, which are considered in formulating a plan, a program and/or a project.

Although some environmental impacts may be characteristic of a management activity, the actual effects on soil and water resources will vary considerably. The extent of these management effects on soil and water resources is a function of:

1. The physical, meteorological and hydrologic environment where the activity takes place (topography, physiography, precipitation, channel density, geology, soil type, vegetative cover, etc.).

2. The type of activity imposed on a given environment (recreation, mineral exploration, timber management, etc.) and its extent and magnitude.

3. The method of application and the duration of the activity (grazing system used, types of silvicultural practice used, constant vs. seasonal use, recurrent application or onetime application, etc.).

4. The season of the year that the activity occurs or is applied.

These factors vary within the National Forests in the Northern Region and from site to site. It follows then that the extent and kind of impacts are variable, as are the abatement and mitigation measures. No solution prescription, method, or technique is best for all circumstances. Thus the management practices presented in the following include such phrases as "according to the design", "as prescribed," "suitable for," "within acceptable limits," and similar qualifiers. The actual prescriptions, specifications, and designs are the result of evaluation and development by professional personnel through interdisciplinary involvement in the NEPA process. This results in specific conservation practices that are tailored to meet site specific resource requirements and needs.

BMP Implementation Process

In cooperation with the States, the USDA Forest Service's primary strategy for the control of nonpoint sources is based on the implementation of BMP's determined necessary for the protection of the identified beneficial uses. The Forest Service Nonpoint Source Management System consists of:

1. BMP selection and design based on site-specific conditions; technical, economic and institutional feasibility; and the designated beneficial uses of the streams.
2. BMP Application
3. BMP monitoring to ensure that they are being implemented and are effective in protecting designated beneficial uses.
4. Evaluation of BMP monitoring results.
5. Feeding back the results into current/future activities and BMP design.

The District Ranger is responsible for insuring that this BMP feedback loop is implemented on all projects. The Practices described herein are tiered to the practices in the R1/R4 FSH 2509.22. They were developed as part of the NEPA process, with interdisciplinary involvement, and meet State and Forest water quality objectives. The purpose of this appendix document is to: 1) establish the connection between the SWCP employed by the Forest Service and BMP's identified in Idaho Water Quality Standards (IDAHO APT 16.01.2300.05) and 2) identify how the SWCP, Standard Specifications for the Construction of Roads, and the Timber Sale Contract provisions meet or exceed the Rules and Regulations Pertaining to the Idaho Forest Practices Act, Title 38,

Chapter 13, Idaho Code (BMP's). The relevant portions of the Rules and Regulations developed under the Idaho Stream Protection Act are also included.

FORMAT OF THE BMPS

Each Soil and Water Conservation Practice (SWCP) is described as follows:

Title: Includes the sequential number of the SWCP and a brief title.

Objective: Describes the SWCP objective(s) and the desired results for protecting water quality.

Effectiveness: Provides a qualitative assessment of expected effectiveness that the implemented BMP will have on preventing or reducing impacts on water quality. The SWCP effectiveness rating is based on: 1) literature and research (must be applicable to area 2) administrative studies (local or within similar ecosystem); and 3) professional experience (judgment of an expert by education and/or experience). The expected effectiveness of the SWCP is rated either High, Moderate or Low.

High: Practice is highly effective (>90%) and one or more of the following types of documentation are available:

a) Literature/Research - must be applicable to area
b) Administrative studies - local or within similar ecosystem
c) Experience - judgment of an expert by education and/or experience.
d) Fact - obvious by reasoned (logical response).

Moderate: Documentation shows that the practice is effective less than 90% of the time, but at least 75% of the time.

Or

Logic indicates that this practice is highly effective, but there is little or no documentation to back it up.

Or

Implementation and effectiveness of this practice will be monitored and the practice will be modified if necessary to achieve the objective of the BMP.

Low: Effectiveness unknown or unverified, and there is little to no documentation

Or

Applied logic is uncertain in this case, or the practice is estimated to be less than 75% effective.

Or

This practice is speculative and needs both effectiveness and validation monitoring.

The effectiveness estimates given here are general, given the range of conditions throughout the Forest. More specific estimates are made at the project level when the BMPs are actually prescribed.

Compliance: Provides a qualitative assessment of how the implementation of the specific measures will meet the Forest Practice Act Roles and Regulations pertaining to water quality.

Implementation: This section identifies: (1) the site-specific water quality protection measures to be implemented and (2) how the practices are expected to be applied and incorporated into the Timber Sale Contract.

ITEMS COMMON TO ALL SOIL AND WATER CONSERVATION PRACTICES

Responsibility For Implementation: The District Ranger (through the Presale Forester) is responsible for insuring the factors identified in the following SWCP's are incorporated into: Timber Sale Contracts through the inclusion of proper B and/or C provisions; or Public Works Contracts through the inclusion of specific contract clauses.

The Contracting Officer, through his/her official representative (Sale Administrator and/or Engineering Representatives for timber sale contracts; and Contracting Officers Representative for public works contracts) is responsible for insuring that the provisions are properly administered on the ground.

Monitoring: Implementation and effectiveness of water quality mitigation measures are also monitored annually. This includes routine monitoring by timber sale administrators, road construction inspectors, and resource specialists which is documented in diaries and project files. Basically, water quality monitoring is a review of BMP implementation and a visual evaluation BMP effectiveness. Any necessary corrective action is taken immediately. Such action may include modification of the BMP, modification of the project, termination of the project, or modification of the state water quality standards.

Abbreviations

TSC = Timber Sale Contract
TSA = Timber Sale Administrator
PWC = Public Works Contract
SCA = Stream Channel Alteration Act
BMP = Best Management Practices
SPS = Special Project Specifications
CFR = Code of Federal Regulations
SAM = Sale Area Map
COR = Contracting Officer Representative
IFPA = Idaho Forest Practices Act
SWCP= Soil and Water Conservation Practices
SMZ = Streamside Management Zone
EPA = Environmental Protection Zone

KEY SOIL AND WATER CONSERVATION PRACTICES

Class * Soil and Water Conservation Practice (FSH 2509.22)

11 WATERSHED MANAGEMENT

W 11.07 Oil and Hazardous Substance Spill Contingency Planning
W 11.09 Management by Closure to Use
W 11.11 Petroleum Storage & Delivery Facilities & Mgt

13 VEGETATION MANIPULATION

G 13.02 Slope Limitations for Tractor Operation
G 13.03 Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows
E 13.04 Revegetation of Surface Disturbed Areas
E 13.05 Soil Protection During and After Slash Windrowing
E 13.06 Soil Moisture Limitations for Tractor Operation

14 TIMBER

A 14.02 Timber Harvest Unit Design
A 14.03 Use of Sale Area Maps for Designating Soil and Water Protection Needs
A 14.04 Limiting the Operating Period of Timber Sale Activities
E 14.05 Protection of Unstable Areas
A 14.06 Riparian Area Designation
G 14.07 Determining Tractor Loggable Ground
E 14.08 Tractor Skidding Design
E 14.09 Suspended Log Yarding in Timber Harvesting
A 14.10 Log Landing Location and Design
E 14.11 Log Landing Erosion Prevention and Control
E 14.12 Erosion Prevention and Control Measures During Timber Sale Operations
E 14.13 Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities
E 14.14 Revegetation of Areas Disturbed by Harvest Activities
E 14.15 Erosion Control on Skid Trails
E 14.16 Meadow Protection During Timber Harvesting
S 14.17 Streamcourse Protection (Implementation and Enforcement
E 14.18 Erosion Control Structure Maintenance
A 14.19 Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
E 14.20 Slash Treatment in Sensitive Areas
A 14.22 Modification of the Timber Sale Contract

15 ROADS AND TRAILS

A 15.02 General Guidelines for Road Location/Design
E 15.03 Road and Trail Erosion Control Plan
E 15.04 Timing of Construction Activities
E 15.05 Slope Stabilization and Prevention of Mass Failures
E 15.06 Mitigation of Surface Erosion and Stabilization of Slopes
E 15.07 Control of Permanent Road Drainage
E 15.08 Pioneer Road Construction
E 15.09 Timely Erosion Control Measures on Incomplete Road and Streamcrossing Projects
E 15.10 Control of Road Construction Excavation & Sidecast Material
S 15.11 Servicing and Refueling of Equipment
S 15.12 Control of Construction In Riparian Areas
S 15.13 Controlling In-Channel Excavation
S 15.14 Diversion of Flows Around construction Sites

S 15.15 Stream crossings on Temporary Roads
S 15.16 Bridge & Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)
E. 15.17 Regulation of Borrow Pits, Gravel Sources, and Quarries
E 15.18 Disposal of Right-of-Way and Roadside Debris
S 15.19 Streambank Protection
E 15.21 Maintenance of Roads
E 15.22 Road Surface Treatment to Prevent Loss of Materials
E 15.23 Traffic Control During Wet Periods
G 15.24 Snow Removal Controls
E 15.25 Obliteration of Temporary Roads
E 15.27 Trail Maintenance and Rehabilitation

18 FUELS MANAGEMENT

E 18.02 Formulation of Fire Prescriptions
E 18.03 Protection of Soil and Water from Prescribed Burning Effects

* **CLASSES OF SWCP (BMP)**

A = Administrative G = Ground Disturbance Reduction
E = Erosion Reduction W = Water Quality Protection
S = Stream Channel Protection/Stream Sediment Reduction

BEST MANAGEMENT PRACTICES

PRACTICE 14.03 - Use of Sale Area Maps for Designating Soil and Water Protection Needs

OBJECTIVE: To delineate the location of protection areas and special treatment areas, to insure their recognition, proper consideration, and protection on the ground.

