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Idaho Panhandle National Forests

Northern Prairie
Environmental Assessment

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Bonners Ferry Ranger District

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Chapter 1 - Purpose and Need

1.1 Project Area and Location

The Northern Prairie project area covers roughly 21,500 acres and is located approximately 20 miles north of Bonners Ferry, Idaho, on public lands administered by the Bonners Ferry Ranger District. The project is located on the northern end of the Purcell Mountains in Sections 15, 16, 17, 18, 19, 20 and 30, T.65N, R2E, and Sections 13, 14, 24, 25, 26, and 34, T65N, R1E, Boise Meridian.

1.2 Purpose and Need

The purpose and need for the Northern Prairie project were derived from the assessments described below in the "Overview of Scientific Findings", and from field reviews and surveys of the resources in the Northern Prairie project area. Based on this information the purpose and need, or objectives, for entering the Northern Prairie project area are to:

1. Improve ecosystem composition and structure and landscape diversity by providing for tree species, stocking levels, and landscape patterns that better resist insects, diseases, and wildfire. More specifically:

   - Reduce the number of trees per acre of Douglas-fir, and favor the development of large diameter ponderosa pine and western larch on dry forest types. Additionally, create forest openings that will allow for regeneration of ponderosa pine and western larch on dry forest types and western larch and western white pine on moist forest types.

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.

As stated in the 1987 Forest Plan (II-1), "The Idaho Panhandle National Forests will continue to provide a significant timber raw materials base to support the local and national economies and social needs." Meeting the vegetation management objectives of the Northern Prairie EA will help meet the Forest Plan goals related to a providing a sustained flow of timber products (Forest Plan II-2) from the IPNF. However, since the inception of the Forest Plan the social and political climate on the Forest has changed considerably and the amount of timber sold from National Forest system lands has decreased by more than 80% (project file - VEG042). Therefore, the purpose and need is focused more on the ecosystem components that will be retained rather than those that will be removed; i.e., the amount of merchantable timber products removed will be a by-product of achieving the vegetation management objectives stated above.

1.3 Overview of Scientific Findings From Broad Scale to Site Specific

To arrive at the purpose and need for this project information from a number of scientific assessments was used. Starting at the broad scale of the Columbia River Basin, general information about characteristics of the ecosystem in the basin was determined. From there, an analysis to more specific levels of information--from the river basin level, to a subbasin level, to a watershed area level, and finally to a subwatershed or project area level were determined. General information from these assessments and how they relate to the Northern Prairie Project Area are briefly described below.

1.3-A Interior Columbia Basin Ecosystem Management Project (ICBEMP)

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

- Risks to late and old forest structures in managed areas,
- Forest compositions susceptible to insects, disease and fire, and
- Risks to hydrologic and aquatic systems from fire potential.

In the assessment, the level below the Columbia River Basin scale was defined as "subbasin." The Northern Prairie project is located in the Kootenai River subbasin, one of 164 subbasins in the Columbia River Basin.

1.3-B Northern Region Overview

The Northern Region Overview (USDA 1998) focused on priorities for restoring ecosystem health and availability of recreation opportunities. The Overview considered and incorporates findings from the Interior Columbia River Basin Assessment and Northern Great Plains assessments. The Northern Region Overview Summary explores this Region's situation with regard to ecosystem health and recreation.

The Overview findings conclude that there are multiple areas of concern in the Northwest Zone of the Region (which includes the Idaho Panhandle National Forests), but that "this subregion holds the greatest opportunity for vegetation treatments and restoration with timber sales. Aquatic restoration should be focused on specific needs based on the zone aquatic restoration strategy" (Northern Region Overview Summary, USDA October 1998, p. 9).

The Overview goes on to state, “The timber management (timber harvest) tool best fits with the forest types in northern Idaho and is essential, for example, to achieve the openings needed to restore white pine and larch, and maintain upland grass/shrub communities. It can enhance terrestrial/watershed objectives where timber funds are used to close and improve roads. Aquatic restoration could tie with assessing road access needs and obliteration of nonessential [roads]” (Northern Region Overview Summary, USDA October 1998, p. 33).

1.3-C North Zone Geographic Assessment

The Idaho Panhandle National Forests (IPNF) has been assessing the ecological conditions across the North Zone sub-basins, which includes the Kootenai River sub-basin (essentially the Bonners Ferry Ranger District). Within the Kootenai River sub-basin lays the Moyie River watershed, which includes the Round Prairie Creek watershed. The North Zone Geographic Assessment (NZGA) defines forests in the Northern Prairie project area as "Low Integrity/High Risk Landscapes." Some of the specific findings that relate to the Northern Prairie project area are:

- These landscapes have changed the most from historic conditions due to major losses of long-lived seral species (ponderosa pine, western larch, and western white pine).
- These landscapes contain large areas of forest types with high probability of major successional change in the next few decades.
- Douglas-fir is at an age where combinations of root diseases and bark beetles begin to create high mortality.
- Dense and multi-storied stands of Douglas-fir or true firs dominate dry habitat types.
- Current forests area dominated by shade tolerant, and drought and fire intolerant species (grand fir, western red cedar, and western hemlock), and short-lived seral species (lodgepole pine and Douglas-fir).
- There is a growing fire risk as a result of natural fuels accumulations.
- These landscapes are the most heavily altered from historic conditions and contain the greatest need and opportunity for large scale forest vegetation restoration.

The management recommendations that relate to the Northern Prairie project area are specifically focused on the restoration of long-lived early seral species (ponderosa pine, western larch, and western white pine). Some of these recommendations include:

- Use regeneration harvest and prescribed fire to create openings that will favor development of long-lived early succession tree species, including blister rust-resistant white pine.
- Use a variety of silvicultural methods (thinning and regeneration) and prescribed fire to sustain and favor long-lived early succession tree species where they are present.

Restoring long-lived early seral species would:

- Reduce the extent of drought and fire intolerant species (grand fir, western hemlock, and western red cedar) on sites where they are not well-adapted and likely drought stressed.
- Reduce the extent of short-lived early seral forest species (Douglas-fir and lodgepole pine) that are near the end of their pathological rotation age.
- Lower the risk of large, severe disturbances.

The aquatic component of the NZGA assigns a Watershed "Functioning" Condition rating for watersheds based on three categories: overall inherent sensitivity, watershed disturbance and riparian disturbance. Overall sensitivity of the drainage evaluates the percentage of sensitive landtypes and acres in the rain-on-snow zone compared to the total acres of the drainage. Watershed disturbance is derived from evaluating the combination of upland road densities, hydrologic openings and percentage disturbance on sensitive landtypes. Riparian disturbance is based on miles of encroaching roads, riparian road density, and stream crossing frequency.

Watershed Functioning Conditions are defined as follows:

Properly functioning**:** Within the scope of this assessment, a properly functioning watershed system is one that is exhibiting dynamic equilibrium characteristics and whose streams are operating and responding appropriately under their current environment. These systems can absorb and respond to disturbances under which they have evolved within their natural range of variability. Typically, parts of these systems, or the system as a whole, can move toward a more stable condition over time following a disturbance (or a series of disturbances) within a certain time period. As a system, these watersheds are not high priority for large-scale watershed restoration actions (although local, site-specific improvements may be beneficial.).

Functioning-at-risk (FAR): A watershed system that is functioning-at-risk is one that is essentially still properly functioning. They continue to have good physical, hydrologic and water quality integrity. However, present or ongoing adverse disturbances are likely to compromise watershed function and initiate a trend toward "not properly functioning" if the disturbances are not modified or corrected. A FAR status may also be assigned where the apparent watershed status is uncertain due to the complexity of the watershed system and the historic and current watershed disturbances.

These systems are the first priority for large-scale watershed system restoration and improvement programs. Such programs will often produce effective and timely responses in the near future.

Not properly functioning (NPF): Watershed systems that are not properly functioning exhibit rapid adverse trends and are not fully supporting beneficial uses. These systems are in need of large-scale restoration. These watersheds are usually second priority due to limited availability of resources, uncertain technology, and the long time period expected for positive responses.

The Round Prairie Creek Watershed is considered "functioning-at-risk" due to its high overall inherent sensitivity and its moderate riparian and watershed disturbance. Past logging and road construction activities have occurred throughout the drainage, including in Canada and on private lands.

Restoration efforts should include identifying and decommissioning roads that are no longer needed and pose a threat to hillslope hydrology and aquatic habitat. Road improvements should also be considered, especially for roads within Riparian Habitat Conservation Areas.

1.3-D Northern Prairie Assessment Area

The assessments described above provide guidance for project level planning. A consistent theme from the Columbia River Basin to the Kootenai River sub-basin is the need for restoration of long-lived early seral species, especially on dry forest habitats. According to the NZGA only 12% of the Kootenai River sub-basin is composed of dry forest types. The Northern Prairie assessment area provides some of largest contiguous blocks of dry forest types on National Forest land within the Kootenai River sub-basin. In addition, the moist forest types, that transition into these dry forest types, provide the opportunity for much needed white pine restoration. The Northern Prairie area provides the restoration opportunities described above.

1.4 Proposed Action

The proposed action includes vegetation treatments on approximately 1,331 acres. Proposed silvicultural treatments would include use of shelterwood and free selection systems. Logging

systems would include tractor, skyline and helicopter. Fuels would be treated using prescribed fire and mechanical piling. Approximately 1.5 of existing roads would be reconstructed and another 7.5 miles would be reconditioned. An estimated 11.0 miles of roads that are currently not drivable would be decommissioned. Individual treatments were identified based on their ability to meet the stated purpose and need. 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. Chapter 2 provides more detailed information regarding the proposed treatments.

1.5 Scope of the Analysis

The Northern Prairie EA analyzes the environmental effects of the proposed action within the assessment area and the surrounding landscape (Figure 1-1). 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.

1.6 Policy Direction and Legal Guidance

1.6-A Laws

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

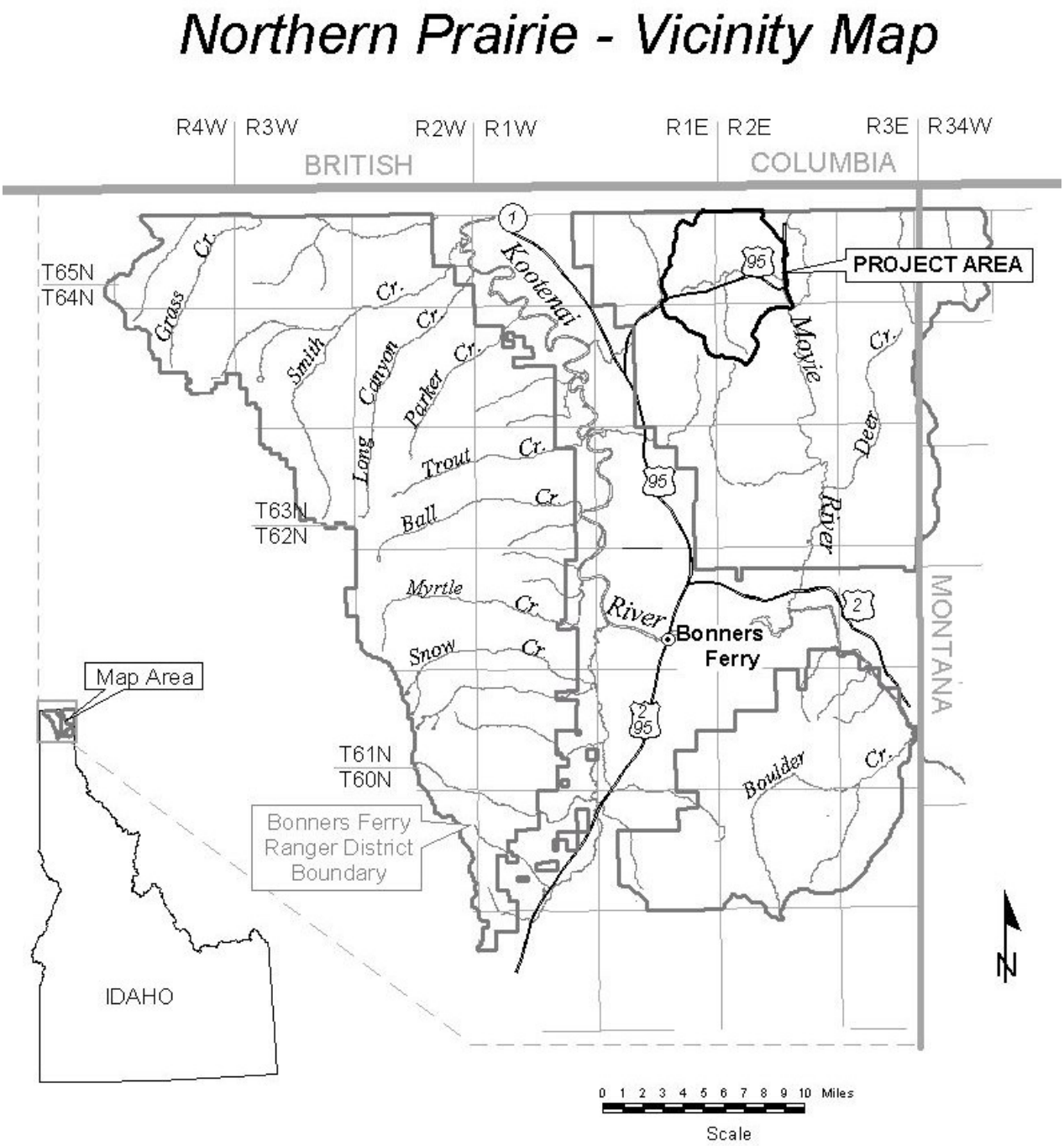
1.6-A.1 Federal Laws

- The National Environmental Policy Act (NEPA) (1970)
- The Clean Water Act (1948) and amendments (1972)
- The Clean Air Act (1955)
- The National Forests Management Act (1976)
- The Forest and Rangeland Renewable Resource Act (1974)
- The Archaeological Resources Protection Act (1979)
- The National Historic Preservation Act (1966)
- Idaho Forest Practices Act (1974) and amendments
- Multiple Use Sustained-Yield Act of 1960
- Endangered Species Act (ESA) of 1973 (as amended)
- American Indian Religious Freedom Act of 1980

1.6-A.2 Executive Orders

- Executive Order 11593 (protection and enhancement of the cultural environment)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)

Figure 1-1 Proposed Project Area Boundary



1.6-B Natural Resource Agenda

On March 2, 1998, former Forest Service Chief Mike Dombeck announced the Forest Service Natural Resource Agenda. The Agenda provided a focus for the Forest Service, and identifies specific areas where there will be added emphasis. The four key areas identified are: 1) Watershed Health and Restoration; 2) Sustainable Forest Ecosystem Management; 3) Forest Roads; and 4) Recreation.

This proposal and the additional action alternatives are consistent with the Agenda. Watershed health and restoration would be addressed through road maintenance, decommissioning, reconstruction and reconditioning. Sustainable forest ecosystem management would be addressed by converting stands to desired, long-lived species less susceptible to disease, by improving growth and productivity of those species where they exist, and by reducing potential fire severity and the continuing mortality of insect and disease infested stands. Forest roads would be addressed by constructing temporary roads to accomplish proposed activities, by reducing sediment risks posed by existing roads, and by decommissioning unneeded roads.