EFFECTIVENESS: High

COMPLIANCE: No related FPA rule

IMPLEMENTATION: The following features will be designated on the SAM:

a. The stream courses (perennial, intermittent, and ephemeral) listed below will be designated as Stream Course Protection areas to be protected under the TSC. During layout of the units these areas will be excluded where possible. Where these areas cannot be easily excluded from the unit, these areas will be excluded by designating the timber as leave trees. INFISH standards and protected stream courses will be applied to the following areas:

1. Myrtle Creek - The entire mainstem length and its tributaries which include Yellow Pine, Adverse, Mack, and White Pine Creeks and other unnamed tributaries shown on USGS base maps.
2. Cascade Creek - The entire mainstem length and its tributaries,
3. Lost Creek - The entire mainstem length and its tributaries,
4. Clark Creek - The entire mainstem length and its tributaries,
5. The channel dissections to the top of the inner gorge within units M02, M04, M06, M07, MC02, MC03, MC06, MC10, MC11, MC13, MC14, MC15, MC16, MC17, MC18, MC22, MC23, MC26.
6. Any unnamed channels that are shown on the sensitive landtype map Figure 3.5.

b. Wetlands (meadows, lakes, potholes, etc.) to be protected per the timber sale contract clauses are those designated on the Fish and Wildlife Service 1:24000 scale wetland maps.

c. Ephemeral channels will be protected through unit layout, marking plans, and/or designation on sale area maps.

The Purchaser and the Sale Administrator prior to harvesting will review these features on the ground.

A Watershed Specialist (Forest or District) will work with the Presale Forester to insure that the above features have been designated on the Sale Area Map during contract development.

PRACTICE: 14.11 - Log Landing Erosion Prevention and Control
PRACTICE: 14.12 - Erosion Prevention and Control During Timber Sale Operations
PRACTICE: 14.15 - Erosion Control on Skid Trails.

OBJECTIVE: To protect water quality by minimizing erosion and subsequent sedimentation derived from log landings and skid trails.

EFFECTIVENESS: Moderate

COMPLIANCE: Meets FPA rules

IMPLEMENTATION: The following minimum criteria will be used in controlling erosion and restoring landings and skid trails so as to minimize erosion:

General:

1. Deposit waste material from construction or maintenance of landings and skid and fire trails in geologically stable outside of Riparian Habitat Conservation Areas.

2. Seeding will be done with a seed/fertilizer mix specified in the contract.

Landings:

1. Landings will not be located in ephemeral draws or swales that were created by or are prone to landslides.

2. During period of use, landing will be maintained in such a manner that debris and sediment are not delivered to any streams.

3. Landings shall be reshaped as needed to facilitate drainage prior to fall and spring runoff. Landings shall be stabilized by establishing ground cover or by some other means within one year after harvesting is completed.

4. Landings will drain in a direction and manner that will minimize erosion and will preclude sediment delivery to any stream.

Skid Trails:

1. Unit design and location will facilitate logging with a minimum amount of excavated skid trails. Where excavated trails are constructed they will be kept to a minimum and must be obliterated by the purchaser following completion of the logging activities. The obliteration will include restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding where needed.

2. Skid trails and fire trails shall be stabilized whenever they are subject to erosion, by waterbarring, cross draining, outsloping, scarifying, seeding, or other suitable means. This work shall be kept current to prevent erosion prior to fall and spring runoff.

1. Spacing of water bars on skid trails will be based on guides for controlling sediment from secondary logging roads (no date). If necessary, additional water bars will be prescribed by the sale administrator and/or watershed specialist.

4. Ground skidding in units M02, M05, MC02, MC06, MC13, and MC21 will be restricted to winter operating seasons on frozen ground or a minimum of 18 inches of snow. This will minimize

ground disturbance and compaction which could lead to increased sediment production and delivery within the municipal watershed.

5. All skid trail and landing locations will be approved by the Forest Service prior to harvesting and will be rehabilitated as necessary to assure that normal drainage patterns are maintained, and that exposed soil surfaces are seeded or covered with slash. This will minimize the potential for sediment production and delivery.

6. In units KP03, KP05, KP07, MC01, MC02, MC03, MC15, MC17, MC18, MC19, MC24, MC25, and MC26, only existing skid trails will be used or the units will be winter logged to prevent new soil compaction above existing levels.

7. Skid trail distance will average 100 feet or greater on ground skidded units, except where the trails converge to landings and as terrain dictates otherwise. This measure will help assure that no more than 15 percent of the activity area will be detrimentally disturbed per Region-1 soil standards.

8. Mechanical fellers will only be allowed off skidtrails if they travel on 18 inches of snow, frozen ground, or a slash mat (to avoid soil compaction levels that exceed Region 1 standards).

Corridors:

1. Corridors that have become entrenched below the litter layer into the top soil and could channel water will be water-barred and/or covered with debris.

PRACTICE 14.19 - Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

OBJECTIVE: To assure the adequacy of required erosion control work on timber sales.

EFFECTIVENESS: High

COMPLIANCE: No directly related FPA rule.

IMPLEMENTATION: The TSC requires that upon the Purchaser's written request and assurance that work has been completed the Forest Service shall perform an inspection. In evaluating acceptance the following definition will be used by the Forest Service: "Acceptable" erosion control means only minor deviation from established standards, provided no major or lasting impact is caused to soil and water resources. The Forest Service will not accept as complete, erosion control measures that fail to meet this criteria.

PRACTICE 15.07 - Control of Permanent Road Drainage

OBJECTIVE: To minimize the erosive effects of concentrated water and the degradation of water quality by proper design and construction of road drainage systems and drainage control structures.

EFFECTIVENESS: Moderate

COMPLIANCE: Meets FPA rules

IMPLEMENTATION: The following items will be included in the identified road contract specifications or drawings.

1. *For New Construction and Reconstruction* - The following criteria will be incorporated into the road design:

   a. The temporary road will be constructed as an outsloped road that follows the natural terrain. Following use, the purchaser will obliterate this road by restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding if needed. The purpose of this requirement is to minimize potential for increasing sediment production and delivery.

   b. The reconstruction will include increasing pipe sizes or changing design on many of the existing stream crossings to provide fish passage (if needed) and pass 100 year flood discharges and prevent diversion of streamflow by the road.

   c. Unstable cut and fill slopes will be stabilized.

   d. Additional relief culverts will be installed to very frequently cross drain the road. Distances between relief pipes will generally not exceed 200 to 250 feet.

   e. The grade of outsloped and insloped roads will be varied with graded rolling dips, drivable dips, or drivable waterbars to frequently cross drain surface water and to safely return water to stream channels in the event the culvert plugs.

   e. Gravelling will be used on native road surfaces to reduce surface erosion - especially near stream crossings. A minimum of a 4 inch lift is recommended.

   f. During and following operations on out sloped roads, retain out slope drainage and remove berms on the outside except those intentionally constructed for protection of road grade fills.

   g. Construct cross drains and relief culverts to minimize erosion of embankments. Minimize the time between construction and installation of erosion control devices. Use riprap, vegetative matter, downspouts and similar devices to minimize erosion of the fill.

   h. Prior to fall or spring runoff, install drainage structures or cross drain uncompleted roads that are subject to erosion.

   i. Install relief culverts at a minimum grade of 1 percent greater than road gradient.

   j. Energy dissipaters or downspouts will be placed below problem culvert outlets (Reconstruction item).

   j. Roads restricted after use will also have erosion control measures in place prior to final pull-out. Roads to be closed by any closure device other than a gate will be decommissioned.

PRACTICE 15.14 - *Diversion of Flows Around Construction Sites*

OBJECTIVE: To minimize downstream sedimentation by insuring that all stream diversions are carefully planned.

EFFECTIVENESS: High

COMPLIANCE: Meets SCA Rules

IMPLEMENTATION: Flow in stream courses may only be diverted if the Forest Service deems it necessary for the contractor to meet contractual specifications. Such a diverted flow shall be restored to the natural stream course as soon as practicable. Stream channels impacted by construction activity will be restored to their natural grade, condition, and alignment.

PRACTICE 15.21 - *Maintenance of Roads*

OBJECTIVE: To conduct regular preventive maintenance operations to avoid deterioration of the roadway surface and minimize disturbance and damage to water quality, and fish habitat.

EFFECTIVENESS: Moderate

COMPLIANCE: Meets FPA Rules

IMPLEMENTATION: For roads in active timber sale areas standard TSC provisions require the Purchaser to perform or pay for road maintenance work commensurate with the Purchaser's use. Purchaser's maintenance responsibility shall cover the before, during and after operations period during any year when operations and road use are performed under the terms of the Timber Sale Contract. All maintenance work shall be done concurrently, as necessary, at least to the following minimum standards:

1. Culverts and ditches shall be kept functional.

2. During and upon completion of seasonal operations, the road surface shall be crowned, out-sloped, in-sloped or waterbarred, and berms removed from the outside edge except those intentionally constructed for protection of fills.

3. The road surface shall be maintained as necessary to minimize erosion of the sub-grade and to provide proper drainage.

4. If road oil or other surface stabilizing materials are used, apply them in such a manner as to prevent their entry into streams.

5. Sidecast of all material associated with road maintenance will be done in a manner to prevent its entry into streams.

6. Slumps, slides and other erosion features causing stream sedimentation will be kept repaired and stabilized.

More specifications are included under “Required Design Criteria for All Action Alternatives”.

PRACTICE 15.25 - Obliteration of Temporary Roads

OBJECTIVE: To reduce sediment generated from temporary roads by decommission or obliterating them at the completion of their intended use.

EFFECTIVENESS: High

COMPLIANCE: Meets FPA Rules

IMPLEMENTATION: Effective obliteration is generally achieved through a combination of the following measures:

1. Recontouring stream crossings to natural gradient and width restoring full floodplain and valley features to natural contour.

2. Recontour unstable fill or cutslopes to natural contours. Decompact the bench portion of the road prism a minimum of 14 inches before placing excavated fill against the cutslope and on the prism.

3. Provide adequate cross drainage for the road. Waterbars placed on a maximum spacing of 30 feet will be the primary means of cross draining roads with stable cut and fill slopes. Outsloping will be the primary means of cross draining unstable road segments.

4. Road returned to resource production through revegetation. Stream crossings will be seeded with a seed mix approved for erosion prevention and covered with straw mulch. Natural regeneration of grass, brush, and trees can usually be relied upon to revegetate the portions of the road prism between stream crossings. Available or recruited wood debris, vegetation, and slash will be used to promote revegetation and protection of disturbed soil surfaces.

PRACTICE 18.02 - Formulation of Fire Prescriptions
PRACTICE 18.03 - Protection of Soil and Water form Prescribed Burning

OBJECTIVE: To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients and debris from entering surface water.

EFFECTIVENESS: High

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: IMPLEMENTATION: Forest Service and/or other crews are used to prepare the units for burning. This includes water barring firelines and reducing fuel concentrations. The interdisciplinary team identifies Riparian Areas and soils with water repellant tendencies as part of the environmental analysis. Some of the techniques used to prevent soil erosion and water quality degradation are:(1) construct water bars in fire lines; (2) reduce fuel loadings in drainage channels; (3) maintain the integrity of the Riparian Area; (4) avoid intense fires, which may promote water repellency, nutrient leaching, and erosion; (5)retain or plan for sufficient ground cover to prevent erosion of the burned sites and (6) removal of all debris added to stream channels as a result of prescribed burning, unless debris is prescribed to improve fisheries habitat.

1. Foaming agent will not be used in Myrtle Creek above the diversion for city water. Foaming agents (if used outside of Myrtle Creek) will not be used for water control lines where any of the ephemeral channels could carry the material to intermittent or perennial streams.

2. Machine constructed firelines will not be used on the sensitive landtypes displayed in Figures 3.5.

3. Firelines must be frequently waterbarred (not to exceed 50 foot spacing when going up and down the hill).

4. Maintain large organic debris appropriate to the habitat type (see "Managing Coarse Woody Debris in the Forests of the Rocky Mountains" by Graham et. al. 1994).

5. Limit prescribed burning to those times when surface soil moisture is above 25 percent to reduce the potential for damage from hot burns.

APPENDIX D
Consistency Checklists and Regulatory Requirements

FOREST PLAN STANDARDS

Soils (IPNF, II - 32, 33), updated 7 Feb. 2000

1. Soil disturbing management practices will strive to maintain at least 85 percent of the activity area in a condition of acceptable productivity potential for trees and other managed vegetation. Unacceptable productivity potential exits when soil has been detrimentally compacted, displaced, puddled, or severely burned as determined in the project analysis.

The discussion of project effects to soil compaction can be found in Appendix A. The "Required Design Criteria for All Action Alternatives" and BMPs in Appendix B must be applied in order for the action alternatives to meet this standard.

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

All alternatives meet this standard. For action alternatives, soil protection measures are specified in the EA under "Features common to all action alternatives" and in this report under "Required Design Criteria for All Action Alternatives", and BMPs in Appendix B.

3. In the event of whole tree logging, provision for maintenance of sufficient nutrient capital should be made in the project analysis.

The Intermountain Forest Tree Nutrition Cooperative is continuing to research potassium contents within tree species and different rock types in order to establish more definite minimum thresholds and affects on tree growth and resistance to root diseases. Until these minimum thresholds are developed through research, the Idaho Panhandle National Forest is using management recommendations from the IFTNC as a guideline for maintaining sufficient potassium on a site. The Forest is also planning to do tree foliar analysis in cooperation with the Tree Nutrition Cooperative this fall, in order to gather more information on forest potassium levels, if funding can be obtained.

The IFTNC has made the following management recommendations to retain the maximum possible amount of potassium on site after logging:

- *A. Practice conventional removal (lop and scatter) rather than whole tree removal. The "lop and scatter" technique should be practiced during intermediate as well as final harvest operations.*
- *B. Let slash remain on site over winter so mobile nutrients such as potassium can leach from fine materials back to the soil.*
- *C. Light broadcast burn or underburn for release of potassium and other nutrients.*
- *D. Avoid mechanical site preparation.*
- *E. Plant species appropriate to site.*

The IFTNC recommendations are part of the design criteria for both action alternatives. The discussion on potassium and nutrient cycling can be found in Appendix A of this report."

Water (IPNF, II - 33)

1. Management activities on Forest lands will not significantly impair the long-term productivity of the water resource and ensure that state water quality standards will be met or exceeded.

The degree to which the alternatives meet this criterion is discussed under the "Direct and Indirect Effects Common to All Alternatives", "Direct and Indirect Effects of the Action Alternatives", "Cumulative Effects to Values-at-risk", and the "Consistency with the Forest Plan" sections in Chapter 4..

2. Maintain concentrations of total sediment or chemical constituents within State standards.

The net production and delivery of sediment from the No Action alternative is only expected to decrease if the recommendations for road reconstruction and maintenance are implemented. Alternative 2, 3, 4, and 5 would substantially reduce production and potential for delivery of sediment to streams. Petroleum products used in the operation and maintenance of heavy equipment are the primary chemical constituents which could be delivered to streams. The action alternatives would likely meet State standards for chemical constituents given that "Required Design Criteria for All Action Alternatives", State and site-specific BMPs, and INFISH standards would be applied if an action alternative is selected.

3. Implement project level standards and guidelines for water quality contained in the Best management Practices (Appendix S, IPNF), including those defined by State regulation or agreement between the State and Forest Service such as:

a. Idaho Forest Practices Rules
b. Rules and Regulations and Minimum Standards for Stream Channel Alterations
c. Best Management Practices for Road Activities.

Specific road maintenance and repair is needed for Alternative 1 to be consistent with Idaho Forest Practices Rules. The action alternatives are consistent with this criterion. In addition to standard State BMPs, other soil and water conservation practices that are approved BMPs are built into the timber sale contract. Site specific "Required Design Critieria for All Action Alternatives, and BMPs in Appendix B Management Practices" are specified and are listed in this report. Soil and water conservation principles were used during alternative design to determine the location and types of treatments including which areas should be avoided or restored. The specified and designed measures surpass those required by the State Forest Practices Act and are consistent with Forest Service standards. Stream crossing upgrades would meet minimum standards for stream channel alterations and are covered under a Memorandum of Understanding with the State of Idaho.

4. Cooperate with the states to determine necessary instream flows for various uses. Instream flows should be maintained by acquiring water rights or reservations.

Instream flows are not an issue with any of the proposed projects. Therefore, this standard is not applicable to any alternative.

5. Manage public water system plans for multiple use by balancing present and future resources with public water supply needs. Project plans for activities in public water systems will be reviewed by the water users and the State.

Streams not defined as public water systems, but used by individuals for such purposed, will be managed to standards established by the state's forest practices rules and/or the National Forests' BMPs or to the fisheries standards whichever is applicable.

The Bonners Ferry City Council mayor and members were informed about this project during a field trip and 2 meetings, as well as correspondence documented in the EIS. Similarly, the Division of Environmental Quality, the Idaho Fish and Game, and the Idaho Department of Lands were included in the field trip and correspondence. State and site-specific standards, and INFISH standards are specified and would be applied. Factors that put water quality at-risk were identified as well as what can be done to minimize or eliminate those risks.

6. Activities within non-fishery drainages, including first and second order streams, will be planned and executed to maintain existing biota. Maintenance of existing biota will be defined as maintaining the physical integrity of these streams. Best Management Practices (Appendix S), Appendix 0, and riparian guidelines will be used to accomplish this objective.

Protection of the integrity of riparian conservation areas (which includes first and second order streams) was approached through alternative design strategies and specified actions in the "Required Design Criteria for All Action Alternatives" and BMPs contained in Appendix B. Alternatives meet this standard as specified in the Chapter 4 effects discussions contained in this report.

7. It is the intent of this plan that models be used as a tool to approximate the effects of National Forest activities on water quality values. The models will be used in conjunction with field data, monitoring results, continuing research and professional judgment, to further refine estimated effects and to make recommendations.

All alternatives meet this standard. WATSED was used to characterize current conditions for water and sediment yield in Upper Myrtle, Mack, White Pine, Lower Myrtle, and Cascade Creeks. Stream crossing risk was also quantitatively evaluated and summarized by cumulative effects area. The LISA model was used to evaluate changes in landslide risk resulting in harvesting on units with the greatest probability for failure and the highest risk if a failure occurs. The SIMMPPLE model was used to estimate existing and projected probability for stand replacing fire. Information from research and Forest Plan monitoring were used and referenced in this analysis. Additionally, other sources of information described under "Data Collection" and "References Cited" sections of this report were used to further refine estimated effects and to make recommendations.

INFISH Standards and Guidelines (USDA A7-13; 1995)

Only INFISH standards and guidelines that apply to the range of alternatives for the Myrtle-Cascade Timber Sale were addressed here; those standard and guidelines that do no apply were added into the project file. These INFISH standards and guidelines are addressed with comments in *italics* as follows:

<u>Timber Management (A-7)</u>

TM-1 Prohibit timber harvest, including fuelwood cutting, in Riparian Habitat Conservation Areas, except as described below.

a. Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result

in degraded riparian conditions, allow salvage and fuelwood cutting in Riparian Habitat Conservation Areas only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other Riparian Management Objectives, and where adverse effects can be avoided to inland native fish. For priority watersheds, complete watershed analysis prior to salvage cutting in RHCAs.

b. Apply silvicutural practices for Riparian Habitat Conservation Areas to acquire desired vegetation characteristics where needed to attain Riparian Management Objectives. Apply silvicultural practices in a manner that does not retard attainment of Riparian Management Objectives and that avoid adverse effects on inland native fish.

Using "Standard Widths Defining Interim RHCA's", no timber harvest activities are proposed under the action alternatives within RHCA's in the project area, therefore this standard does not apply.

Roads Management (A-7-8)

RF-1 Cooperate with Federal, Tribal, State, and county agencies, and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain Riparian Management Objectives.

The proposed activities are all on National Forest lands, but have been coordinated with all those listed.

RF-2 For each existing or planned road, meet the Riparian Management objectives and avoid adverse effects to inland native fish by:

a. completing watershed analyses prior to construction of new roads or landings in Riparian Habitat Conservation Areas (RHCAs) within priority watersheds.