1.6-C National Fire Plan

"Operating principles directed by the Chief of the Forest Service in implementing this include: firefighting readiness, prevention through education, rehabilitation, hazardous fuel reduction, restoration, collaborative stewardship, monitoring, jobs, and applied research and technology" (from Protecting People and Sustaining Resources in Fire-Adapted Ecosystems: A Cohesive Strategy, p.11-12).

The restoration portion of this strategy states, "Restore healthy, diverse, and resilient ecological systems to minimize uncharacteristically intense fires on a priority watershed basis. Methods will include removal of excessive vegetation and dead fuels through thinning, prescribed fire, and other treatment methods."

Although the Northern Prairie project is not specifically considered a proposal under the National Fire Plan, the project is consistent with the direction to manage and reduce overly dense forest vegetation through development of actions which are designed to restore resilient ecosystems and that will sustain the resources through time. There are some "at risk communities" in the project vicinity as defined in Title 1, Section 101, (1)(A)(ii) of the Healthy Forests Restoration Act (HFRA).

1.6-D Final Rule – Administration of the Forest Development Transportation System

In January 2001, the Forest Service Manual, which governs regulations concerning the management, use and maintenance of the National Forest Transportation (Road) System, (Chapter 7700) was revised with a "Final Rule." The revision de-emphasized the development of forest road systems and added a requirement for science-based roads analysis. The intent of the revision is "to help ensure that additions to the National Forest network of roads are those deemed essential for resource management and use; that, construction, reconstruction, and maintenance of roads minimize adverse environmental impacts; and finally, that unneeded roads are decommissioned and restoration of ecological processes are initiated" (36 CFR Part 212).

An interim directive issued in December 2001 established that all road management decisions signed after January 12, 2002 must be informed with a "roads analysis" (Interim Directive 7710-2001-3, project file). The Final Rule set forth that if a forest level roads analysis has not been completed, the Responsible Official (in this case, the Bonners Ferry District Ranger) determines whether a roads analysis is needed at the project scale, and if so, what level of analysis is necessary to support a project-level decision. Given the scope of this project an interdisciplinary team (IDT) was convened to conduct a comprehensive analysis of the roads in the project area. Considering all resource needs the team made recommendations regarding the long-term use and classification of these road systems. The recommendations of this team are incorporated as part of this analysis

1.6-E Forest Service Handbook Objectives and Direction

Forest Service Handbook (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:

- Develop and maintain desired forest conditions over time, and
- Utilize the timber resource."

These Handbook objectives are not mutually exclusive. Both must be considered when applying a harvest cutting method. Specific silvicultural operations can be used to create the desired stand structures and manipulate 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 reburn of areas in subsequent years;
- Site preparation to reduce undesired fuel, soil, or vegetation conditions; and 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;
- Genetic management for trees, shrubs, and herbs to develop races which are resistant to introduced pests (Oliver et al. 1994).

1.7 Forest Plan Direction

The IPNF Forest Plan provides direction for all resource management programs and resource activities on the IPNF. The Forest Plan consists of Forest-wide goals and standards as well as Management Area specific standards and guidelines that provide for land uses and resource outputs. The IPNF Forest Plan embodied the provisions of the National Forest Management Act (NFMA) of 1976 and its implementation regulations, as well as those of other guiding documents (see "Laws" section).

Specific Forest Plan goals (USDA 1987, p. II-1 & II-2) that guided the development of the Purpose and Need are:

- Provide for a diversity of plant and animal communities.
- Maintain high quality water to protect fisheries habitat, water based recreation, public water supplies, and be within state water quality standards.
- Manage resource development to protect the integrity of the stream channel system.

- Provide efficient fire protection and fire use to help accomplish land management objectives.
- Manage the forest resources to protect against insect and disease damage.

There are many Forest Plan Standards that are applicable to the general design of the proposed action. Specific Forest Plan Standards (USDA 1987, pp. II-32-34, II-38-39) that guided the development of the Purpose and Need are:

- Reforestation will normally feature seral tree species, with a mixture of species usually present. Silvicultural practices will promote stand structure and species mix that reduce susceptibility to insect and disease damage.
- Project design will provide for site preparation and slash hazard reduction practices that meet reforestation needs of the area.
- Maintain concentrations of total sediment or chemical constituents within State standards.
- Encourage utilization of forest products to reduce biomass, which must be disposed of otherwise.
- Activity fuels will be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.
- Vegetation management [through fire] will favor the use of fire, hand treatment, natural control, or mechanical methods whenever feasible and cost effective. Direct control methods, such as chemical or mechanical, may be used when other methods are inadequate to achieve control.

The IPNF Forest Plan designated Management Areas (MAs) to guide the management of National Forest lands within the IPNF. Each MA provides for a combination of activities, practices, and uses appropriate to the management goals and objectives of that specific management area.

The Northern Prairie project area is comprised of lands in four MAs and Riparian Habitat Conservation Areas (RHCAs). Management Areas are described in detail in the IPNF Forest Plan on pages III-1 through III-87. Summaries of the Management Area Goals specific to the project area are as follows:

Management Area 1 (67% of area) consists of lands designated for timber production.

Management Area 4 (13% of area) consists of lands designated for timber production within big game winter range.

Management Area 9 (20% 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.

Management Area 17 (< 1% of area) includes existing and proposed developed recreation.

1.8 Decision To Be Made

This Environmental Assessment is not a decision document. The EA discloses the environmental consequences of proceeding with the proposed action or any of the alternatives. The deciding officer (IPNF Forest Supervisor) will select an alternative based on the information in this document, on public comments, on financial considerations, and on how well the preferred alternative meets the purpose and need of the project and complies with applicable state and federal laws, agency policy and Forest Plan direction.

Decisions to be made include whether to select an action alternative and, if so:

- When proposed activities could begin and whether there are any time restrictions
- What type of vegetation prescriptions would occur and where
- What type of fuels treatment would occur and where
- What mitigation and monitoring requirements would take place
- Logging systems to be used
- Miles of road reconstruction and decommissioning

Chapter 2 - Alternatives

2.1 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.

2.2 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

2.2-A Forest Vegetation

A short definition of a healthy forested ecosystem is, "a forest 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.

The North Zone Geographic Assessment (NZGA) defines forests in the Northern Prairie project area as "Low Integrity/High Risk Landscapes." These landscapes have changed the most across the North Zone from historic conditions due to major losses of long-lived seral species (ponderosa pine, western larch, and western white pine). These landscapes are the most heavily altered from historic conditions and contain the greatest need and opportunity for large-scale forest vegetation restoration. In the Northern Prairie project area the most significant changes have occurred in dry forest types. Prior to the 20th century, many stands in these forest types were burned frequently by low- or mixed-severity fire; occasional stand-replacing fire occurred as well. Where fires occurred at relatively short intervals (less than 25 years), they were mostly non-lethal. All-aged structures were produced by non-lethal fire regimes, and even-age structures were produced by fire regimes with a combination of non-lethal fire patchy, severe fire (Smith and Fischer 1997). On similar stands in western Montana, fires at mean intervals of less than 50 years account for the presence of old growth ponderosa pine (Arno and others 1995). Additionally, on moist forest types western white pine has been replaced by grand fir, western red cedar, and western hemlock, species that are more tolerant of shade, and less tolerant of drought and fire. The issue indicators in Table 2-1 will be used to evaluate direct, indirect, and cumulative effects of different vegetation management alternatives.

Table 2-1. Principle Issues and Indicators: Forest Vegetation

Principle Issue	Principle Issue Indicators
Forest Composition	Acres trended towards restoration of long-lived seral species; i.e., ponderosa pine, western larch and western white pine. In particular, restoration of ponderosa pine in dry forest types is a primary concern.
Forest Structure	Acres trended towards restoration of historic forest structures. Dense stands of immature Douglas-fir and grand fir now dominate the landscape. Historically, open-grown stands of large-diameter ponderosa pine, western larch, and white pine were a much more significant component of these forests than they are currently.
Forest Openings	Increase in the size of forest openings compared to historic estimates.
Risk of Stand-Replacing Fire in Dry Forest Types	Due to changes in species composition and over 80 years of fire suppression, stand-replacing fire is one of the greatest risks to dry forest types. Using the SIMPPLLE Model (Simulating Vegetative Patterns and Processes at the Landscape Level) changes in risk can be estimated relative to no action.
Insects and Diseases	Given the dominance of species (Douglas-fir and grand fir) on the landscape that are susceptible to root diseases, changes in root disease risk is an important indicator of ecosystem health. The SIMPPLLE model will be used to estimate changes in risk relative to no action. Acres trended toward reduced risk of mountain pine beetle and Douglas-fir beetle. Given the abundance of mature Douglas-fir and lodgepole pine forests, and valuable old growth ponderosa pine components, susceptibility to bark beetle attacks is a concern.

2.2-B Wildlife

The distribution and abundance of wildlife is primarily a function of habitat conditions (i.e., vegetation type and successional stage). These conditions reflect inherent potential (i.e., capable habitat) and current ability (i.e., suitable habitat) of a site to provide essential habitat requirements for a given species as well as disturbance types (i.e., fire, windthrow, landslide, and insect outbreaks) and frequencies. Fire suppression and timber harvest have been the predominant factors affecting habitats in the project area.

A list of threatened and endangered species, Forest Service sensitive species, management indicator species (MIS), and other species and habitats of special interest was developed from the Forest Service Region 1 list and from known species occurrence on the Bonners Ferry Ranger District. The species list was reviewed to determine each species' relevance to the Northern Prairie project based on known species distribution and habitat availability. Table 2-2 lists species and species habitats that are considered present and possibly affected in a measurable way. Table 2-3 lists principle issues and indicators wildlife that will be used to assess potential effects on species, species habitats, or both. Habitat requirements, reference conditions, and existing conditions are provided in Chapter 3 and potential effects on these species (or their habitats) are disclosed in Chapter 4.

Species (and their habitats) absent from the project area, or, present in the project area, but not measurably affected by the proposed actions (i.e., either no effect or impacts at a level that would not influence species use or occurrence) are discussed in Appendix A.

Table 2-2. Wildlife Species Analyzed in Detail

Species	Rationale for Detailed Analysis	Preferred Habitat
Threatened and Endangered		
Canada Lynx (*Lynx canadensis*)	Part of project area lies within established Lynx Analysis Unit. Lynx habitat affected.	Higher elevation lodgepole pine and spruce/ fir forests with adequate prey base of snowshoe hares, its primary food.
Gray Wolf (*Canis lupus*)	Recent wolf pack activity documented near the project area.	Wide variety of habitats that are generally remote and isolated from human development. Adequate populations of prey species, often wintering concentrations of deer or elk.
Grizzly Bear (*Ursus arctos horribilis*)	Documented recent use within the project area.	Habitat generalist. Denning areas isolated and remote from human development.
Sensitive		
Black-backed woodpecker (*Picoides arcticus*)	Habitat is present and potentially impacted in the project area.	Early post-fire or insect-infested forest stands. High densities of small-diameter snags.
Flammulated Owl *(Otus flammeolus)*	Suitable habitat is present and potentially impacted in the project area.	Mature or old growth ponderosa pine, Douglas-fir forest.
Fisher *(Martes pennanti)*	Suitable denning and foraging habitat in the project area and potentially affected.	Mesic mature forest habitats
Western Toad *(Bufo boreas)*	Terrestrial and breeding habitat present within the project area.	Adults occur in a variety of uplands. Breed in shallow ponds, lakes, or slow moving streams.
Management Indicator		
Northern Goshawk *(Accipiter gentilis)*	Suitable habitat for goshawk nesting or foraging is present and potentially impacted within the project area.	Mature to old growth forest with relatively closed canopies for nesting, variety of forested habitats for foraging.
Pileated woodpecker (*Dryocopus pileatus*)	Suitable habitat exists and is potentially impacted within the project area.	Forests with tall, large diameter dead or defective trees for nesting, variety of forested habitats for foraging.
Forest Land Birds	Habitat impacted in the project area.	Wide variety of forested and non-forested habitats.

Table 2-3. Alternative Driving Principle Issues and Indicators: Wildlife

Species	Principle Issue Indicators
Canada lynx	Amount of lynx habitat in a LAU currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, amount of lynx habitat regenerated in the previous 10-year period, and impacts to multi-storied mature or late-successional forests
Gray wolf	Changes in prey densities or human access
Grizzly bear	Changes in linear road densities
Black-backed woodpecker	Changes in quality of post-fire and insect-infested forest habitat
Flammulated owl	Changes to large snag habitat and trend toward suitable habitat conditions
Fisher	Changes to suitable denning habitat, changes to mature forest habitat
Western toad	Impacts to breeding habitat
Northern goshawk	Trends in suitable nesting habitat, structural changes in post-fledging family area (PFA)
Pileated woodpecker	Changes to large snag habitat and old growth habitat
Forest Land Birds	Impacts to priority habitats

2.2-C Watershed and Fisheries

The goal is to maintain and improve the aquatic ecosystems in the Gillon Creek and Round Prairie Creek watersheds. Specifically, this will involve restoring normal slope hydrology and riparian function where it has been altered by roads. Table 2-4 contains the indicators that would be used to measure the response and expected changes to the watershed and fisheries resources related to this project.

Table 2-4. Principle Issues and Indicators: Watershed and Fisheries

Principle Issue	Principle Issue Indicators
Hydrologic Function	Total road densities and road densities on sensitive landtypes (miles per square mile).
Riparian Function	Riparian road density (miles per square mile) and number of improved at risk stream crossings.
Soil Erosion And Mass Wasting	Percent of ground with detrimentally impacted soils modeled erosion and sediment delivery estimates (tons per acre).
Water Yield	Increase in equivalent clearcut acres (ECAs) per watershed.
Fisheries	Changes in riparian and hydrologic conditions

2.3 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.

1.1 Biodiversity

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

2.1 Social/Economic Factors

A. Cultural Resources
B. Economics/Community Stability
C. Visual Quality
D. Recreation
E. Public Health and Safety
   1) Effects on Minority Populations and Low-income Populations
   2) Roadless Area
   3) Minerals
   4) Water Resources And Aquatics
      (a) Microbial Contaminants
      (b) Inorganic Contaminants
      (c) Pesticides and Herbicides
      (d) Organic Chemical Contaminants
      (e) Radioactive Contaminants
      (f) Changes in Stream Dynamic Equilibrium
      (g) Stream Survey Data

2.4 Alternatives Considered But Eliminated From Further Study

2.4-A No Timber Harvest

An alternative was considered that would not treat stands with timber harvest prior to prescribed burning. 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 is relatively shallow on the south-facing dry-site stands, and would waste usable and highly demanded wood fiber that could 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.

2.5 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 two "action" alternatives. These alternatives were developed to address the significant issues that were outlined previously in this chapter.

2.5-A 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 would occur. No silvicultural treatments, roadwork (decommissioning, reconstruction, reconditioning, etc.), 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.

2.5-B Alternative 2

Under Alternative 2 the restoration of forest composition and structure would be met through a combination of silvicultural treatments and prescribed burning. Shelterwood with reserves (two-aged) prescriptions, which would be designed to regenerate long-lived seral species, would be the primary silvicultural treatment (1,062 acres). On dry-forest types regeneration would feature ponderosa pine and western larch. On moist and cool-moist forest types regeneration would feature white pine and western larch. An additional 155 acres would be treated using free selection (uneven-aged management) prescriptions. Alternative 2 also includes 114 acres of underburning that would improve wildlife habitat. This underburning would not involve timber harvest.

Alternative 2 would also include approximately 11.0 miles of road decommissioning, 7.5 miles of road reconditioning, and 1.5 miles of road reconstruction. No new road construction would occur.