This project area is not within an INFISH priority watershed nor are any activities proposed within RHCAs so no watershed analysis is required.

b. minimizing road and landing locations in Riparian Habitat Conservation Areas.

No new roads or landings are proposed within RHCAs under the action alternatives. Therefore, all alternatives meet this standard.

c. initiating development and implementation of a Road Management Plan or a Transportation Management Plan. At a minimum, address the following items in the plan:

1. Road design criteria, elements, and standards that govern construction and reconstruction.
2. Road management objectives for each road.
3. Criteria that govern road operation, maintenance, and management.
4. Requirements for pre-, during-, and post-storm inspections and maintenance
5. Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives.
6. Implementation and effectiveness monitoring plans for road stability, drainage, and erosion control.
7. Mitigation plans for road failures.

The interdisciplinary team (IDT) evaluated access and road improvement needs within the project area. The proposed road maintenance, improvements and obliteration from this process are displayed in Figure 3.1 and are discussed under "Watershed and Fisheries Improvement Opportunities" of this document and in Chapter 2 of the EIS.

d. avoiding sediment delivery to streams from the road surface.

1 . Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is infeasible or unsafe.

This standard is applied directly for the proposed temporary road. In addition, recommendations are made which would cross drain ditchlines before entering stream channels and prevent diversion of streamflow down the road prism if a culvert fails.

2. Route road drainage away from potentially unstable stream channels and hillslopes.

This standard was applied by improving the cross drainage of haul routes. This will reduce the potential to concentrate water and deliver it to unstable slopes (primarily stream breaklands) below the road. Provided that road improvements in the action alternatives are conducted for No Action, all alternatives meet this standard.

e. avoiding disruption of natural hydrologic flow paths.

Restoring slope hydrology would be accomplished through road reconstruction and maintenance, which would frequently cross drain ditch and road surface water and would prevent the diversion of channel flow down the road prism. The proposed road obliteration would also restore natural hydrologic flow paths.

f. avoiding sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RHCAs in priority watersheds.

None of the proposed units are within priority watersheds, but this is a standard BMP included in the timber sale contract.

RF-3 Determine the influence of each road on the Riparian Management Objectives. Meet Riparian Management Objectives and avoid adverse effects on inland native fish by:

a. reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or that retard attainment of Riparian Management Objectives, or do not protect priority watersheds from increased sedimentation.

b. prioritizing reconstruction based on the current and potential damage to inland native fish and their priority watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of Riparian Habitat Conservation Areas.

c. closing and stabilizing or obliterating, and stabilizing roads not needed for future management activities. Prioritize these actions based on the current and potential damage to inland native fish in priority watersheds, and the ecological value of the riparian resources affected.

The proposed road reconstruction and maintenance described in Chapter 2, 3, and 4 originate from the above standards. The action alternatives would meet this standard. No Action would meet this standard if the needed reconstruction and maintenance were accomplished.

RF-4 Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-vear flood, including associated bed load and debris, where those improvements would/do pose a substantial risk to, riparian conditions. Substantial risk improvements include those that do not meet design and operation maintenance criteria, or that have been shown to be less effective than designed for controlling erosion, or that retard attainment of Riparian Management Objectives, or that do not protect priority watersheds from increased sedimentation. Base priority for upgrading on risks in priority watersheds and the ecological value of the riparian resources affected. Construct and maintain crossings to prevent diversion of streamflow out of the channel and down the road In the event of crossing failure.

The proposed road reconstruction and road obliteration described in Chapter 3 and 4 originate from the above standard. The action alternatives would meet this standard. No Action would meet this standard if needed reconstruction, maintenance and/or obliteration are accomplished.

RF-5 Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

Two streams with crossings, which would be used for haul routes potentially prevent fish passage; in which there are three in the Cascade Creek drainage (not confirmed if fish are present) and two in Cooks Creek drainage, these would be improved under the action alternatives to allow fish passage as discussed in Chapter 3 & 4. No Action would meet this standard if needed reconstruction, maintenance and/or obliteration are accomplished.

Fires/Fuels Management (A-11)

FM-1 Design fuel treatment and fire suppression strategies, practices, and actions so as not to prevent attainment of Riparian Management Objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could perpetuate or be damaging to long-term ecosystem function or inland native fish.

FM-2 Locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of Riparian Habitat Conservation Areas. If the only suitable location for such activities is within the Riparian Habitat Conservation Area, an exemption may be granted following a review and recommendation by a resource advisor. The advisor would prescribe the location, use conditions, and rehabilitation requirements, with avoidance of adverse effects to inland native fish a primary goal. Use an interdisciplinary team, including a fishery biologist, to predetermine incident base and helibase locations during presuppression planning.

FM-3 Avoid delivery of chemical retardant, foam, or additives to surface waters. An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following a review and

recommendation by a resource advisor and a fishery biologist, when the action agency determines that an escape fire would cause more long-term damage to fish habitats than chemical delivery to surface waters.

FM-4 Design prescribed burn projects and prescriptions to contribute to the attainment of the Riparian Management Objectives.

FM-5 Immediately establish an emergency team to develop a rehabilitation treatment plan to attain Riparian Management Objectives and avoid adverse effects on inland native fish whenever Riparian Habitat Conservation Areas are significantly damaged by a wildfire or a prescribed fire burning out of prescription.

The proposed fires/fuels management described in Chapter 2, 3, and 4 originate from the above standards. The action alternatives would meet this standard. No Action would not meet this standard if wildfire without suppression were allowed.

General Riparian Area Management (A-12)

RA-1 Identify and cooperate with Federal, Tribal, State and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.

This project does not affect instream flows, therefore, this standard does not apply.

RA-2 Trees may be felled in Riparian habitat Conservation Areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.

None of the alternatives propose activities within the RHCAs so this standard does not apply.

RA-3 Apply herbicides, pesticides, and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of Riparian management Objectives and avoids adverse effects on inland native fish.

Provided the BMPs listed in the Bonners Ferry Noxious Weed EIS are followed, all alternatives would meet this standard.

RA-4 Prohibit storage of fuels and other toxicants within Riparian Habitat Conservation Areas. Prohibit refueling with Riparian Habitat Conservation Areas unless there are no other alternatives. Refueling sites within a Riparian Habitat Conservation Area must be approved by the Forest Service or Bureau of Land Management and have an approved spill containment plan.

This is a standard BMP that is part of the timber sale contract; and is also noted within Chapter 4 under required design for all action alternatives – Hazardous Materials.

RA-5 Locate water drafting sites to avoid adverse effects to inland native fish and instream flows, and in a manner that does not retard or prevent attainment of Riparian Management Objectives.

Drafting of water would only be needed for prescribed fire operations. The amount of water needed for these operations would not significantly affect fish or instream flows. The use of foaming agents would not occur near stream channels.

Watershed and Habitat Restoration (A-12)

WR-1 Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and contributes to attainment of Riparian Management Objectives.

The proposed watershed restoration projects as described in Chapter 3 & 4 originate from the above standard. The action alternatives would meet this standard. No Action would meet this standard if the needed restoration projects were accomplished.

WR-2 Cooperate with Federal, State, local, and Tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans (CRMPs) or other cooperative agreements to meet Riparian Management Objectives.

Cooperation at the multiple levels as listed occurred within the framework for developing the proposed activities of this project and that future resource management will develop a CRMP for the Kootenai River system.

Fisheries and Wildlife Restoration (A-13)

FW-1 Design and implement fish and wildlife habitat restoration and enhancement actions in a manner that contributes to attainment of the Riparian Management Objectives.

The proposed road obliteration and reconstruction described in Chapter 2, 3 and 4 and specifically in "Chapter 3-Watershed and Fisheries Improvement Opportunities" originate from the above standard.

FW-2 Design, construct, and operate fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of the Riparian Management Objectives or adversely affect inland native fish. For existing fish and wildlife interpretive and other user-enhancement facilities inside Riparian Habitat Conservation Areas, assure that Riparian Management Objectives cannot be met and adverse effects on inland native fish are avoided. Where Riparian Management Objectives cannot be met or adverse effects on inland native fish avoided, relocate or close such facilities.

There is no user-enhancement facilities located or proposed and is not an issue within the proposed project. Therefore, this standard is not applicable to any alternative.

FW-3 Cooperate with Federal, Tribal, and State wildlife management agencies to identify and eliminate wild ungulate impacts that prevent attainment of the Riparian Management Objectives or adversely affect inland native fish.

Wild ungulate impacts will not prevent attainment of RMO's so this standard does not apply.

FW-4 Cooperate with Federal, Tribal, and State fish management agencies to identify and eliminate adverse effects on native fish associated with habitat manipulation, fish stocking, fish harvest, and poaching.

Cooperation at the multiple levels as listed occurred within the framework for developing the proposed activities of this project. Using the INFISH Standard Widths Defining Interim RHCA's for the project activities, habitat

manipulation does not apply. Fish stocking, harvest and/or poaching are all regulated by State management guidelines.

Fish – Forest Plan (IPNF, II – 29-31)

1. Activities on National Forest lands will be planned and executed to maintain existing water uses. Maintain is defined as "limiting effects from National Forest activities to maintain at least 80 percent of fry emergence success in identified fishery streams." The percent is measured from pristine conditions. Current methodology will not detect an impact of less than 20 percent. During the life of the plan, new technologies may permit more precise assessments; however, the goal of this standard will remain as "to maintain 80 percent of fry emergence success.

The 1989 Forest Plan Evaluation and Monitoring Report documents the change away from use of the 20% fry emergence standard, Item G-1 (pgs C-1 and C-2). The findings were that it was not a good monitoring tool to report health of streams. G-1 was combined with an expanded G-3 which includes a more comprehensive array of fisheries and hydrology parameters.