2.5-C Alternative 3

Alternative 3 was designed as a modification of Alternative 2. The shelterwood prescriptions in dry-forest types were changed to of free selection (uneven-aged systems) prescriptions to address the flammulated owl and goshawk issues, for a total of 959 acres of free selection in dry forest types. Another 179 acres on moist and cool-moist forest types were also changed to free selection prescriptions in order to address lynx issues. These changes in prescription, which would result in considerably less forest canopy removal, would specifically address wildlife (flammulated owl, northern goshawk, and lynx) and hydrology (forest openings) issues raised in Alternative 2, while

still meeting the objectives for restoration of long-lived seral species, but to a lesser degree than Alternative 2. Alternative 3 does include 79 acres of shelterwood with reserves prescriptions. Alternative 3 includes the same road treatments as Alternative 2. Alternative 3 also includes the 114-acre wildlife habitat burn.

2.5-D Alternative Summaries

Table 2-5 provides a summary description and comparison of the proposed vegetation treatments for Alternatives 2 and 3. Figure 2-1 displays the proposed vegetation treatment areas for both action alternatives. The treatment unit numbers and acreages are the same for both Alternative 2 and 3. Table 2-6 provides a description of the proposed road treatments and Table 2-7 describes the fuels treatments. Figure 2-2 displays the proposed road treatments for both alternatives. Tables 2-8 and 2-9 provide detailed vegetation treatment information for Alternatives 2 and 3 including acres, prescription type, logging system, fuels treatment, and the estimated percent forest canopy cover before and after treatment, for each proposed treatment unit. Table 2-10 provides detailed information regarding the miles and type of roadwork that will be completed for each road. Table 2-11 provides summary information for the alternatives analyzed in detail. Information includes types of vegetation treatments, fuel treatments, logging systems, and road treatments. Table 2-12 provides a summary of how each alternative responds to the issues

Table 2-5. Proposed Vegetation Treatment Descriptions: Alternative Comparison

Shelterwood with reserves (dry-forest types)
These prescriptions would be designed to create two-storied stands featuring retention of large-diameter ***ponderosa pine*** and ***western larch*** in the overstory and regeneration of these same species in the understory. All of the acres would be considered regenerated with this entry. No future overstory removals would be conducted.

→ Alternative 2 = 945 Acres

Shelterwood with reserves (moist-forest types)
These prescriptions would be designed to create two-storied stands featuring retention of large-diameter ***white pine*** and ***western larch*** in the overstory and regeneration of these same species in the understory. All of the acres would be considered regenerated with this entry. No future overstory removals would be conducted.

→ Alternative 2 = 117 Acres

→ Alternative 3 = 79 Acres

Free Selection (dry-forest types)
These prescriptions would be designed to create multi-storied stands featuring retention of large-diameter ***ponderosa pine*** and ***western larch*** in the overstory and regeneration of these same species in the understory. An estimated 25-35% of the acres would be regenerated with this entry. No future overstory removals would be conducted

→ Alternative 2 = 14 Acres

→ Alternative 3 = 959 Acres

Free Selection (moist-forest types)
These prescriptions would be designed to create multi-storied stands featuring retention of large-diameter ***western larch*** and ***white pine*** in the overstory and regeneration of these same species in the understory. An estimated 25-35% of the acres would be regenerated with this entry. No future overstory removals would be conducted

→ Alternative 2 = 141 Acres

→ Alternative 3 = 179 Acres

Underburn w/ No Timber Harvest
Treatment would occur in a mixture of natural forest openings and patches of mature forest composed of mostly 90-100 year old ***subalpine fir, Douglas-fir,*** and ***lodgepole pine***. Underburning these stands would maintain the existing diverse forest structure by killing small conifers that are encroaching in the natural forest openings.

→ Alternatives 2 and 3 = 114 Acres

Figure 2-1. Proposed Vegetation Treatments

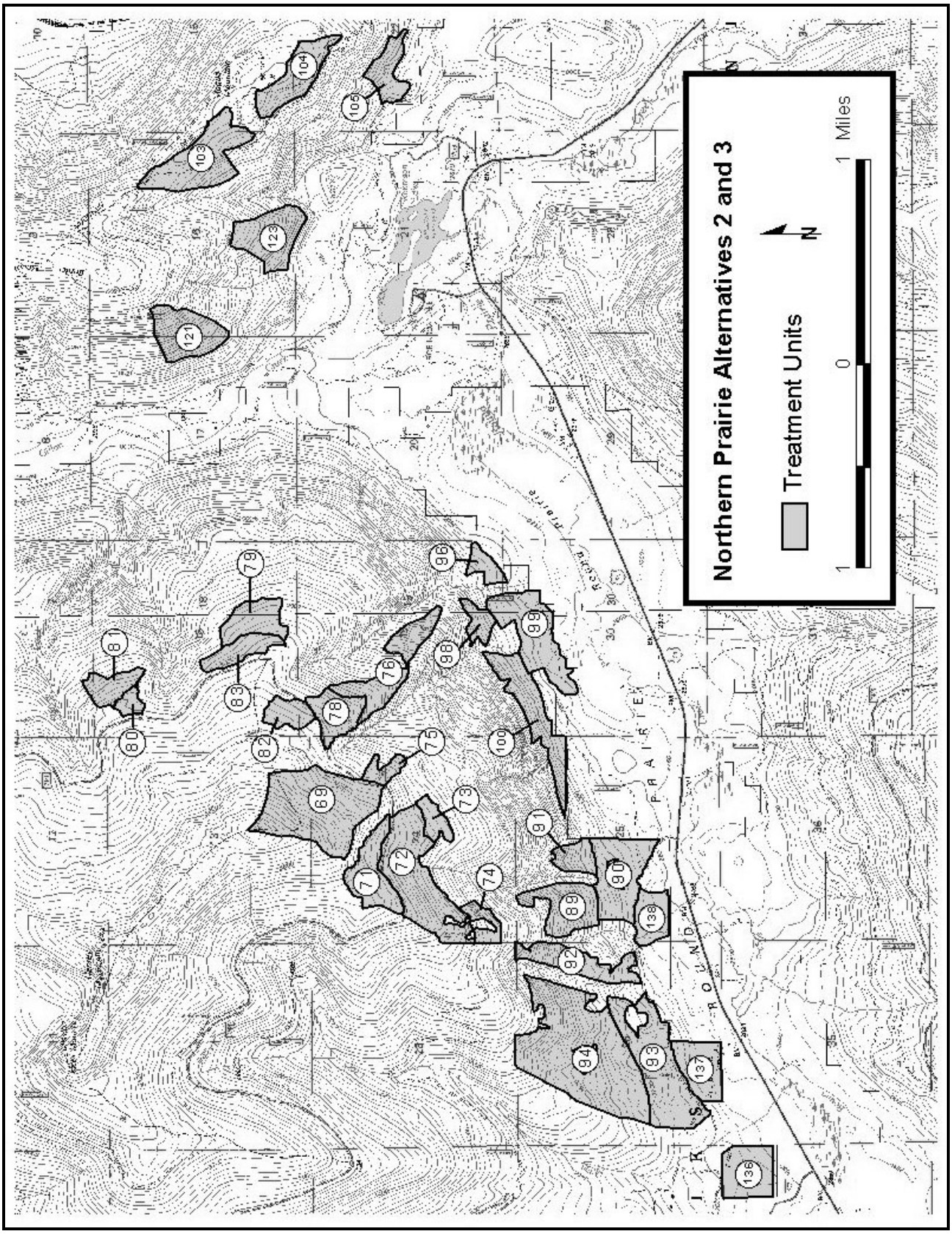


Table 2-6. Proposed Road Treatment Descriptions

Open Roads – Roads that are currently open to motorized use. These roads would remain open.

Access Currently Restricted – Drivable roads that are closed year round, or seasonally. No changes in existing access are proposed.

Reconstruction – Drivable roads, both open (0.9 miles) and those with access currently restricted (0.6 miles), where reconstruction is proposed. Reconstruction will include improving drainage (adding pipes), improving cut and fill slopes, and resurfacing (gravelling).

Reconstruction and Decommission – Open, drivable roads, that will be reconstructed, but will have the drainage structures removed following completion of the timber sale.

Reconditioning - Drivable roads where resurfacing of the road prism is proposed. All of the roads proposed for reconditioning currently have restricted access.

Decommissioning – The status of these roads is quite variable. Some roads are considered open and drivable and others have restricted access. Most of the drivable roads are in very poor condition and have not received routine maintenance; consequently, they pose a long-term hydrologic risk. The interdisciplinary team that conducted the roads analysis process (RAPS) for this project recommended that these roads should be decommissioned. The proposed decommissioning method varies and is described below:

- ***Restore Crossings*** – existing pipes that are not functioning properly would be removed. Crossings would be restored to their natural contours.

- ***Revegetation*** – roads that have essentially decommissioned themselves through natural revegetation processes. Drainage structures are functioning properly.

Table 2-7. Proposed Fuels Treatments

Grapple Pile – Following timber harvest activity fuels would be grapple piled and burned. Fuels are normally allowed to cure for at least six months after harvest, which allows time for important nutrients (i.e., potassium) to leach into the soil. Typically, piling is conducted with a track-mounted excavator, which minimizes soil disturbance. After the piles are created they are burned when conditions are favorable, normally fall and winter.

Underburn – Following timber harvest activity fuels would be underburned. Again, fuels are typically allowed to cure for at least six months before they are burned. Burning is mostly conducted in the spring and fall when conditions (fuel and soil moistures, air quality, etc.) are favorable.

Figure 2-2 Proposed Road Treatments

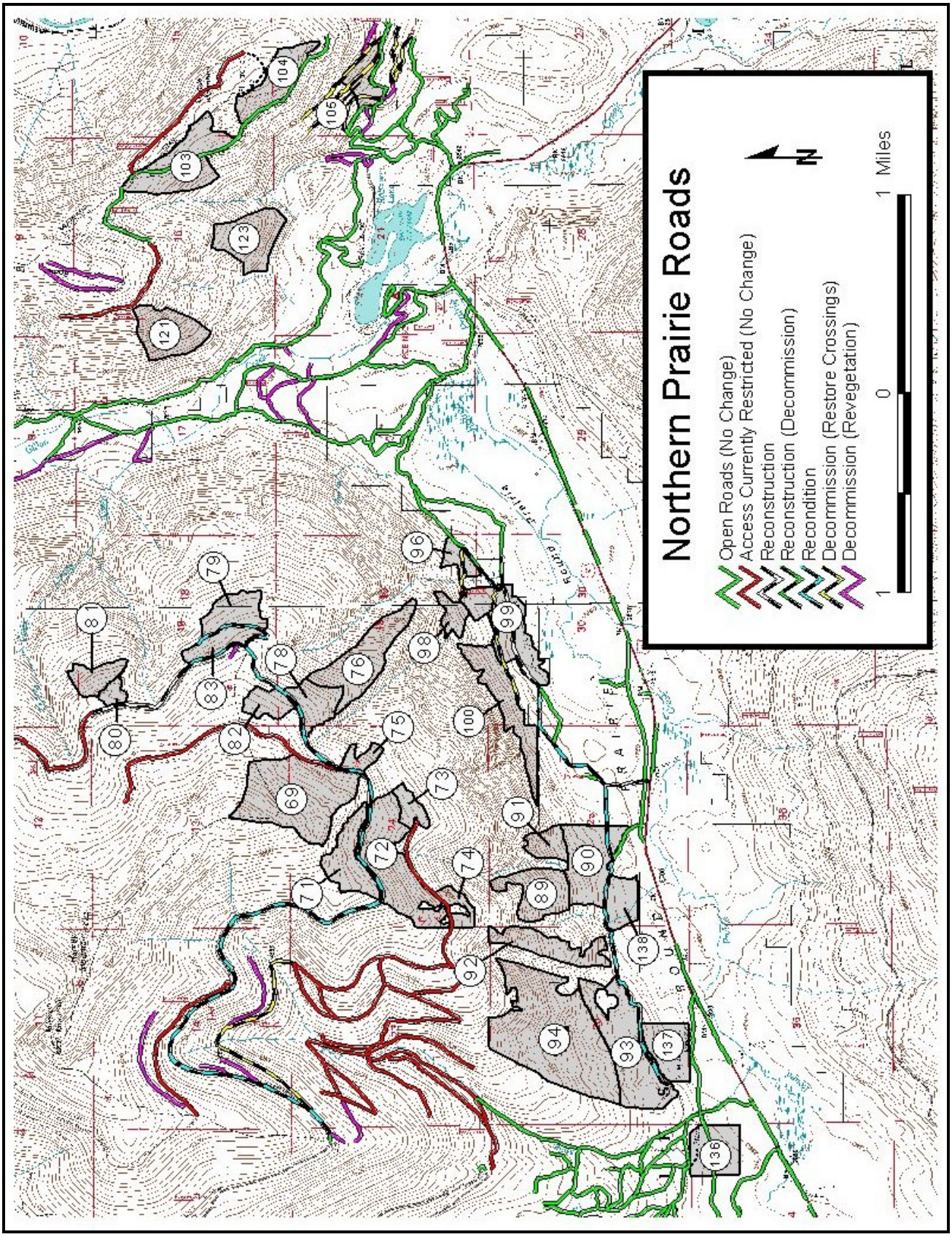


Table 2-8. Alternative 2 Vegetation Treatments

Unit	Acres	Rx	Logging System	Fuels Treatment	PCC Before Treatment	PCC Before Treatment
69	114	BURN	NA	UB	45	15-20
71	40	ISW	T	UB	70	30-40
72	89	FS-M	S	GP	75	30-60
73	14	FS-D	T	GP	60	30-60
74	13	ISW	S	GP	74	30-40
75	11	ISW	S	UB	70	30-40
76	61	ISW	H	UB	70	30-40
78	30	ISW	S	UB	75	30-40
79	30	FS-M	T	GP	70	30-60
80	8	ISW	T	GP	70	30-40
81	21	ISW	S	GP	75	30-40
82	18	ISW	T	UB	80	30-40
83	22	FS-M	S	GP	70	30-60
89	42	ISW	H	GP	70	35-45
90	54	ISW	T	UB	60	35-45
91	18	ISW	H	GP	70	35-45
92	37	ISW	H	UB	65	35-45
93	86	ISW	T	UB	70	35-45
94	163	ISW	H	UB	70	35-45
96	12	ISW	T	UB	75	35-45
98	13	ISW	H	GP	75	35-45
99	62	ISW	T	UB	70	35-45
100	51	ISW	H	GP	65	35-45
103	65	ISW	S/T	UB	65	35-45
104	41	ISW	H	UB	70	35-45
105	25	ISW	T	UB	70	35-45
121	45	ISW	S	UB	65	35-45
123	46	ISW	H	UB	65	35-45
136	39	ISW	T	UB	50	35-45
137	36	ISW	T	GP	65	35-45
138	25	ISW	T	GP	66	35-45
	1331					

Rx = Silvicultural prescription
PCC = Percent canopy closure
SWR = Shelterwood with reserves
BURN = Rx Fire (no harvest)
G = Ground-based skidding (Tractor)
S = Skyline yarding
H = Helicopter logging
ST = Skyline and tractor
GP = Grapple pile
UB = Underburn

Table 2-9. Alternative 3 Vegetation Treatments

Unit	Acres	Rx	Logging System	Fuels Treatment	PCC Before Treatment	PCC Before Treatment
69	114	BURN	NA	UB	45	15-20
71	40	ISW	T	GP	70	30-40
72	89	FS-M	S	GP	75	30-60
73	14	FS-D	T	GP	60	30-60
74	13	FS-D	S	UB	74	35-60
75	11	FS-D	S	UB	70	35-60
76	61	FS-D	H	UB	70	35-60
78	30	FS-M	S	GP	75	30-60
79	30	FS-M	S	GP	70	30-60
80	8	FS-M	T	GP	70	35-60
81	21	ISW	S	UB	75	30-40
82	18	ISW	T	GP	80	30-60
83	22	FS-M	S	GP	70	30-60
89	42	FS-D	H	UB	70	35-60
90	54	FS-D	T	GP	60	35-60
91	18	FS-D	H	UB	70	35-60
92	37	FS-D	H	UB	65	35-60
93	86	FS-D	T	UB	70	35-60
94	163	FS-D	H	UB	70	35-60
96	12	FS-D	T	GP	75	35-60
98	13	FS-D	H	UB	75	35-60
99	62	FS-D	T	GP	70	35-60
100	51	FS-D	H	UB	65	35-60
103	65	FS-D	S/T	UB	65	35-60
104	41	FS-D	H	UB	70	35-60
105	25	FS-D	T	UB	70	35-60
121	45	FS-D	S	UB	65	35-60
123	46	FS-D	H	UB	65	35-60
136	39	FS-D	T	GP	50	35-60
137	36	FS-D	T	GP	65	35-60
138	25	FS-D	T	GP	66	35-60
	1331					

Rx = Silvicultural prescription
PCC = Percent canopy closure
FS-D = Free Selection – Dry Site
FS-M = Free Selection – Moist Site
SWR = Shelterwood with reserves

G = Ground-based skidding (Tractor)
S = Skyline yarding
H = Helicopter logging
ST = Skyline and tractor
GP = Grapple pile
UB = Underburn

Table 2-10. Alternatives 2 and 3 Road Treatments

ROAD	Recondition	Recon	Decom (Cross)	Decom (Recon)	Decom (Reveg)	TOTAL Miles
95-UA		<0.1				<0.1
449-UD					0.2	0.2
449-UB					0.3	0.3
449-UA					0.1	0.1
273-UI					0.1	0.1
273-UH					0.8	0.8
273-UG					0.3	0.3
273-UF					0.2	0.2
273-UE					0.3	0.3
273-UD					0.4	0.4
273-UA					0.5	0.5
272-UU					<0.1	<0.1
272-UA					<0.1	<0.1
2587-UG			0.3			0.3
2587-UF		0.1		0.2		0.3
2587-UE				0.2		0.2
2587-UB		0.2				0.2
2587	1.0	0.6	0.6			2.3
2573-UN			0.6			0.6
2573-UM					0.2	0.2
2573-UH			0.4			0.4
2573-UG					0.1	0.1
2573-UF			0.6			0.6
2573-UE					0.2	0.2
2573-UD			0.6			0.6
2573-UA					0.8	0.8
2573-C					0.1	0.1
2481-UF					0.1	0.1
2481-UE					0.2	0.2
2481-UB					0.2	0.2
2481-F	0.6					0.6
2481	4.6	0.6				5.2
2481-DUB					0.5	0.5
2481-D			1.3			1.3
2274-UD					<0.1	<0.1
2274-UB					0.1	0.1
2229-UL					0.1	0.1
2228-UC					<0.1	<0.1
2228	1.3	<0.1				1.3
2206-UB					0.6	0.6
Grand Total	7.5	1.5	4.3	0.4	6.3	20.0

Table 2-11. Summary Comparison of Alternatives

Treatment Type	Alt 1	Alt 2	Alt 3
Shelterwood w/ Reserves (even-aged)	0	1062	79
Free Selection (uneven-aged)	0	155	1138
Total Acres Harvested	0	1217	1217
Prescribed Burn w/ No Timber Harvest	0	114	114
Total Acres Vegetation Treatments	0	1331	1331
Logging System			
Tractor	0	441	441
Skyline	0	239	239
Skyline-Tractor	0	65	65
Helicopter	0	472	472
Fuels Treatment (Harvest Related)			
Underburn	0	713	713
Grapple Pile	0	504	504
Total Acres Fuels Treatments (Harvest Related)	0	1217	1217
Total Miles or Improvements			
Decommissioning (Revegetation)	6.3	6.3	6.3
Decommissioning (Crossings)	0	4.3	4.3
Reconstruction	0	1.5	1.5
Reconstruction - Decommission	0	0.4	0.4
Reconditioning	0	7.5	7.5

Table 2-12. Comparison of Issues and Alternatives

Issue	Alternative 1	Alternative 2	Alternative 3
Forest Vegetation	Acres reforested with PP (0), WL (0), and WP (0) Acres of dry forest structure restored to open conditions featuring large diameter ponderosa pine (0) No change in the size of forest openings. No reduction in risk of stand-replacing fire on dry forests No reduction in risk of root-disease on dry forests	Acres reforested with a combination of PP and WL (950), WP and WL (164) Acres of dry forest structure restored to open conditions featuring large diameter ponderosa pine (959) with fairly uniform stand density and closer to the lower level of conditions that existed historically. Size of forest openings increase by nearly 100%. Risk of stand-replacing fire on treated dry forests reduced by an estimated 85% Risk of root disease on dry forests reduced by an estimated 84% Acres of moderate and high hazard bark beetle stands treated (1100); shelterwood (995) and free selection (105)	Acres reforested with a combination of PP and WL (319), WP and WL (139) Acres of dry forest structure restored to open conditions featuring large diameter ponderosa pine (959) with diversity of stand structures that resemble conditions that existed historically. No measurable increase in forest opening size. Risk of stand-replacing fire on treated dry forests reduced by an estimated 78% Risk of root disease on dry forests reduced by an estimated 66% Acres of moderate and high hazard bark beetle stands treated (1100); shelterwood (50) and free selection (1050)
Wildlife	Lynx – No short-term habitat changes; Amount of stand initiation structure likely to increase along with Increased probability of stand-replacing fire in the long-term. Gray Wolf - no changes to human access or prey densities Grizzly Bear – No change in linear road densities Black-backed woodpecker – No immediate changes in snag habitat. Habitat conditions change according to natural events over time. Flammulated owl - habitat trend toward denser cover of young trees and away from achieving suitable habitat conditions	Lynx – 0.7% increase in stand initiation structure; no impacts to multi-story mature stands Gray Wolf - Prey availability is expected to increase, and mortality risk would not change Grizzly Bear – No change in linear road densities; restricted and reconstructed roads would be unavailable for general public use, and timber harvest would not be allowed during the grizzly bear spring season Black-backed woodpecker - no recent post-fire habitat affected; less than 1% of the potential nesting habitat on the IPNF would be impacted Flammulated owl –General trend toward unsuitable habitat conditions reversed. Transitory reduction of 108 acres (23%) of	Lynx – 0.5% increase in stand initiation structure; no impacts to multi-story mature stands Gray Wolf - Prey availability is expected to increase, and mortality risk would not change Grizzly Bear – No change in linear road densities; restricted and reconstructed roads would be unavailable for general public use, and timber harvest would not be allowed during the grizzly bear spring season Black-backed woodpecker – similar to Alt 2, but more untreated habitat retained in portions of units Flammulated owl – General trend toward unsuitable habitat conditions reversed. Inconsequential decrease in

Issue	Alternative 1	Alternative 2	Alternative 3
		suitable habitat in the project area. Short-term habitat losses offset by longer-term habitat stability.	suitable habitat acres. Short-term habitat losses offset by longer-term habitat stability
	Fisher – No short-term loss of habitat; some acres may be converted to unsuitable condition through fire in the long-term	Fisher - Reduction of 3.5% suitable habitat in the project area will not result in a loss of viability. Habitat maintained on a landscape scale	Fisher –same as Alt 2
	Western Toad – No impact	Western Toad - May slightly elevate the risk of direct toad mortality, no breeding habitat affected.	Western Toad - same as Alt 2
	Northern goshawk – Short-term maintenance of suitable habitat; Long-term trend toward decreased suitable habitat.	Northern goshawk – Reduction of 105 acres of suitable habitat. No change to structural components of the PFA	Northern goshawk – same as Alt 2 *except* units harvested by free selection prescription would contain adequate trees to remain in the same VSS category. Post-harvest VSS percentages more closely resemble Alt 1.
	Pileated woodpecker – snag production shifts away from larger, longer-lived species, affecting the long-term stability and persistence of large snag habitat	Pileated woodpecker – reduction of nesting habitat by as much as 19% in the short term; utility of one hypothetical homerange negatively affected.	Pileated woodpecker – inconsequential changes to pileated woodpecker nesting habitat; viability of all seven hypothetical homeranges retained.
	Forest land birds - Riparian habitats would remain unaffected in the short-term. Long-term trend toward decreased habitat quality for dry-forest species.	Forest land birds - no effect on forest land birds associated with riparian habitats. Long-term trend toward increased habitat quality for dry-forest species.	Forest land birds same as Alternative 2
Watershed and Aquatics Habitat	Hydrologic Function – No direct effects on hydrologic function would. No new roads would be constructed; road density in the project area would remain unchanged.	Hydrologic Function - not be adversely affected. No new permanent roads would be constructed. Decommissioning would reduce road density to 3.4 miles per square mile in the CEA.	Hydrologic Function - would not be adversely affected. No new permanent roads would be constructed. Decommissioning would reduce road density to 3.4 miles per square mile in the CEA.
	Riparian Function – No changes in ECAs within RHCAs; no changes in riparian road density.	Riparian Function – No changes in ECAs within RHCAs; decommissioning would reduce roads within RHCAs from 3.7 miles to 3.4 miles in the CEA.	Riparian Function – No changes in ECAs within RHCAs; decommissioning would reduce roads within RHCAs from 3.7 miles to 3.4 miles in the CEA.
	Soil Erosion-Mass wasting –the area of detrimentally impacted soils would not directly affected; sediment delivery would be negligible.	Soil Erosion-Mass wasting – the area of detrimentally impacted soils would increase by 5.8 percent; increases in sediment delivery would be negligible.	Soil Erosion-Mass wasting – the area of detrimentally impacted soils would increase by 5.8 percent; increases in sediment delivery would be negligible.

Issue	Alternative 1	Alternative 2	Alternative 3
	Water Yield – No short-term changes in Equivalent Clearcut Acres (ECAs). Fisheries – no short-term risk of loss; long-term risk of loss due to of severe fire.	Water Yield – 4% short-term increase in ECAs from 9.8% to 13.8%. Fisheries – no short-term risk of loss; long-term reduced risk of loss due to of severe fire.	Water Yield – 2.4% short-term increase in ECAs from 9.8% to 12.2% Fisheries – no short-term risk of loss; long-term reduced risk of loss due to of severe fire.

2.6 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.

2.6-A Cultural Resources

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.

Estimated Effectiveness – High. Contract provisions for protection of cultural resources are utilized in all contracts and have been effective in protecting cultural resources. (2000 Forest Plan Monitoring Report, Summary of Findings, page 2).

2.6-B Improvements and Survey Monuments

Survey monuments, landlines, and all other improvements will be protected by buffering, appropriate clauses in the timber sale contract, or both.

Estimated Effectiveness – High. Contract provisions for protection of improvements are utilized in all contracts and have been effective in protecting these features.

2.6-C 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 chemical products, or both, stored within the tanks. Diked areas would be sufficiently impervious and of adequate capacity to contain spilled petroleum and chemical products, or both. 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 aquatic organisms, or any of these individual resources, from contaminants are not likely.

5) 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.

6) 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.

7) 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.

Estimated Effectiveness (all items) – High. Contract provisions for storage and use of hazardous materials are utilized in contracts and have been effective in protecting natural resources.

2.6-D Noxious Weeds

1) Noxious weed treatment would be conducted according to guidelines and priorities established in the Bonners Ferry Weed Control Project FEIS (USDA 1995). Methods of control may include biological, chemical, mechanical and cultural.

2) Gravel or borrow pits to be used during road construction or reconstruction would be free of new weed invader species (as defined by the IPNF Weed Specialist). A list of weed species considered to be potential new invaders is included in the project file.

3) Any priority weed species (as defined by the IPNF Weed Specialist) identified during road maintenance would be reported to the District Weed Specialist. A list of priority weed species is included in the project file.

4) Weed treatment of all haul routes, service landings and helicopter landings would occur prior to ground disturbing activities where feasible. If the timing of ground disturbing activities would not allow weed treatment to occur when it would be most effective, it would occur in the next treatment season following the disturbance.

5) All timber sale contracts would require cleaning of off-road equipment prior to entry onto National Forest lands. If operations occur in areas infested with new invaders (as defined by the IPNF Weed Specialist), all equipment would be cleaned prior to leaving the site.

6) All newly constructed roads, skid trails, landings or other areas of disturbance (including maintenance on existing roads such as cleaning ditchlines, repairing or upgrading culverts, or cleaning catch basins) would be seeded with a weed-free native and desired non-native seed mix and fertilized as necessary.

7) All straw or hay used for mulching or watershed restoration activities would be certified weed-free.

8) Road segments identified for weed treatment and proposed for decommissioning or storage would be treated prior to decommissioning or storage activities.

The above mitigation measures are accepted weed prevention practices developed by public land management agencies and university cooperative extension offices and promoted by weed management organizations across the nation (e.g. Sheley et al. 2002, Drlik et al. 1998, USDA 2001a). The above measures include those required in Forest Service Manual (FSM) 2080 for activities related to timber harvest and roads. They are described in FSM 2981.2- 1a and FSM 2081.2 - 6a, respectively (see project file). Also included are weed prevention practices recommended but not required (see project file).

For new weed invaders, the estimated effectiveness of the above measures is high; the measures are expected to be very effective at preventing establishment of new invaders. According to current research (Hobbs and Humphries 1995), early detection and treatment of infestations before explosive spread occurs can significantly reduce the social cost of weed invasions.

For existing infestations confined to road prisms in the project area, estimated effectiveness is **moderate to high**; the measures are expected to be somewhat to very effective at reducing the spread of these in the project area. Effectiveness of treatments on National Forest lands could be reduced if adjacent landowners do not treat their weed infestations.

For existing infestations of meadow hawkweed, goatweed and knapweed, estimated effectiveness is expected to be **low** in portions of the project area where these weeds are already established in natural openings away from existing roads.

Existing weeds and new invaders are also spread by wildlife, winds, water and hikers – the mitigation measures would have no effect on these sources of weed spread.

2.6-E Public Health and Safety

1) 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.

Estimated Effectiveness (item 1): High. The Idaho Division of Environmental Quality recognizes the North Idaho Smoke Management Memorandum of Agreement (1990) as the best available control technology for prescribed burning. This mitigation has a high degree of effectiveness to keep air pollution from smoke at acceptable levels and ensure that air quality standards would be met.

2) Abatement used on Forest Service roads consists of road surface preparation and application of water or other materials. Use of materials other than water will require approval of the Forest Service, shall meet specifications provided in the timber sale contract, and follow manufacturers recommendations for application. Magnesium chloride or calcium chloride would only be applied under the following conditions to prevent delivery to stream channels:

(a) Only the road prism would be treated, not the ditch line
(b) These products would not be applied during rainstorms or when storms are forecast within 24 hours.

Estimated Effectiveness (item 2) – High. Contract provisions for dust abatement applications are utilized in contracts and have been effective in protecting natural resources.