2. Streams providing spawning and rearing habitat, which are considered critical to the maintenance of river and lake populations of special concern, will be managed at a standard higher than the 80 percent standard. Monitoring will be needed to detect this higher standard. "*High Value Streams*"

3. The stream and river segments (if listed) will be managed as low access fishing opportunities to maintain a diversity of fishing experiences for the public and to protect sensitive fish populations. Special road management provisions will be used to accomplish this objective. "*Low Access Fishing Streams*"

Forest Plan standards 2 & 3 are not inclusive to this analysis because no streams in the analysis area are listed under "high value streams" or "low access fishing streams." However, streams within the analysis area, as listed in Chapter 3 (Table 3-1) are recognized as to providing beneficial uses. Also, in standard #2 above, please note the explanation provided under standard #1 for fry emergence.

4. Provide fish passage to suitable habitat areas, by designing road crossings of streams to allow fish passage or removing in-stream migration barriers.

Within the analysis area, man-caused fish migration barriers have been identified in Chapter 3 on those streams supporting salmonid species (see "Watershed and Fisheries Improvement Opportunities) and mitigation measures are established to eliminate such barriers.

5. Utilize data from stream, river, and lake inventories to prepare fishery prescriptions that coordinate fishery resource needs with other resource activities. Pursue fish habitat improvement projects to improve habitat carrying capacities on selected streams.

As stated in Chapter 3, but emphasized here; information was utilized from stream inventories, field reviews, historical records, aerial photographs, analysis of watershed conditions, published scientific literature, discussions with Fisheries Biologists and electrofishing/stocking data from the Idaho Department of Fish and Game (IDF&G), the United States Fish and Wildlife Service (USFWS), electrofishing data from the Idaho Division of Environmental Quality (DEQ) and comprehensive knowledge of the fisheries resources in the Kootenai River Basin. As mentioned in standard #4 above and in Chapter 3, road reconstruction and/or

obliteration work in the analysis area will remove known fish migration barriers and reduce the potential of mass failure.

6. Coordinate management activities with water resource concerns as described in MA 16, Appendix I and Appendix O.

- *The INFISH amendment to the Forest Plan describes how management should be conducted within MA-16;*
- *MA-16 for fisheries management objectives, see response in Forest Plan fish standard #1 for detailed information;*
- *Appendix I – see response in Forest Plan fish standard #1 for detailed information;*
- *Appendix O – "Riparian Management along Headwater Streams"---See specific INFISH Standards and Guidelines.*

CLEAN WATER ACT

Army Corp Discharge, Dredge and Fill Permits

The proposed harvesting and road maintenance would not affect wetlands or streams. The proposed stream crossings upgrades proposed for under "Watershed and Fisheries Improvement Opportunities" are covered under the "silvicultural road exemption" of the nationwide permit. No wetlands would be affected by the reconstruction work.

Water Quality Limited Stream Segments

There are no WQLS stream segments listed by the State of Idaho within the project area. Snow Creek was removed from the 1996 WQLS listing in the EPA approved 1998 listing.

Antidegradation Policy for Beneficial Uses

Application of the antidegradation policy is described in Chapter 4 under "Evaluation of Alternatives" and "Consistency with the Forest Plan" in Chapter 4. The effects analysis in Chapter 4 describes the anticipated effects for each alternative.

ROAD ANALYSIS QUESTIONS

AQ (1): How and where does the road system modify the surface and subsurface hydrology of the area?

See discussion under "Watershed and Fisheries Improvement Opportunities" and "Sediment Production and Delivery" sections in Chapters 3 and 4. Roads in Upper Myrtle Creek are more prone to modifying subsurface runoff because the compacted till layer is usually closer to the soil than in Lower Myrtle Creek. Road 633 in Upper Myrtle Creek is fairly well drained on the south-facing slopes and less well drained on the north facing slopes.

AQ (2): How and where does the road system generate surface erosion?

See discussion under "Watershed and Fisheries Improvement Opportunities".

AQ (3): How and where does the road system affect mass wasting?

See discussion under "Watershed and Fisheries Improvement Opportunities" and "Stream Crossing Risk" and "Sediment Production and Delivery" in Chapter 3.

AQ (4): How and where do road-stream crossings influence local stream channels and water quality?

See discussion under "Watershed and Fisheries Improvement Opportunities" and "Stream Crossing Risk" in Chapter 3.

AQ (5): How and where does the road system create potential for pollutants, such as chemical spills, oils, de-icing salts, or herbicides, to enter surface waters?

There are no long sections of road encroaching on the stream or riparian area. The greatest potential for chemical spill delivery to streams is at or near crossings. The "Required Design Criteria for All Action Alternatives" are designed to minimize this risk.

AQ (6): How and where is the road system "hydrologically connected" to the stream system? How do the connections affect water quality and quantity (such as delivery of sediments and chemicals, thermal increases, elevated peak flows)?

See "Watershed and Fisheries Improvement Opportunities", and the "Stream Crossing Risk", and "Sediment Production and Delivery" sections in Chapter 3 and 4.

AQ (7): What downstream beneficial uses of water exist in the area? What changes in uses and demand are expected over time? How are they affected or put at risk by road derived pollutants?

See "Values-at-risk" in Chapter 2 and "Beneficial Uses and Quality of Support" in Chapter 3 and the effects analysis in Chapter 4 and Appendix A.

AQ (8): How and where does the road system affect wetlands?

Any of the roads in Snow Creek, or Myrtle and Cascade Creeks can potentially contribute sediment to wetlands including the Kootenai Wildlife Refuge. The other drainages due not contribute directly to wetland quality and conditions.

AQ (9): How does the road system alter physical channel dynamics, including isolation of floodplains; constraints on channel migration; and the movement of large wood, fine organic matter, and sediment?

There are no significant sections of road that encroaches on stream channels or the riparian area. See also the "Watershed and Fisheries Improvement Opportunities", "Stream Crossing Risk", and "Sediment Production and Delivery" sections in Chapter 3 and 4.

AQ (10): How and where does the road system restrict the migration and movement of aquatic organisms? What aquatic species are affected and to what extent?

See discussion of fisheries under "Habitat Condition and Connectivity" and "Watershed and Fisheries Improvement Opportunities" and "Stream Crossing Risk" in Chapter 3; and "Biological Assessment (BA) and Matrices" in Appendix C.

AQ (11): How does the road system affect shading, litterfall, and riparian plant communities?

For the most part, most of the roads in the project area are located outside of riparian areas except where the roads cross streams as discussed under "Stream Crossing Risk" in Chapter 3 and "Changes in Riparian Condition and Function" in Appendix A.

AQ (12): How and where does the road system contribute to fishing, poaching, or direct habitat loss for at-risk aquatic species?

By regulation, fishing opportunities are limited in Myrtle Creek, but the Idaho General Fishing regulations show that Myrtle Creek and its tributaries are open for fishing under the six trout bag and possession limit of mixed trout species (except bull trout) and the additional ten eastern brook trout limit over the six trout bag and possession limit rule. The existing road system allows access to all major tributaries to Myrtle and Cascade Creeks.

AQ (13): How and where does the road system facilitate the introduction of non-native aquatic species?

The existing road system allows access to all major tributaries to Myrtle and Cascade Creeks. The stream crossings, Kootenai River and high elevation lakes would be the most likely introduction points for non-native species. Eastern Brook Trout and Coastal Rainbow Trout already have been introduced into a majority of the watersheds within the project area.

AQ (14): To what extent does the road system overlap with areas of exceptionally high aquatic diversity or productivity, or areas containing rare or unique aquatic species or species of interest?

There are no areas with "exceptionally high" aquatic diversity or productivity within the project area. Rare or unique species are discussed in the "Biological Assessment (BA) and Matrices" in Appendix C.

APPENDIX E - CORPORATE MONITORING DATA

Long-term Monitoring of Ecosystem Core Data

The Idaho Panhandle National Forest is currently implementing a process to monitor changes to a number of ecosystem conditions resulting from project activities and natural disturbances. The overall focus of this monitoring is to evaluate changes in ecosystem condition (structure, composition, and function). The following conditions (Core Data Monitoring Elements) have currently been selected for long-term monitoring: hydrologic integrity, wildlife security and public access, water yield, changes in forest structure outside the Historic Range of Variability (HRV), changes in species composition outside HRV, habitat loss and decline, and changes in landscape pattern. The analysis for each project considers project-related changes to these conditions and anticipated changes are described in project environmental analysis documentation. The following tables display core ecosystem conditions that will be monitored, data that will be used to monitor this core data, and units of measure that will describe these changes in core data. In some cases there would be no "Project Related Changes" to core ecosystem data.

Table 1- Project-Related Changes Wildlife Security and Public Access

Core Data To Be Monitored	Unit of Measure	Project-Related Changes
Open Road Density	miles/square mile	Road closures or removal of existing road closures are not proposed under either of the action alternatives – there would be no change in open road density

Table 2 – Projected Related Hydrologic Integrity Changes

HUC	Total Road Densities (mi/mi^2)				Equivalent Clearcut Acres (ECA)			
	Exist	Alt 2	Total	% chg	Exist	Alt 2	Total	% chg
Myrtle Creek	2.5	-0.7	1.8	-28.0%	1,542	425	1,967	27.5%
Cascade Creek	2.4	-1.0	1.4	-41.7%	235	104	339	44.2%
Lost Creek	2.2	-1.3	0.9	-59.1%	338	72	410	21.3%
Clark Creek	4.1	-1.6	2.5	-39.0%	91	10	101	10.9%
Burton Creek	0.2	-0.1	0.1	-50.0%	281	0	281	0.0%

Table 3 – Project Related Vegetation Changes

HUC	*HUC Acres	Changes in Forest Structure Outside HRV Seedling-Sapling (acres)				Changes in Species Composition Outside HRV (acres)			
		Exist	Alt 2	Total	% chg	Exist	Alt 2	Total	% chg
Myrtle Creek	23,488	4,162	203	4365	4.8%	2,066	963	3,029	46.6%
Cascade Creek	2,455	729	56	785	7.7%	151	140	291	92.7%

**Only those HUCs where activities create changes in forest structure are included*

FRAGSTATS: Landscape Structure Data

Growing concerns over loss of biodiversity have spurred land managers to seek better ways of managing landscapes at a variety of scales over both time and space. FRAGSTATS is a spatial pattern analysis program for quantifying landscape structure (USDA 1995). FRAGSTATS quantifies the size and distribution of different types of forest patches (e.g., old growth, forest openings, etc.). FRAGSTATS generates several landscape metrics that can be used to describe the characteristics of forest vegetation in a given area. The metrics that will be tracked as part of the IPNF Core Data Monitoring Elements are described below and listed in Table 4 and Table 5. At this point there are no Forest Plan Standards for the metrics list below, but this information is deemed important in tracking changes landscape pattern.