3) 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.

Estimated Effectiveness (item 3) – High. Contract provisions for traffic signing are utilized in contracts and have been effective in protecting public safety.

2.6-F Road Reconstruction and Maintenance

A road package will be included with this project for road improvement, reconstruction, and maintenance. The site-specific BMP criteria listed in Appendix C must be applied during project implementation.

Estimated Effectiveness – High to Moderate. See the discussion on Best Management Practices (Appendix C) for more information.

2.6-G 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 spacing 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) 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.

5) 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.

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

7) A variety of slash disposal methods would be utilized (underburning and grapple piling). 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.

8) 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. Piles would be burned in the late fall when the risk of escape into adjoining stands and damage to the residual timber is reduced.

9) To protect soil quality, broadcast burning would be conducted when soil moistures exceed 25%.

Estimated Effectiveness (all items) – High. Forest Plan Monitoring has shown that use of the above measures results in less impact to the soils in managed areas.

2.6-H 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) 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).

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

6) 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.

7) 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).

Estimated Effectiveness (all items)– High. Timber Sale Contract provisions for these resources have been effective in protecting natural resources.

2.6-I Vegetation

1) 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.

2) 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 or natural regeneration.

Estimated Effectiveness – High. Timber sale and service contracts provide the necessary administrative control to insure target stand objectives are met.

2.6-J Watershed and Fisheries

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.

All water rights within the proposed project area were identified on a map (project file) and each right would be protected with a 1,320 foot upstream buffer that would be 75 feet wide on either side of the channel. These protective buffers follow the State of Idaho's Forest Practices Rules.

Estimated Effectiveness - High. - A description of each applicable INFISH standard and guideline and its estimated effectiveness may be found in Appendix C. These requirements would be implemented since they are incorporated into project design.

2.6-K Wildlife

1) Wildlife Tree Retention - A snag analysis (project file – WL001) for the Northern Prairie 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 Northern Prairie 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.

(a) Snags and live tree replacements would be retained where opportunities exist in treatment units at levels recommended by scientific literature based on recent studies (Bull et al. 1997). Retention objectives are consistent with recent published data that suggests that populations of cavity nesters were viable in stands of ponderosa pine and mixed conifer forests that contained about four snags per acre (Bull et al. 1997). The following minimum amounts of snags and live tree replacements are to be retained within applicable cutting areas:

- Dry forest habitats: 4 snags and 8 live tree replacements/acre from the largest trees.

- Moist forest habitats: 6 snags and 12 live tree replacements/acre from the largest trees.

(b) While retention objectives are accounted for on a treatment level scale, some snags would be represented on every 10 acres of treatment, in clusters or clumps where feasible, to promote good distribution of snags. Large diameter snags (greater than 15 inches diameter) that are felled for safety reasons would remain on site to provide for large woody debris recruitment and long-term site productivity.

(c) Selection of snags and live tree replacements would emphasize practices that assure the highest probability for long-term retention (Bull, et al. 1997). The high hazard snags and snags in the advanced stages of decay would not be used to meet retention objectives (Intermountain Forest and Industry Association et al. 1995). Retention practices would focus on ponderosa pine, western larch, Douglas-fir and western red cedar trees, especially veteran or relic ponderosa pine and western larch trees. Trees killed by root disease should be avoided, where possible, to meet retention objectives because of their rapid deteriorate/fall-down rate.

(d) Slash would be pulled back from veteran or relic ponderosa pine and western larch live trees and snags to protect them from the adverse effects of prescribed burning. Grapple piling would be considered to treat fuels on moderate slopes where residual snags would be at risk from broadcast burning.

Estimated Effectiveness (item 1) - Moderate. This measure would be implemented using project layout, contract provisions, compliance monitoring and fuels treatment, and would have a moderate chance of avoiding and/or reducing adverse effects on snag dependent wildlife. It would not be the intent of this project to willfully remove the high hazard snags, and snags in the advanced stages of decay ("soft" snags). Some of these "soft" snags would survive and remain standing during the life of the project. Due to Occupational Health and Safety Administration (OSHA) guidelines, most contractors will remove snags deemed to pose a safety risk to ground crews. Consequently, free selection prescriptions will generally result in higher levels of snag retention than regeneration-harvested units, since portions of units will be left untreated and contractor exposure to hazardous snags subsequently reduced. In addition, the "hard" snags preferred by the District for their ability to remain longer on the landscape are less likely to be felled as hazards than softer snags.

Past monitoring has demonstrated that tree harvesting and subsequent burning removes a large portion of existing snags, especially the "soft snags." However, through the strategic placement of leave patches or clumps, snags within these areas should be relatively protected. In addition, prescribed underburning will recruit "new" snags by fire-killing residual green trees. There would be no problem meeting and exceeding live tree replacement criteria in that vegetative prescriptions are designed to leave ample green trees scattered in patches and individually (regeneration cutting), and uniformly (selective cutting) across treatment areas. Consequently, this measure should provide more than the minimum number of snags and live tree replacements.

2) Dry Forest Ecosystems – Because there are fewer ponderosa pine trees in the northern Rocky Mountains than were there historically, it is necessary to retain selected large Douglas-fir trees in addition to the large ponderosa pine trees to achieve suitable habitat conditions for species associated with the drier habitats (e.g. flammulated owls, white-breasted nuthatch, Cassin's finch). For stands

associated with the dry forest ecosystem, design harvest prescriptions to maintain the persistence of a mature ponderosa pine/Douglas-fir community by:

(a) Retaining an overstory canopy closure of 35-65 percent.
(b) Achieving a relatively open landscape of ponderosa pine/Douglas-fir that is structurally complex as opposed to a landscape that is structurally simple. Design for non-uniform spacing of trees (moderate within stand variability) with patchy microhabitats of understory trees.
(c) Retaining a minimum of one patch (~1/10th acre) of densely vegetated understory per 5 acres across all mature dry-site harvest units (73, 74, 75, 76, 89, 90, 91, 92, 93, 94, 96, 98, 99, 100, 103, 104, 105, 121, 123, 136, 137, and 138). Where possible, these patches should be in the vicinity of large residual snags or snag recruits.

Estimated Effectiveness (item 2) - High. Using silvicultural prescriptions, marking guides, contract inspections and appropriate fuel treatment methods, this feature would have a high likelihood of avoiding or reducing adverse effects on flammulated owl habitat through retention of important habitat components (nesting, roosting and foraging).

3) Fuels Treatment

(a) Prior to prescribed burning, pull back slash from veteran and relic ponderosa pine and western larch live trees and snags (to the maximum extent practicable) to protect them from the adverse effects of prescribed burning. Consider grapple piling to treat fuels on moderate slopes where residual snags would be at risk from burning.
(b) In areas where grapple piling is prescribed for fuel reduction, leave approximately 1 slash pile per acre unburned to provide habitat for small forest animals (e.g., snowshoe hares).

Estimated Effectiveness (item 3) – High: Timber sale and brush disposal contracts allow for effective control of operations and have the flexibility to meet these criteria.

4) Goshawk Nest Site Protection – Nest searches will be conducted during project layout and implementation. Operations and related activities would be suspended within approximately ½ mile of known or discovered nests between March 15 and August 15 to reduce risk of failure. Activity restrictions can be removed after June 30 if the District wildlife biologist determines a nest site is inactive or unsuccessful. Protect existing and newly discovered nest sites by a 40-acre, no activity buffer, and maintain at least 600 ft between any nest sites and harvest units (Reynolds et al. 1992).

Estimated Effectiveness (item 4) - Moderate to High. District marking and layout crews have been reliable in reporting new territories and alternate nests of existing territories in the vicinity of activity areas in past sales (Meadow Creek, Feist Creek , Hall Mountain and Snyder Creek territories). The 40-acre no-activity area should provide an adequate post-harvest nest stand for goshawks as long as known nest trees are located near the center of the buffer. Seasonal restrictions are likely to minimize disturbance to active nests, particularly if ground-based systems are being used outside the ½ mile buffer

5) Grizzly Bear Protection– Tree felling, yarding, and road reconstruction/reconditioning will be restricted during the grizzly bear "spring" season (April 1 – June 15). Additionally, hauling on seasonally restricted roads (roads 2481, 2481E, and 2229) will not take place during this same time period. Broadcast burning requiring aerial (helicopter) ignition during the spring season will be limited to two days of helicopter use. Any currently undrivable roads reopened and utilized as timber haul routes will be kept unavailable for general public use during implementation, and will be restored to an undrivable condition upon completion of post-harvest fuels treatments.

6) Gray Wolf - Any gray wolf den or rendezvous sites identified in or adjacent to proposed activity areas will be spatially and/or temporally buffered as appropriate. This would include:

- No project activities within one (1) mile of occupied sites from April 1-July 1 for den sites and from July 1-August 15 for rendezvous sites

Upon review by the Forest Level 1 team, these distances could decrease based on topographical characteristics at each site.

7) Other Threatened, Endangered, and Sensitive (TES) Wildlife Species Management - If any TES species is located during project layout or implementation, alter timber harvest and associated activities, as necessary, so that proper protection measures are taken. Timber sale contract clause B(T)6.25, Protection of Threatened, Endangered And Sensitive Species, should be included in any timber sale contract.

Estimated Effectiveness (items 5, 6, 7) – High. Contract provisions for protection of TES habitats and locations are utilized in all contracts and have been effective in protecting these resources (See Forest Plan Monitoring and Evaluation reports).

8) **Protection of Wetlands, Seeps, Bogs, Wallows and Springs** – All known or discovered wetlands, seeps, bogs, elk wallows and springs less than one acre in size would be protected with a "no activity" buffer approximately 100 feet in diameter

Estimated Effectiveness (item 8) – High. This practice would be incorporated into project design and unit layout, and implemented by the sale administrator.

2.6-L Threatened, Endangered, and Sensitive Plants

Any changes to the selected alternative that may occur during layout would be reviewed, and rare plant surveys conducted as necessary prior to project implementation. Newly documented occurrences would be evaluated, with specific protection measures implemented. Such measures could include the following;

- Dropping units from harvest activity
- Modifying unit boundaries to provide an adequate buffer around documented occurrences. A qualified botanist would establish the buffers. Buffers would be site-specific.
- Modifying harvest methods, fuels treatment or logging systems to protect TES plants and their habitat

- Impelmenting, if necessary, Timber Sale Contract provisions B(T)6.25#, Protection of Endangered Species, and C(T)9.51, Settlement for Environmental Cancellation.

Estimated Effectiveness - High; the above measures would provide for the viability of newly documented occurrences. Following recommendations for protection of peatlands at Robinson Lake (Lichthardt 2004) would provide for the viability of the peatlands and the rare plants they support.

2.6-M Recreation

1) Logging slash and the risk of fire near Robinson Lake facilities and access roads.

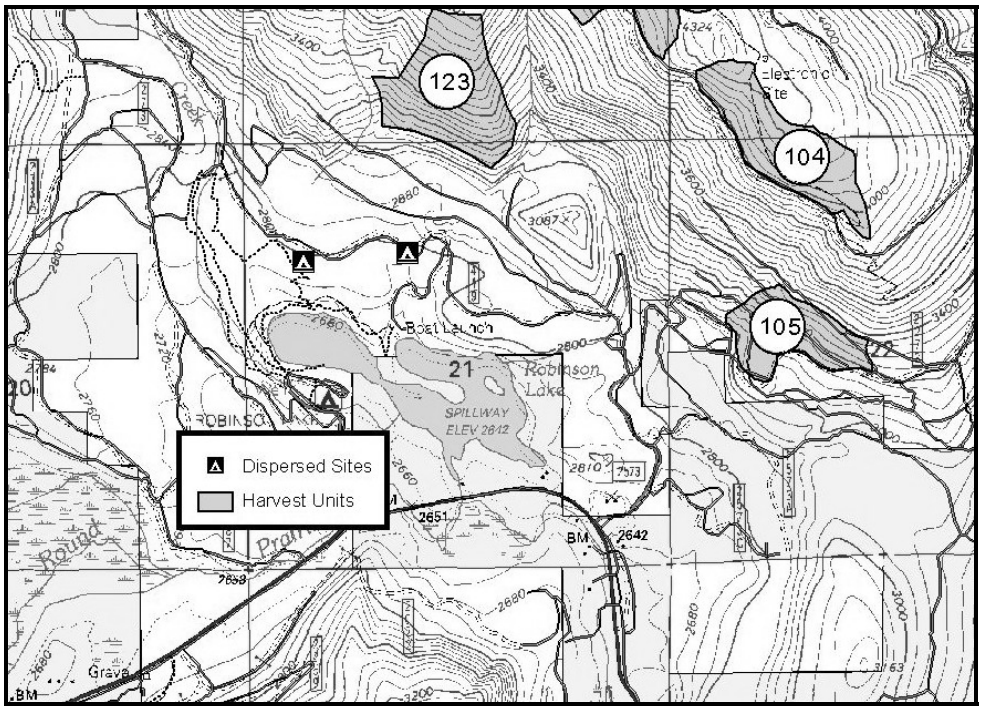
Estimated Effectiveness (item 1) - High. Using timber sale contract specifications the fire hazard will be nearly eliminated by trampling the slash in the skid trails and grapple piling.

2) Schedule work around Robinson Lake for the off-recreation season (winter).

3) Protect Robinson Lake facilities and improvements.

4) Do not place log landings in the popular dispersed campsites (Figure 2-3) north of Robinson Lake.

Figure 2-3. Robinson Lake Dispersed Recreation Sites



5) Do not allow helicopter operations on weekends, or holidays, during the peak recreation season (mid-May through mid-October).

6) Avoid skidding across trails #409 and #40 and keep these trails cleared of logging slash.

7) So that trail closures are at a minimum, do not schedule work in units (79, 80, and 83) along Trail #409 from early September through mid-November.

Estimated Effectiveness (items 2-7) - High. Timber sale contract provisions have proven effective in controlling timing of operations and protecting improvements (e.g., trails, campground facilities, outbuildings, etc.). Timing restrictions will be included in the Timber Sale Contract and areas requiring protection will be identified on the timber sale maps.

8) Signing, information for campground hosts, and public service announcements could help reduce public concern with activities around Robinson Lake campground.

Estimated Effectiveness (item 8) - High. Interpretive signs and trails will explain the objectives of harvest activities and how they relate to long-term ecosystem health.

2.7 MONITORING

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).

2.7-A 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 Northern Prairie EA 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.

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

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

2) *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.

3) *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 modified as necessary to achieve this objective. Sensitive Plants are protected according to site-specific management plans developed by Forest, Zone or District Botanists.

4) *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.

5) *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:

(a) Are BMPs implemented as designed?

(b) Are the BMPs effective in controlling non-point sources of pollution?
(c) 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:

(a) modification of and adjustment to contracts;
(b) administrative procedures; and
(c) 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.

6) *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.

7) *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.

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

2.7-B 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:

2.7-C 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.

1) *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.

2) *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.

3) *Timber Management* - A timber sale administrator will visit each active harvest unit 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.

4) *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.

5) *Fuels Treatment* - The fuels treatment prescriptions and accomplishments are entered into the TSMRS database. District fuels management personnel will conduct walk through surveys after the work is completed.

2.7-D Effectiveness Monitoring

1) *Timber Management* – District stand exam crews would conduct regeneration surveys one, three, and five years following planting to certify regeneration in units that are treated with a regeneration harvest. (KV-funding assured through timber sale base rates to comply with National Forest Management Act).

2) *Water Quality* – The District hydrologist would monitor BMP effectiveness 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.

3) *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).

4) *Snag Retention* – Following treatments, the District wildlife biologist would sample the treatment units to evaluate the influences of forest management practices on wildlife tree retention practices and determine if predicted or stated objectives were achieved.

5) *Noxious Weeds* – The timber sale administrator would document pretreatment of roads and equipment as proposed (Features Common to All Action Alternatives) on sale inspection reports. The timber sale administrator would evaluate the effectiveness of seeding disturbed areas upon completion of the activity. Treated areas would be surveyed and monitored according to treatment priorities established in the Bonners Ferry Noxious Weed Control Project FEIS.

District weed management personnel would monitor disturbed sites and weed treatment would be accomplished as necessary. An Integrated Pest Management approach (including biological, mechanical, cultural and chemical control) would be used. This would decrease the chance of existing infestations becoming established in new areas, and would reduce the risk of new invaders becoming established. All weed management activities would be conducted in accordance with the guidelines in the Bonners Ferry Noxious Weed Control Project FEIS (USDA 1995).

6) *Access Management* – The District hydrologist and District engineering personnel would monitor proposed road obliteration work during the implementation phase of the project and following the project to determine the effectiveness of obliteration methods.

7) *TES Plants*: The North Zone botanist would monitor sensitive plant populations where the proposed activity was modified by buffering to avoid adverse effects would be conducted to validate the effectiveness of mitigation measures during and following the activity.

Chapter 3 - Affected Environment

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 (different tree species), forest structure (tree sizes) 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.

3.1 Forest Vegetation

3.1-A 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.

3.1-A.1 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 Northern Prairie 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).

3.1-A.2 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). Based on a fire history study of the area a significant stand-replacing fire occurred in the Northern Prairie area during the late 1890's. This fire appears to have burned nearly 65%of the National Forest acreage, or more than 11,000 acres, in the Northern Prairie area. Prior to this event an estimated 800 acres burned each decade from 1790-1880. From 1900-1945 an estimated 600 acres burned each decade. However, since 1945 there have been dozens of fire starts in the project area, but the majority of fires during this period were less than one acre.

There have also been significant changes in landscape patterns since European settlement. Based on an analysis of landscape patterns in the project area, the current average opening size is estimated at 34 acres versus the historic estimate of 318 acres (Behrens 2004), which represents a decrease in opening size of nearly 90%.

According to the District's historical records scattered timber harvesting occurred in the project area prior to 1935, but the extent of this harvesting was fairly limited (T. Sandberg; Zone Archaeologist, personal communication; 2003). The majority of regulated timber harvest began in the mid 1970's and continued through the 1990's. Figure 3-1 summarizes harvest activity shows and timber management trends in the Northern Prairie cumulative effects area over the past 30 years. More than one-half of the harvest in the area occurred between 1985-1994 and two-thirds of this harvest was even-aged regeneration cutting (i.e., clearcut, seed tree, and shelterwood). This trend changed during the late 1990's when intermediate harvesting (i.e., thinning, sanitation, salvage, etc.) became the primary harvest method. Negligible timber harvest has occurred in the cumulative effects area in the 2000's. Table 3-1 summarizes the timber sales that were sold and harvested from the early 1970's to present.

During the fire suppression era timber harvest replaced natural fire as the primary landscape disturbance pattern. In total, approximately 2,500 acres were regenerated using regeneration harvests during a 30 year period, or about 15% of the cumulative effects area. Contrast this with the 11,000 acres that were regenerated during the later 1890's in a single fire event. On the other hand, even-aged regeneration cutting was essentially limited to treatment units less than 40 acres scattered across the landscape. In terms of changes to forest structure at the landscape level, this limitation, and, the combination of the fire suppression era, has possibly created substantial changes in landscape structures that would have been created through natural fire. For example, Figure 3-2 shows the estimated forest opening sizes in the late 1890' compared to current conditions. This stand-replacing fire regenerated more than four times the landscape acreage than the percentage regenerated with even-aged harvest since the mid-1970's (Figure 3-2); i.e., there has been no timber management equivalent in the Northern Prairie cumulative effects area for the type of fire event that occurred in the late 1890's. Additionally, the openings created with the 1890's s event were considerably more variable in size than those created through timber management. Agee (1999) stated that modern human management has homogenized fuels at high levels, converting low-severity fire regimes to high severity and changed landscape patch size. Patch sizes were smallest in low-severity fire and highest in high severity regimes. Therefore, the combination of relatively small even-aged regeneration treatment units and fire suppression at the landscape level has inadvertently converted the majority of the landscape to a high-severity fire regime.

A little over 4,400 acres of private land are scattered throughout the cumulative effects area. These lands are a mixture of industrial and small private forestlands and agricultural lands. The timber harvest systems on these privately owned lands have varied from even-aged regeneration cutting to economic selection cutting, depending on landowner objectives.

Figure 3-1. Northern Prairie Timber Management History

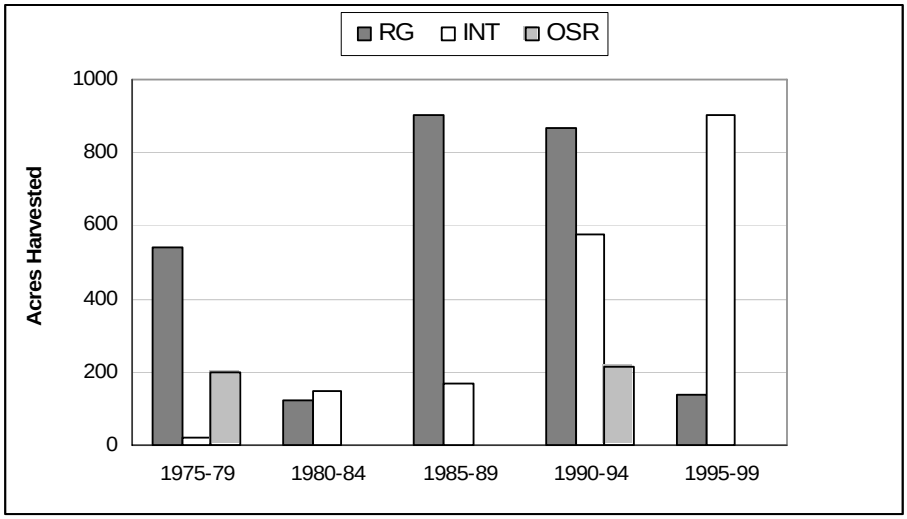
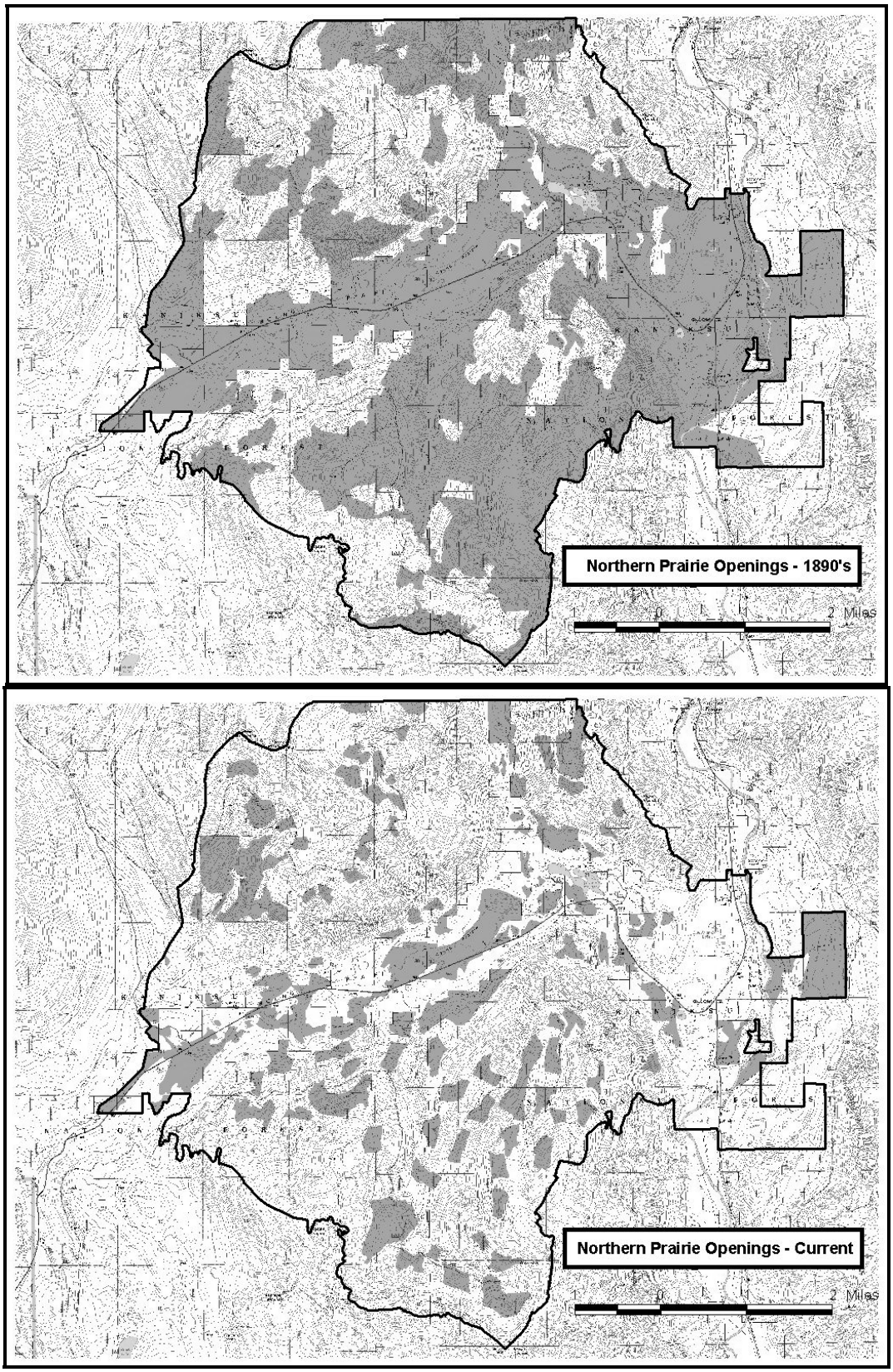


Table 3-1. Timber Sales within the Northern Prairie Project Area (Harvest Acres)

Year	Sale Name	**RG**	INT	**OSR**
1975	Hogue Mt	97	0	0
1976	Tungsten Mt	387	0	140
1979	Coyote Salvage	0	19	0
1979	Mission Harvey	56	0	60
1982	Joker	0	53	0
1983	Tombstone	116	50	0
1984	Ice Storm	0	39	0
1984	Mule Pasture	9	0	0
1984	Robinson Lake Pickup	0	6	0
1986	Harvey Mt	182	28	0
1986	Miller Ck	98	0	0
1987	Tungsten Cable	11	0	0
1989	Harvey II Salvage	0	72	0
1989	Hellroaring	102	68	0
1989	Round Prairie	465	0	0
1989	West Mission Gillion	47	0	0
1990	Little Hellroaring	430	0	0
1990	Mission 160	22	0	0
1990	Upper Hellroaring	123	0	0
1991	Border Mt	191	24	86
1992	Picklepluck	0	241	0
1992	Wiley Coyote	0	39	0
1993	96 Tiers	68	23	51
1994	Helitier	33	0	0
1994	Robinson Cruiseo	0	252	75
1995	Hellroaring Pk	89	608	0
1996	Uproaring Salvage	0	297	0
1999	Clipper Salvage	50	0	0
TOTALS		2576	1819	412

Figure 3-2 – Comparison of Forest Opening Sizes



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.

3.1-B 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).

3.1-B.3 Dry Forests

These forest types consist primarily of Douglas fir, ponderosa pine, western larch and grand fir and represent 24% of the project area. A century ago the ponderosa pine (*Pinus ponderosa*) type covered about 40 million acres in the Western United States (Van Hooser and Keegan 1988). In the areas where ponderosas pine is seral, underburns prevented more shade tolerant competitors – interior Douglas-fir (*Pseudotsuga menziesii var. glauca*), grand fir (*Abies grandis*), and white fir (*A. concolor*) – from developing an understory and eventually replacing the shade-intolerant, but fire resistant pine (Arno 1988; Weaver 1967). All-aged structures were produced by non-lethal fire regimes, and even-age structures were produced by fire regimes with a combination of non-lethal fire patchy, severe fire (Smith and Fischer 1997). On similar stands in western Montana, fires at mean intervals of less than 50 years account for the presence of old growth ponderosa pine (Arno and others 1995).

Underburns have been excluded for 60 to 90 years in most of the seral ponderosa pine forests. As a result, accumulations of surface fuels and conifer thickets have developed that allow stand-replacing fires to become common (Arno and Brown 1991; Barrett 1988; Mutch and others 1993). In the Selway-Bitterroot Wilderness, Barrett and Arno (1991) found a mean fire return interval of 23 years. Fire behavior was mostly non-lethal, but patches of stand-replacement also occurred. Fire severity tended to be greater where fire-free intervals were longer. In this area 64% of 128 historic fires in dry forest types were recorded by fire scars without stand-replacement, 34 percent were recorded with some tree regeneration and 2 percent were recorded only by tree regeneration indicating stand replacement (Arno 1976).

Similar patterns of fire exclusion in the dry forest types on the Bonners Ferry Ranger District and the Northern Prairie project have occurred as well. Actual fire history data taken in the mid-1990's (project file – VEG023) in the project area estimated historic fire-return intervals in these dry forest stands at 23 years prior to the modern fire suppression era. Cross-sections of one western larch stump recorded at least six fire events from circa 1780 to 1919. It was estimated that this tree died around 1990 and there was no evidence of fire from the previous 72 years. With another 15 years past since the data was collected the effective fire-free interval is now in approaching 90 years. Prior to this 90-year fire free interval, the longest interval between fires was 34 years and the shortest was 14 years. This means the current fire free-interval is nearly three times the previous *longest* interval and nearly 4 times the *average.* This data correlates

well with fire history data (project file – VEG002) taken from other dry forest types on the District where frequent (less than 50 years) historic intervals were noted.

3.1-B.4 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 56% 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 2% 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 80 years has reduced ecological diversity and increased homogeneity (stands of similar size, age, species composition, structure, etc.) across the landscape (Smith and Fischer, 1997).

3.1-B.5 Cool-Moist Forest Types

Cool-moist forests are dominated primarily by subalpine fir and Engelmann spruce and represent 15% 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.

3.1-B.6 Cold-Dry Forest Types

Cold-dry forests 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 pine are less prevalent. At higher elevations whitebark pine 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). These forests account for roughly 5% of the Northern Prairie landscape.

3.1-C Forest Composition

The composition of a forest changes over time. Historically, fire was the primary ecological process that determined forest composition. Since fire has in effect been removed from the ecosystem for essentially 100 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 Northern Prairie area as displayed in Figure 3-3. . The most dramatic changes have occurred with respect to long-live seral species, ponderosa pine, western white pine, and western larch. These species have been replaced across the landscape by more shade-tolerant climax species, Douglas-fir, grand fir, western red cedar, and western hemlock.

Blister rust has taken its toll on western white pine throughout north Idaho. The Northern Prairie area is no exception. Prior to the introduction of blister rust white pine was a major species on an estimated 22% of the forests in the area, or over 3,600 acres. Today white pine is a major species on just over 1% (less than 200 acres) of the forests in the Northern Prairie area. 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).