Mean Patch Size (ha) -This metric equals the average size of given type of forest structure. In general, smaller mean patch sizes for a given type of structure might be considered more fragmented than those with larger mean patch sizes for a given type of structure.

Patch Size Standard Deviation (ha) - This metric describes the variability of the mean patch size for a given type of structure.

Contrast Weighted Edge Density (m/ha) – Edges are simply places where two ecosystems come together. They are never a perfectly sharp line; there is always a transition zone from one set of environmental conditions to another. Because it is the difference between two ecosystems that creates edges and ecotones, it is generally thought that the edge effect will be greatest when two adjacent ecosystems are very different from one another (Hunter 1990). The greater the contrast, the more likely the adjoining habitats are to be very different in structure and in wildlife species they support. This tends to increase the species richness of the ecotone (Thomas et al, 1979). Contrast weighted edge density measures these differences. As an example, pole timber (Table 4) in Myrtle Creek has less than 2 meters of maximum-contrast edge per hectare. Thus, patches similar in structure surround pole timber stands in the landscape and any edge effects on this habitat are likely to be relatively weak.

Mean Core Area 1 (ha) - This metric expresses the effectiveness of mean patch size of a given forest structure. For example, the mean patch size of old growth stands (Table 4) in Myrtle Creek is currently 108 hectares with a mean core area of about 62 hectares. This means 62 out of 108 hectares are serving as effective old growth habitat.

Core Area SD 1 (ha) - This metric describes the variability of the mean core area for a given type of structure.

FRAGSTATS data was generated for the existing condition and Alternative 2 (preferred alternative). Only Myrtle Creek and Cascade Creek were included in the calculations since these were the only HUCs where effective changes in landscape patterns could be detected.

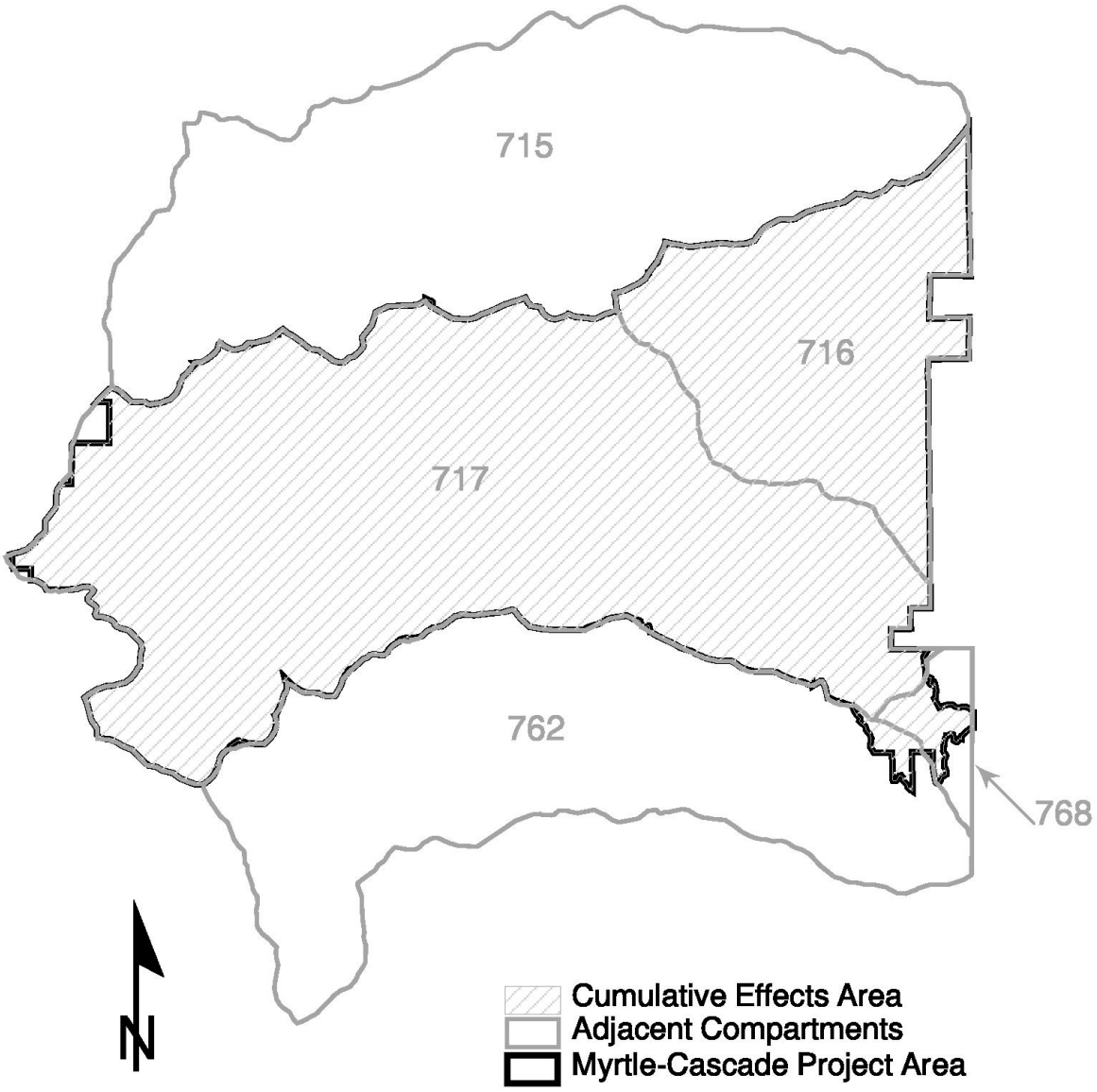
Table 4 - Myrtle Creek Changes in Landscape Pattern (FRAGSTATS Data)					
Existing Condition	**Mean Patch Size (ha)**	**Patch Size SD (ha)**	**Contrast Weighted Edge Density (m/ha)**	**Mean Core Area 1 (ha)**	**Core Area SD 1 (ha)**
LANDSCAPE TOTAL	69.75	114.93	12.70	37.57	188.16
SHRUB/SEED/SAPL	62.41	102.60	7.50	37.19	74.04
POLE	76.94	107.04	1.85	42.63	74.08
IMM/MED	46.01	52.25	3.71	21.48	32.97
MAT/LRG	67.66	132.15	4.97	32.98	75.92
OLD GROWTH	108.11	154.37	5.24	61.91	107.90
Alternative 2					
LANDSCAPE TOTAL	69.23	111.48	13.14	37.03	186.41
%Change from Existing	*-0.74%*	*-3.00%*	*3.46%*	*-1.44%*	*-0.93%*
SHRUB/SEED/SAPL	60.94	99.15	7.97	36.00	71.64
%Change from Existing	*-2.36%*	*-3.36%*	*6.27%*	*-3.20%*	*-3.24%*
POLE	76.52	107.13	1.84	42.63	74.07
%Change from Existing	*-0.55%*	*0.09%*	*-0.54%*	*0.00%*	*-0.01%*
IMM/MED	45.69	52.23	3.77	21.09	32.88
%Change from Existing	*-0.70%*	*-0.04%*	*1.62%*	*-1.82%*	*-0.27%*
MAT/LRG	67.46	122.08	5.29	31.96	67.03
%Change from Existing	*-0.30%*	*-7.62%*	*6.44%*	*-3.09%*	*-11.71%*
OLD GROWTH	108.11	154.37	5.29	61.91	107.90
%Change from Existing	*0.00%*	*0.00%*	*0.93%*	*0.00%*	*0.00%*

Table 5 - Cascade Creek Changes in Landscape Pattern (FRAGSTATS Data)					
Existing Condition	**Mean Patch Size (ha)**	**Patch Size SD (ha)**	**Contrast Weighted Edge Density (m/ha)**	**Mean Core Area 1 (ha)**	**Core Area SD 1 (ha)**
LANDSCAPE TOTAL	38.01	52.26	17.64	16.60	45.84
SHRUB/SEED/SAPL	36.89	45.10	13.55	20.33	27.34
POLE	21.62	14.03	2.69	4.33	4.68
IMM/MED	15.37	17.74	2.06	3.75	5.06
MAT/LRG	87.56	76.73	6.26	44.24	43.48
OLD GROWTH	39.50	53.61	10.21	12.79	20.65
Alternative 2					
LANDSCAPE TOTAL	35.39	49.37	19.40	14.95	42.67
%Change from Existing	*-6.89%*	*-5.53%*	*9.98%*	*-9.94%*	*-6.92%*
SHRUB/SEED/SAPL	31.81	41.60	15.38	16.83	25.43
%Change from Existing	*-13.77%*	*-7.76%*	*13.51%*	*-17.22%*	*-6.99%*
POLE	21.62	14.03	2.69	4.33	4.68
%Change from Existing	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*
IMM/MED	15.38	17.74	2.15	3.76	5.06
%Change from Existing	*0.07%*	*0.00%*	*4.37%*	*0.27%*	*0.00%*
MAT/LRG	81.81	73.20	7.47	39.16	41.17
%Change from Existing	*-6.57%*	*-4.60%*	*19.33%*	*-11.48%*	*-5.31%*
OLD GROWTH	39.50	53.61	10.58	12.79	20.65
%Change from Existing	*0.00%*	*0.00%*	*3.62%*	*0.00%*	*0.00%*