Historically, it is estimated that ponderosa pine was the major species on about 17% of the Northern Prairie area, or about 2,800 acres. Currently, ponderosa pine is the primary species on less than 2% (250 acres) of the forested acres in the area. For the Northern Prairie area species such as Douglas-fir were certainly a part of the landscape, but the current levels (45%) are far above the estimated historic levels (9%). Formerly, recurrent low intensity fires regulated competition for limited site resources (e.g., waster and nutrients) by eliminating fire-intolerant species. With the effective exclusion of underburning fires, dry forests have become overstocked, exceeding their moisture-limited potential. In the absence of fire, native insects and pathogens regulate stocking by killing susceptible individuals and species (Harvey et al 1994).

Finally, western larch was the major forest species on an estimated 21% (nearly 3,500 acres) of the forested landscape. Western larch is now the major species on about 14% (just over 2,400 acres) of the forests in the project area. Although the levels of western larch are about one-third less than the estimated historic levels, they are considerably higher that the remainder of the Kootenai River sub-basin where they are about fifty percent less than the estimated historic levels. The relatively higher percentages of western larch in the project area compared to the rest of the Kootenai River sub-basin is likely related to the 1890's fire. As stated by Schmidt and Shearer (1995) wildfires have maintained, or in some cases enhanced, the natural distribution of western larch.

Changes in forest composition are even more dramatic in the dry forest types. As shown in Figure 3-4 it is estimated that ponderosa pine was the dominant species on 70% of dry forests

historically, contrasted with the current forests where ponderosa pine is the dominant species on only 6% of these forests. On the other hand Douglas-fir is the dominant species on 84% of the dry forest types, where it was about 15% historically. As a result, significant changes in forest composition have occurred in the project area, especially on dry forest types.

Figure 3-3. Overall Species Composition: Historic vs. Current

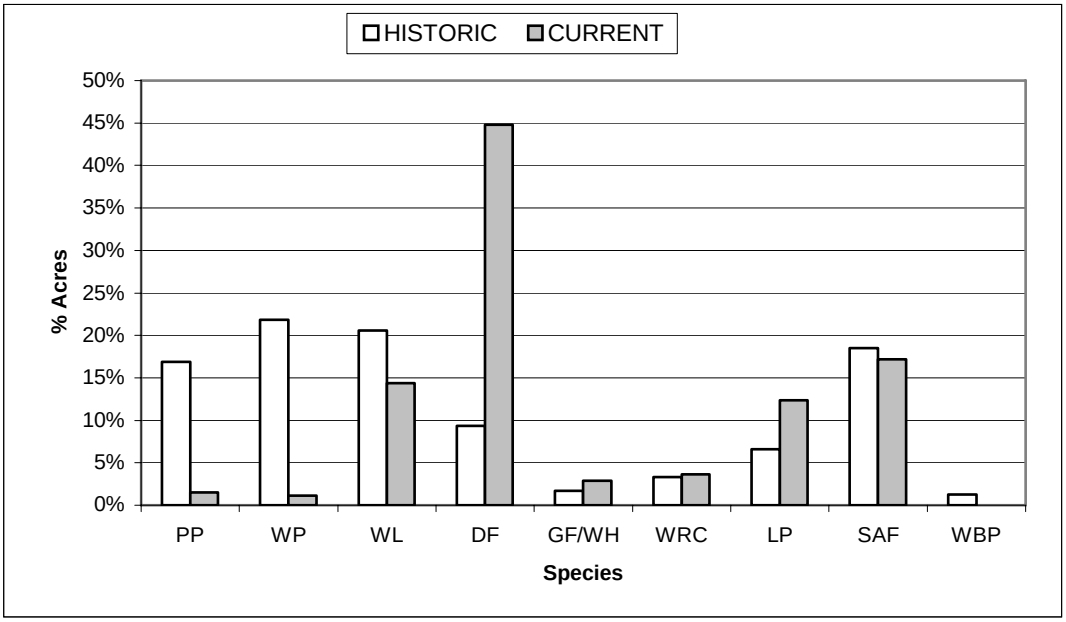
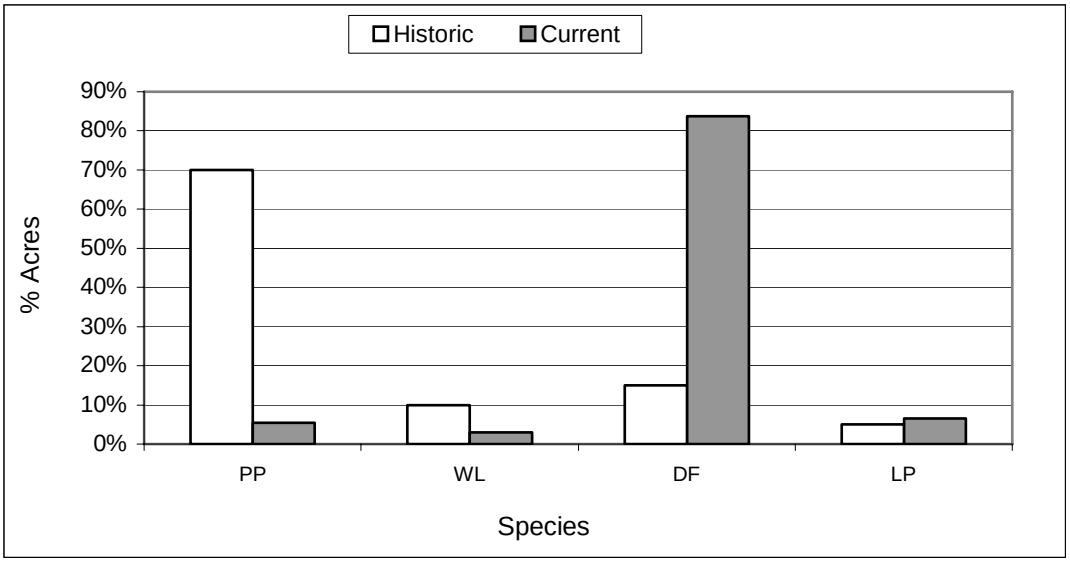


Figure 3-4. Dry Forest Species Composition: Historic vs. Current



3.1-D 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 essentially 100 years forest structure has been determined mostly by fire suppression and timber harvest. For the sake of comparison and to provide some estimation of landscape variability, current conditions were compared to the historic conditions across the Kootenai sub-basin (USFS 2000c) as a whole. This comparison is shown in Figure 3-5. When the current conditions are compared to the historic sub-basin conditions each structural class is actually fairly similar with the exception of the mature and old growth classes. However, when these two classes are added together, their combined totals are not much different than historic levels. The fact that project area is currently "short" on old growth and "long" on mature forests reflects the impact the 1890's fire had on the landscape. As stated earlier, this fire burned nearly 65% of the landscape; so essentially, much of the forest that burned over 100 years ago simply has not become old enough to be considered old growth. These mature forests will continue to transition into old growth forests over the next 20-40 years, assuming there are no major disturbances.

Changes in forest structure have been even more dramatic on dry forest types in the Northern Prairie area. An historic study of some of dry forest types in western Montana illustrates some of the changes that have occurred on these types of 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 in 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 Northern Prairie analysis area average about 220 TPA greater than 3 inches DBH. Arno et al (1997) found that stands where long-lived, fire-dependent, and fire-resistant species such as ponderosa pine and western larch have been retained experienced frequent (25-50 years) low intensity fires historically. They also found that Douglas-fir became established and survived on these sites, perhaps as a result of a comparatively long (42 year) fire intervals. Historically, it was estimated that 40% of the dry forest types in the Kootenai sub-basin were comprised of old growth (Figure 3-6). Currently, only 19% of the dry forest types in the Northern Prairie project area are classified as old growth, which is considerably less when compared to the historical average across the sub-basin. However, when compared to the amount of dry forest old growth across the entire Kootenai sub-basin, which totals a little over 8%, the Northern Prairie contains some of the most abundant dry forest old growth in the sub-basin.

Figure 3-5. Northern Prairie Forest Structure: Historic vs. Current

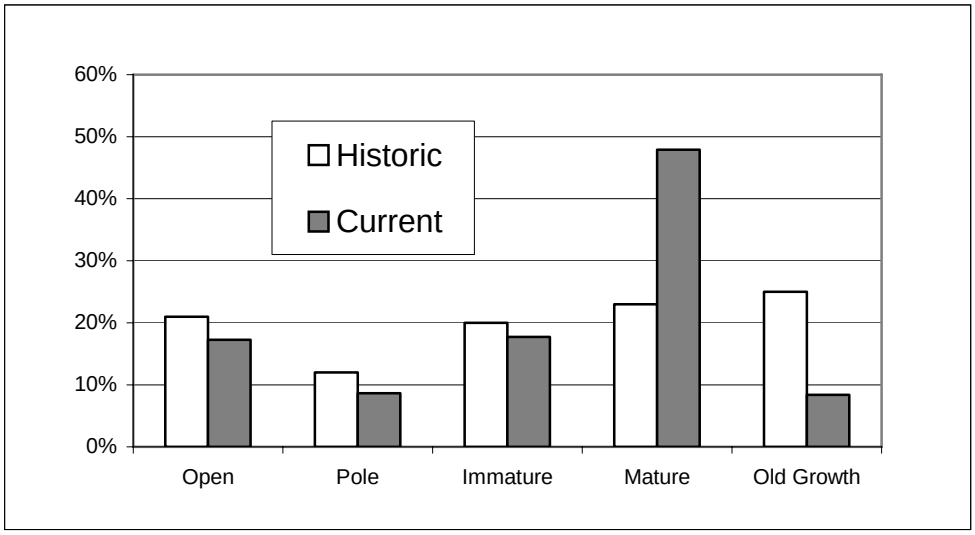
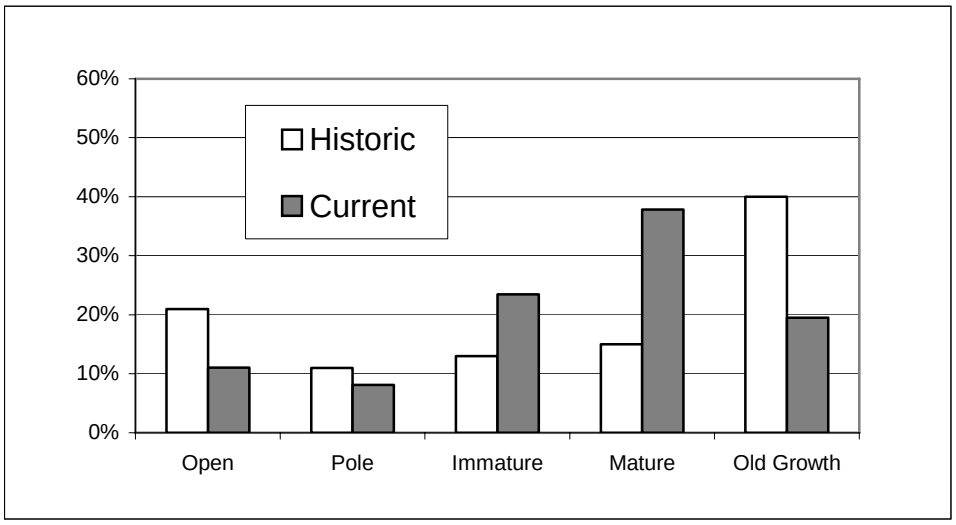


Figure 3-6. Northern Prairie Dry Forest Structure: Historic vs. Current



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, instead of well-spaced old ponderosa pine and larch. These changes in structure now threaten the integrity of these old growth forests, given they are now more vulnerable to insect and disease occurrence and stand-replacing fires.

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 (project file – VEG037). Based on the 2004 Forest Plan Monitoring Report 138,296 forested acres (14%) are considered allocated old growth on the North Zone of the IPNF. The FIA database estimates

13.5% of the North Zone forests are considered old growth (project file – VEG023). Based on these two independent inventories the current old growth levels on the North Zone are slightly below historic levels. In the Kootenai River sub-basin (the Bonners Ferry Ranger District), old growth forests total 17% (2004 Forest Plan Monitoring Report) of the forested landscape, which falls within the estimated historic range, while old growth accounts for just over 8% of the Northern Prairie forests, well below the historic range (project file – VEG028).

3.1-E Insects and Diseases

Disease agents (pathogens) and insects affect forests in various ways (Haack and Byler 1993). They are essential to the function of dynamic ecosystems: they serve to the thin out some trees, recycle nutrients, create habitat and provide food to many wildlife species. They can also negatively affect resource values and ecosystem function (USFS 1999). The following is a summary of the primary insect and disease concerns in the project area.

3.1-E.1 Root Diseases

Root diseases are common in the moist Douglas-fir, grand fir, and high elevation cool subalpine forests in the Northern Rockies Province. Several pathogens are involved, even in the same stand, so it is usual to consider them as a group. The main hosts are Douglas-fir and true firs (USFS 1999). Root diseases have apparently increased significantly over the past several decades, with the several-fold increase in host abundance (USFS 1999). Douglas-fir and true firs (grand fir and subalpine fir), species that are more susceptible to root diseases than larch and pine species (Hagle and Shaw 1991), are currently the dominant species, or a significant stand component, on more than 10,000 acres in the project area (project file – VEG020).

3.1-E.2 Bark Beetles

Bark beetles are considered the most consequential insects in western coniferous forests, where they kill millions of trees annually (USFS 1999). Most of this mortality is scattered widely throughout mature forests (Furniss and Carolin 1977). Mountain pine beetle, Douglas-fir beetle, spruce beetle, and fir engraver beetle are among the most important mortality agents of mature Idaho forests (USFS 1999). Of these species, mountain pine beetle and Douglas-fir beetle are the most likely species of concern in the project area, given the relatively high number of stands where mature lodgepole pine ponderosa pine, and Douglas-fir are a major components. Based on the rating system for mountain pine beetle in *lodgepole pine* developed by Randall and Tensmeyer (2000), there are more than 1,600 acres (project file – VEG016) in the project area that are rated either moderate or high hazard. Another 2,400 acres (project file – VEG018) are rated moderate or high hazard or mountain pine beetle in *ponderosa pine* based on the hazard rating system in Gibson (2006). The hazard rating system for Douglas-fir beetle (Randall and Tensmeyer 1999) estimates there are more than 4,000 acres (project file – VEG013) of either high or moderate hazard for Douglas-fir beetle in the project area.

Stand hazard ratings for individual bark beetle species are not exactly the same, but they do have some similarities. Typically, stand characteristics such as stand density, stand age, and average diameter of host species are part of the rating system. Numerical ratings for these stand characteristics are multiplied to obtain a stand risk values and then stand hazard values are

assigned. The hazard rating systems used for the bark beetles discussed above are included the Northern Prairie project file.