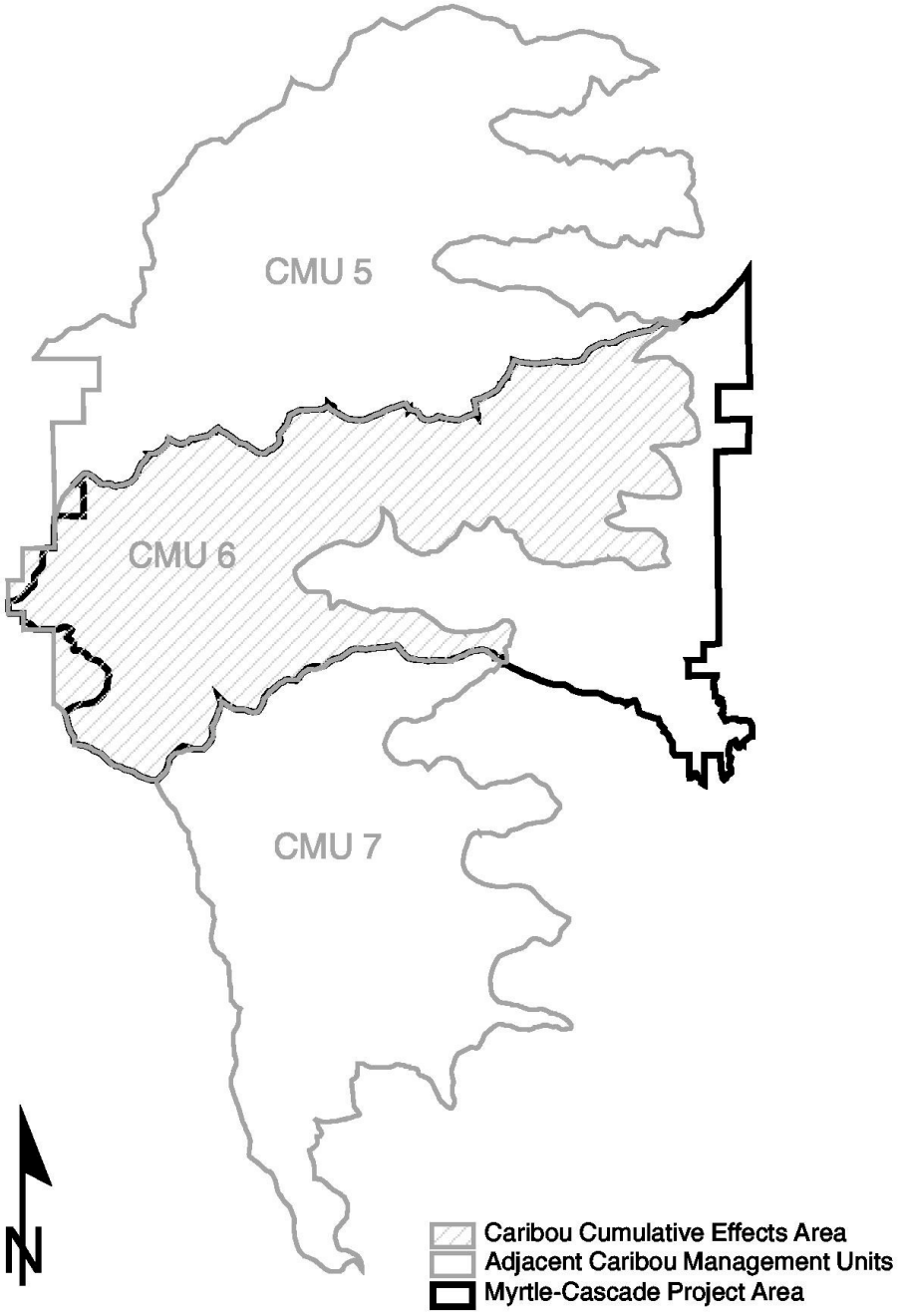
APPENDIX F - Cumulative Effects Areas (CEAs)

Myrtle-Cascade EIS Project
Cumulative Effects Area For Vegetation & Other Wildlife

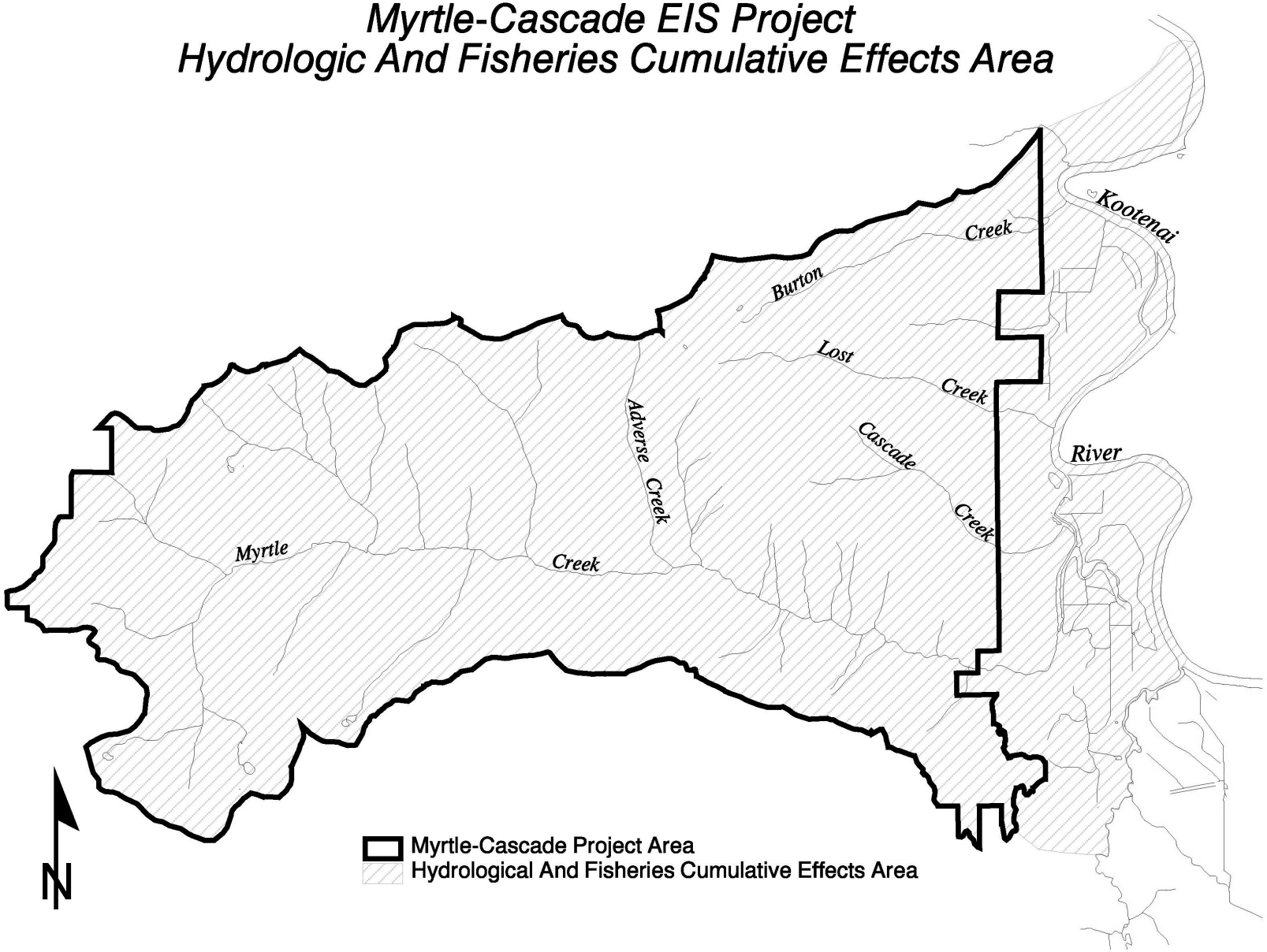
Other wildlife includes: black-backed woodpecker, boreal toad, Couer d'Alene salamander, common loon, flammulated owl, fisher, harlequin duck, northern bog lemming, northern goshawk, northern leopard frog, Townsend's big-eared bat, wolverine, American



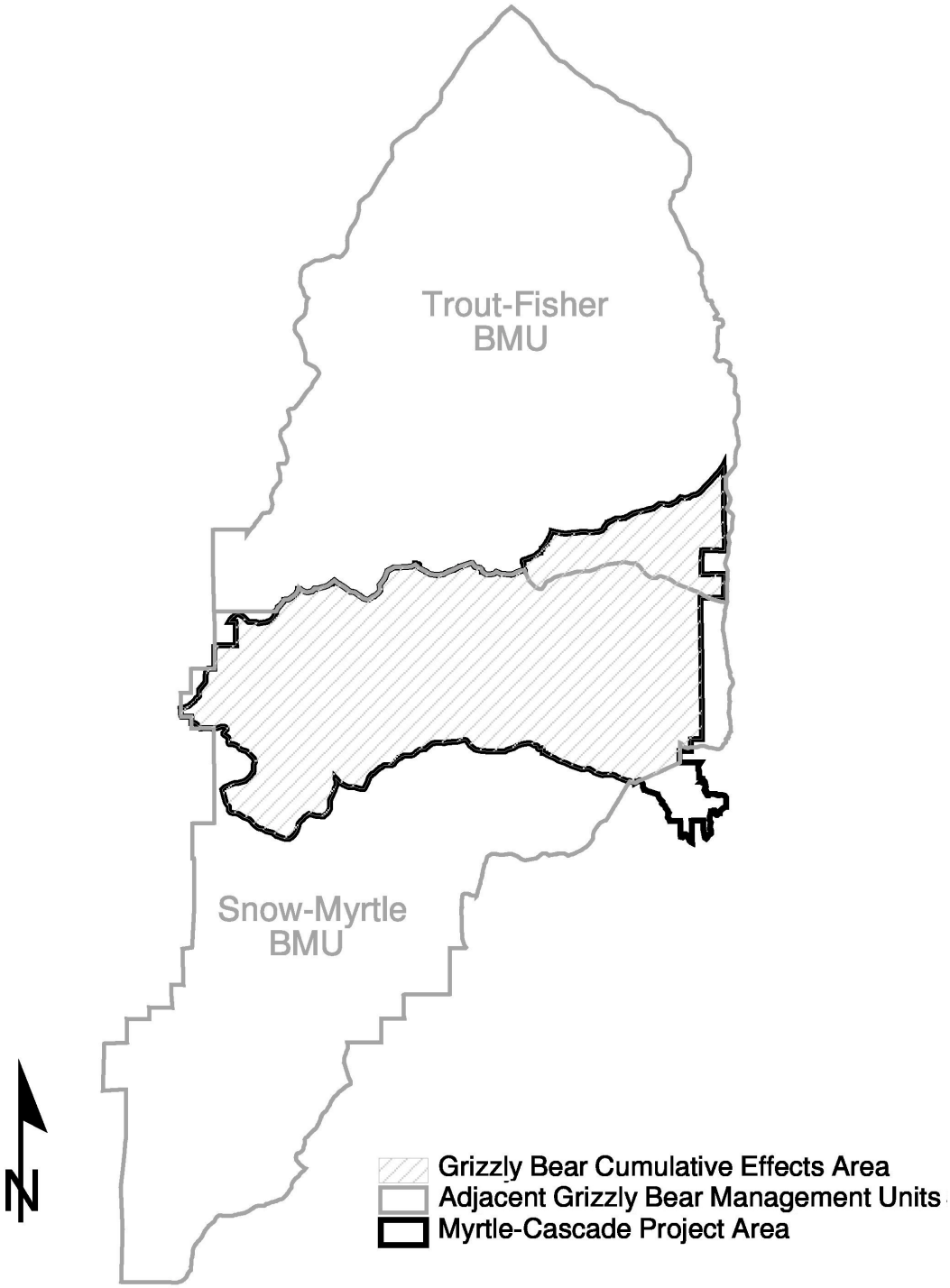
Myrtle-Cascade EIS Project
Caribou Cumulative Effects Area



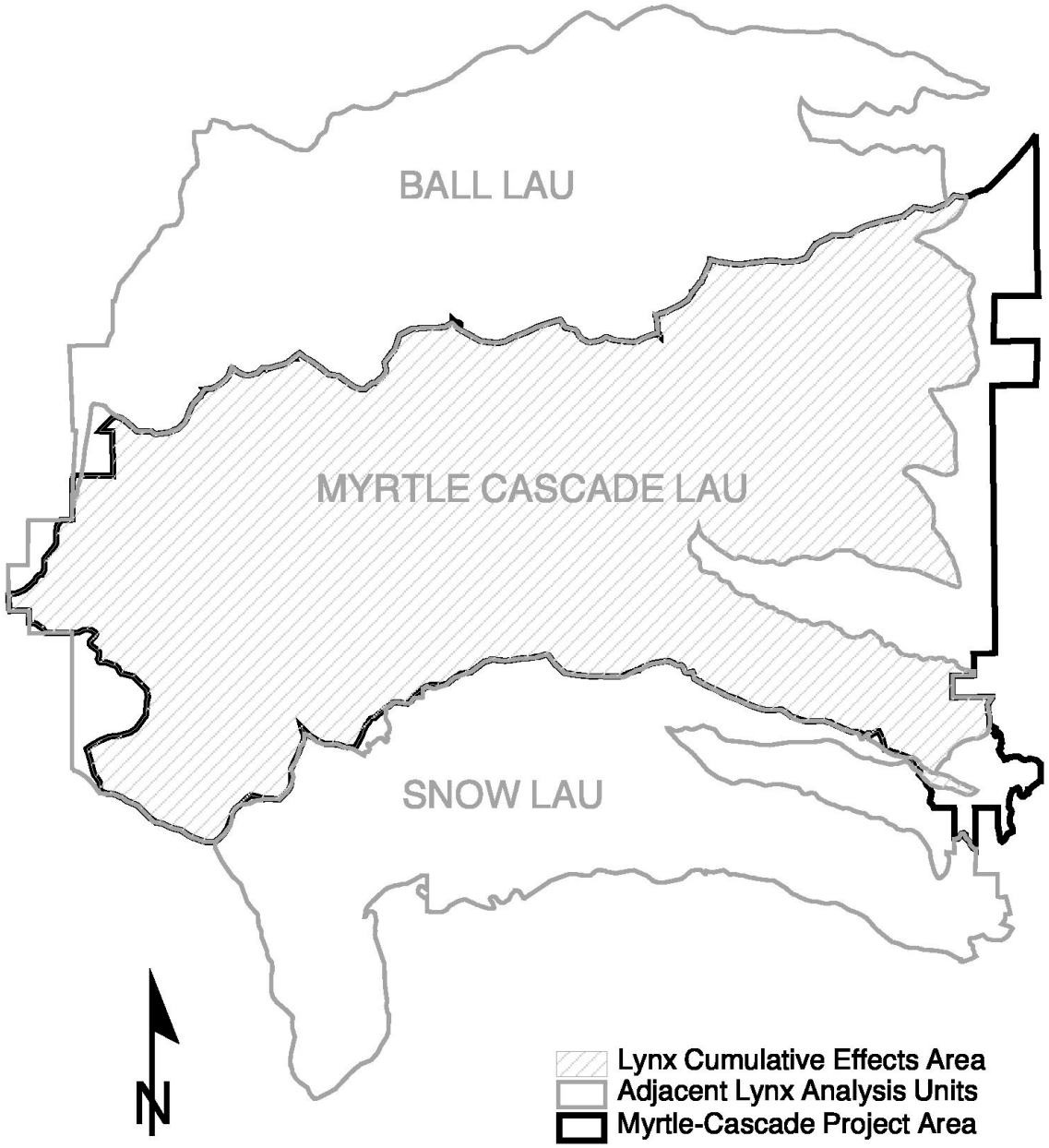
Myrtle-Cascade EIS Project
Hydrologic And Fisheries Cumulative Effects Area



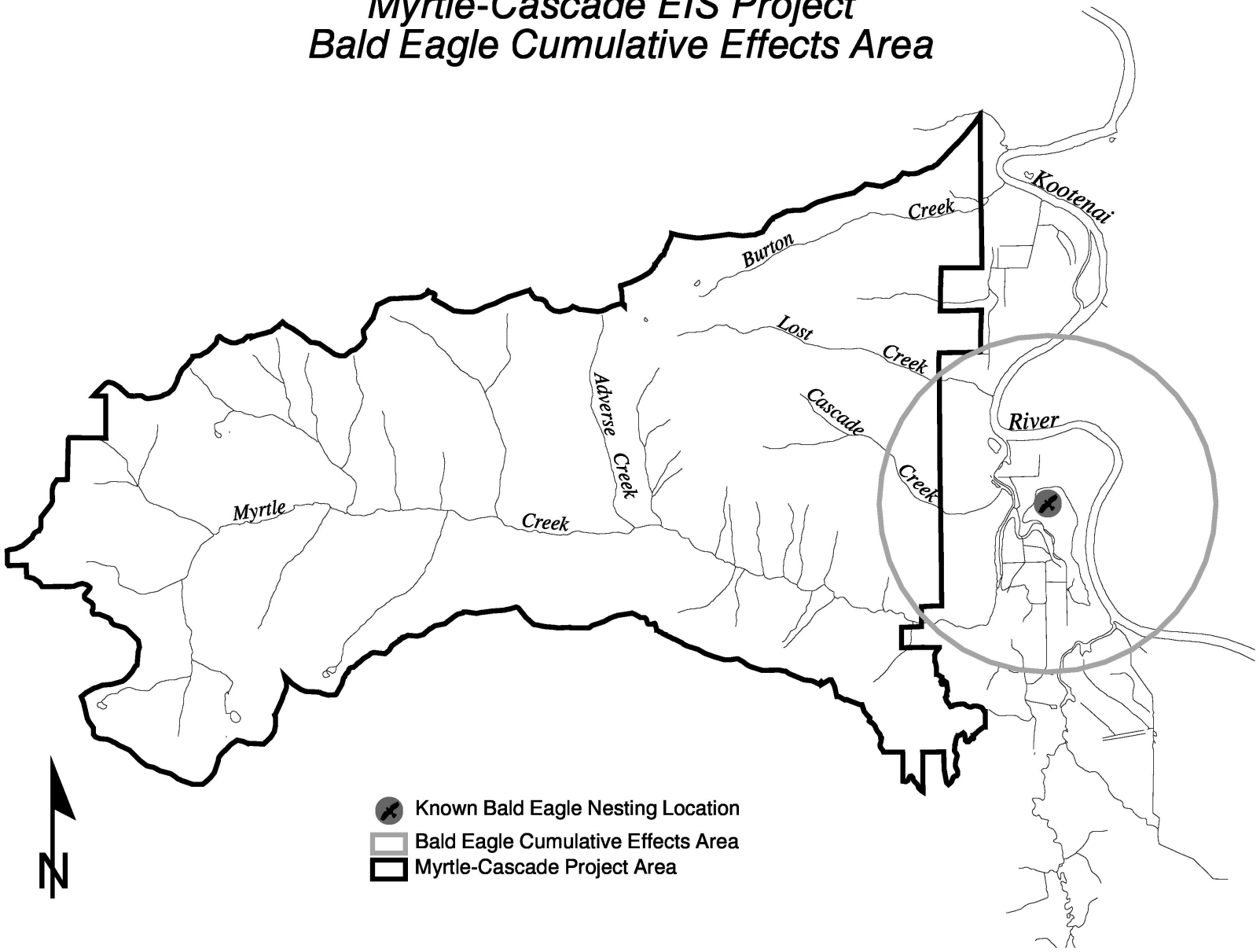
Myrtle-Cascade EIS Project
Grizzly Bear Cumulative Effects Area



Myrtle-Cascade EIS Project
Lynx Cumulative Effects Area



Myrtle-Cascade EIS Project
Bald Eagle Cumulative Effects Area



APPENDIX G - Reasonably Foreseeable Actions