3.1-F Conclusions

3.1-F.1 Long-lived seral species (ponderosa pine, white pine, and larch) have declined across all forest types and have been replaced by species such as Douglas-fir

Forest Composition (All Forest Types)
Western white pine has ***decreased*** from an estimated 22% to a little more than 1%
Ponderosa pine has ***decreased*** from an estimated 17% to less than 2%
Western larch has ***decreased*** from an estimated 21% to 14%
Douglas-fir has ***increased*** from an estimated 9% to 45%

3.1-F.2 Dry forests have experienced the greatest ecological change

Species Composition (Dry Forest Types)
Ponderosa pine has ***decreased*** from an estimated 70% to 5%
Western larch has ***decreased*** from an estimated 10% to less than 3%
Douglas-fir has ***increased*** from an estimated 15% to 84%

Forest Structure (Dry Forest Types)
Open forest structures (11%) are well ***below*** the historic average (21%)
Immature forest structures (23%) are well ***above*** the historic average (13%)
Mature forest structures (38%) are well ***above*** the historic average (15%)
Old growth forest structures (19%) are well ***below*** the historic average (40%)

3.1-F.3 The 1890's fire created a relatively young forested Northern Prairie landscape

Forest Structure (All Forest Types)
Mature forest structures (48%) are well ***above*** the historic average (23%)
Old growth forest structures (8%) are well ***below*** the historic average (25%)

3.1-G Desired Conditions

Two striking changes of dry forests have occurred in recent times. Formerly, recurrent low intensity fires regulated competition for limited site resources (e.g., water and nutrients) by eliminating fire-intolerant trees. With effective exclusion of underburning fires in this century, dry forests quickly became overstocked, exceeding their moisture-limited productive potential. In the absence of fire, native insects and pathogens regulate stocking by killing susceptible individuals and species. Formerly, frequent underburning fires prevented excess accumulation of carbon and storage of nutrients in woody biomass via consumption and release of nutrients. With exclusion of fire, organic residues have accumulated as have standing live and dead fuels. The effectiveness of fire prevention and suppression in dry interior forests in recent years has permitted greatly increased ground fuel accumulations and stratified fuels (both living and dead) to the point where many fires can no longer be contained or confined (Harvey et al, 1994).

Figure 3-7 displays a photograph that represents common stand conditions on dry forest types within the Northern Prairie project area today. In this stand fire has been excluded for over 70 years and some selective harvesting occurred in the early 1920's. As a result, Douglas-fir has replaced ponderosa pine as the dominant species and down woody fuels (larger than three inches in diameter) have built up beyond the levels recommended by Graham et al (1994). Figure 3-8 displays a photograph of another dry forest stand that was harvested and treated with prescribed fire twice in the last 25 years.

This stand is less than five miles away from the stand in Figure 3-7, but on the same habitat type. These two figures display how contrasting styles in management can drastically change the development of dry forest stands. However, Figure 3-8 more closely represents a picture of the types of stands that would meet long-term management objectives on dry forest types across the Northern Prairie landscape.

3.1-G.1 North Zone Geographic Assessment

The North Zone Geographic Assessment (NZGA) defines forests in the Northern Prairie project area as "Low Integrity/High Risk Landscapes." Some of the specific findings that relate to the Northern Prairie project area are:

- These landscapes have changed the most from historic conditions due to major losses of long-lived seral species (ponderosa pine, western larch, and western white pine).

Figure 3-7. - Altered Stand Conditions in Dry Forest TypesThe BEHAVE model predicts that a fire burning under normal summer conditions in this type of stand would have fireline intensities over 500 BTU/foot/second and flame lengths over eight feet. This type of fire would present serious control problems, including torching out, crowning, and spotting. Control efforts at the head of the fire would probably be ineffective (Roussopoulos and Johnson 1975). The majority of large-diameter trees in this stand would not survive this type of fire.

Figure 3-8. Managed Dry Forest Stand - The above stand, about 4.5 miles south of the Northern Prairie project area, is located on the same habitat type as the stand in Figure 3-7. This stand was thinned in 1974 and underburned in 1978. A group selection harvest was conducted in 2000 and the stand was underburned again in the spring of 2002. Ponderosa pine is the dominant species in this stand with lesser amounts of western larch and Douglas-fir. Based on fire behavior predictions using the BEHAVE model, a fire burning under normal summer conditions in this type of stand would have fireline intensities of about 8 BTU/foot/second and flame lengths of just over one foot. This type of fire could be fought with personnel using hand tools at the head of the fire, or the flanks (Roussopoulos and Johnson 1975). The majority of large-diameter trees in this stand would survive this type of fire.

- These landscapes contain large areas of forest types with high probability of major successional change in the next few decades.
- Douglas-fir is at an age where combinations of root diseases and bark beetles begin to create high mortality.
- Dense and multi-storied stands of Douglas-fir or true firs dominate dry habitat types.
- Current forests area dominated by shade tolerant, and drought and fire intolerant species (grand fir, western red cedar, and western hemlock), and short-lived seral species (lodgepole pine and Douglas-fir).
- There is a growing fire risk as a result of natural fuels accumulations.
- These landscapes are the most heavily altered from historic conditions and contain the greatest need and opportunity for large scale forest vegetation restoration.

The management recommendations that relate to the Northern Prairie project area are specifically focused on the restoration of long-lived early seral species (ponderosa pine, western larch, and western white pine). Some of these recommendations include:

- Use regeneration harvest and prescribed fire to create openings that will favor development of long-lived early succession tree species, including blister rust-resistant white pine.
- Use a variety of silvicultural methods (thinning and regeneration) and prescribed fire to sustain and favor long-lived early succession tree species where they are present.

Restoring long-lived early seral species would:

- Reduce the extent of drought and fire intolerant species (grand fir, western hemlock, and western red cedar) on sites where they are not well-adapted and likely drought stressed.
- Reduce the extent of short-lived early seral forest species (Douglas-fir and lodgepole pine) that are near the end of their pathological rotation age.
- Lower the risk of large, severe disturbances.

3.1-G.2 Forest Plan Direction

The IPNF Forest Plan provides direction for all resource management programs and resource activities on the IPNF. Some of the directions that apply specifically to the vegetation resources within the Northern Prairie Project Area are listed below:

- Provide for a diversity of plant and animal communities.
- Provide efficient fire protection and fire use to help accomplish land management objectives.
- Manage the forest resources to protect against insect and disease damage.

There are many Forest Plan Standards that are applicable to the general design of the proposed action. Specific Forest Plan Standards (USDA 1987, pp. II-32-34, II-38-39) that apply to vegetation resources are listed below:

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

- Project design will provide for site preparation and slash hazard reduction practices that meet reforestation needs of the area.
- Encourage utilization of forest products to reduce biomass, which must be disposed of otherwise.
- Activity fuels will be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.
- Vegetation management [through fire] will favor the use of fire, hand treatment, natural control, or mechanical methods whenever feasible and cost effective. Direct control methods, such as chemical or mechanical, may be used when other methods are inadequate to achieve control.

3.2 Wildlife

Ecological disturbances (e.g. landslides, fire, insect and disease outbreaks) lay the foundation for landscape patterns and strongly influence wildlife populations. Disturbances that arise from natural processes or human actions can alter these landscape patterns and wildlife habitat, directing wildlife abundance and composition. Wildlife species will occupy their preferred niche on the landscape, and move from place to place as forest structures change and different habitat conditions develop (Clark and Sampson 1995). Consequently, wildlife species will not necessarily persist indefinitely in areas where they are found today because of the dynamic and shifting environments in which they live.

In the absence of disturbance, vegetation follows a gradual and more predictable sequence of change called succession. As vegetation moves through each stage of succession, the composition of wildlife species shifts accordingly. Wildlife species have distinctive successional strategies. Some species are more suited to the early stages of forest succession where grasses, forbs and shrubs dominate the site, while others are better suited for the later stages of forest development (e.g. old growth). Other species are habitat generalists and have adapted to a wide array of vegetation patterns.

3.2-A Characterization of Habitats

The distribution and abundance of wildlife is primarily a function of habitat conditions (i.e., vegetation type and successional stage). These conditions reflect inherent fixed attributes (as depicted in the description of capable habitat below) as well as disturbance (fire, windthrow, landslide, and insect outbreaks) types and frequencies. In addition to altering habitat due to direct impacts (timber harvest), humans can alter habitat indirectly by influencing natural disturbance patterns. For example, fire suppression results in changes in vegetation composition and structure and subsequent susceptibility to various natural disturbances.

The Northern Prairie project area is located in the Purcell Mountains on the east side of the Bonners Ferry Ranger District, between the Kootenai and Moyie river valleys. Vegetation ranges from relatively steep, dry and rocky south-facing habitats immediately above Round Prairie Creek; to cooler, more mesic sites at upper elevations and in creek bottoms.

As discussed in the Vegetation Section (Chapter 3), wildfires along with tree harvesting and associated road construction have been the major disturbances shaping wildlife habitat in the Northern Prairie project area. In the absence of fire, much of the area has been converted from relatively open ponderosa pine/Douglas-fir-dominated stands to denser stands encroached by young Douglas-fir and grand fir trees. In higher elevations and moister sites, fire suppression has also resulted in an increase in stand density, with late seral species including Douglas-fir, western redcedar, and western hemlock replacing western larch and western white pine. This change in species composition has altered ecosystem biodiversity, increasing the risk of ecological stress. The dominance of subalpine fir at higher elevations and Douglas-fir at lower elevations has increased the forest's vulnerability to drought stress, insect and disease infestations, and large stand-replacing wildfires. Previous timber harvest, mostly regeneration harvest, has occurred in portions of the project area and has altered habitat by reestablishing early seral conditions.

Given the often-conflicting habitat requirements of many species, a sound strategy for management is to maintain a complex pattern of forest types and age classes across the landscape that encourages biodiversity and emulates the historic patterns. Currently, the Northern Prairie project area consists of a relatively high proportion of mature and immature forests, with few large (>40 acres) openings on USFS lands. The patchwork of small openings – particularly in the Harvey Mountain area – represents an unnatural arrangement of vegetation that did not exist historically (Chapter 3 – "Forest Vegetation"). In order to more closely approximate historic vegetation patterns (such as stand-replacing fire) that local wildlife species have evolved with, it is necessary to have forest openings of varying sizes from a few acres to several thousand across the landscape. Some species may be adapted to a forested matrix with occasional small openings, but others (such as grizzly bear) thrive on the landscape patterns historically caused by large disturbances. While the artificial creation of large (>40 acres) openings may be locally detrimental to a few species, these openings would increase landscape diversity and more closely approximate historic patterns of forest vegetation; resulting in a more disparate assortment of wildlife species.

3.2-B Methodology

The Council on Environmental Quality (40 CFR 1502.2) directs that impacts be discussed in proportion to their significance. Some wildlife require a detailed analysis/discussion to determine effects on a particular species. Others may not be impacted, impacted at a level that is inconsequential, or adequately mitigated through the design of the project. Generally, these elements do not require a detailed discussion and analysis.

The appropriate methodology and level of analysis needed to determine potential effects are influenced by a number of variables including presence of species or habitat, the scope and nature of the activities associated with the proposed action and alternatives, and risk factors that could ultimately result in a meaningful adverse or favorable effect. The screening process tiered to the following documents and used a variety of information including scientific literature, resource inventories, and sighting records:

- Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin
- Idaho Panhandle National Forests Land and Resource Management Plan
- Available Conservation Assessments and Strategies for wildlife species

3.2-C Species Habitats and Requirements

This section describes the status and distribution of wildlife species analyzed in detail that have been identified as species of concern within the project area and could potentially be affected by proposed activities. It also describes the environmental baseline and relevant habitat components that may or may not be affected by the alternatives. Information presented in this section is based on scientific literature, wildlife databases, professional judgment, recent field surveys, and habitat evaluations.

The resource information provided, especially as it relates to habitat analysis, includes past actions (timber harvesting and road building) that have influenced vegetative changes to what is now part of the existing or baseline condition. For example, the characterization of forest structure from a past regeneration harvest would acknowledge changes that have occurred over the past 30 years, from stand initiation to a mid-seral stage of succession.

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 vegetative structure and composition on the site may not currently provide the necessary attributes to support a species such as stand age, 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.
>
> Suitable habitat refers to wildlife habitat that currently has both the fixed and variable stand attributes for a given species' habitat requirements. Variable attributes change over time and may include stand age, cover type, stand density, tree size, or canopy cover.

The IPNF has developed Forest-wide wildlife habitat capability/suitability models, which utilize Timber Stand Management Record System (TSMRS) data, for five Threatened, Sensitive, and MIS wildlife species or species guilds (Canada lynx, flammulated owl/pygmy nuthatch/fringed myotis, fisher/American marten, northern goshawk, and white-tailed deer critical mid-winter range). In order to validate these models, USFS personnel conducted site visits of representative capable habitat for these species, with emphasis placed on stands modeled as "currently suitable." Any proposed treatment areas that potentially include suitable habitat for one or more species addressed in the model were visited. Capable habitat is determined by habitat type and topographic factors. Since these do not change over time, TSMRS data presumably offer reliable information on habitat capability.

3.2-C.1 Threatened and Endangered Species

(a) Canada Lynx

Canada lynx is one of the three species of wild cats that occur in the temperate forests of North America. They occur in boreal, sub-boreal and western montane forests and are uncommon or absent from the wet coastal forests of North America. Distribution of lynx is nearly coincident with that of the snowshoe hare, its primary prey. Both snow conditions and vegetation types are important factors to consider in defining lynx habitat. Lynx habitat quality is believed to be lower in the southern periphery of its range because landscapes are more heterogeneous in terms of topography, climate, and vegetation (Ruediger et al. 2000).

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 (mainly snowshoe hare) for foraging and

late-successional forests that contain cover (especially deadfalls) for kittens and for denning (Koehler and Aubrey 1994). The highest use occurs when these are in close proximity. Like most wild cats, lynx require cover for security and stalking prey and 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 1994). In north-central Washington, lynx used areas with gentle slopes (less than 10%) in winter (McKelvey et al. 2000); and moderate to gentle slopes (less than 40%) were used in the southern Rocky Mountains (Apps 2000). In northern Idaho and northwestern Montana, lynx generally occur in moist, cold habitat types above 4,000 feet elevation.

Reference Condition

The Canada lynx was listed as Threatened on March 21, 2000. 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 the 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 difficult (Koehler and Aubrey 1994).

Identified risk factors that can impact lynx populations mainly address alteration of forest habitats. Upon listing, lynx habitat management on Federal lands was guided by the Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000). However, the IPNF has since adopted the Northern Rockies Lynx Management Direction (NRLMD) (USDA 2007a). Similar to the LCAS, the NRLMD directs agencies to delineate LAUs to evaluate and analyze effects of planned and on-going projects on lynx and their habitat, and provides guidance for addressing these risk factors. Pursuant to this new direction, the IPNF has redefined what is considered lynx habitat on the Forest, and redelineated Lynx Analysis Unit (LAU) boundaries.

At the time of Federal listing, Canada lynx primary habitat in North Idaho was broadly characterized to include areas with site potential to produce subalpine fir, mountain hemlock, Western hemlock, cedar and moist grand fir climax habitats. Dry forest communities (ponderosa pine and Douglas-fir habitat types) and upper subalpine habitat types (alpine larch and whitebark pine cover types) were considered non-lynx habitat. As the available knowledge of lynx habitat requirements has increased, lynx habitat in North Idaho has been more narrowly defined to include only subalpine fir/Engelmann spruce habitats (primary habitat except on the Priest Lake RD, where moist cedar-hemlock is also considered primary vegetation) and cool/moist habitat types occurring adjacent to primary habitat to create a transition between lynx habitat and non-lynx habitat. Based on research findings, the distance agreed upon by the IPNF and the Canada Lynx Biology Team for this transition zone is limited to secondary habitat within 200 meters of primary habitat.

Additionally, to more accurately determine lynx habitat, the IPNF is no longer using habitat type alone to map lynx habitat and has begun to utilize vegetation response units (VRU), which incorporates other factors such as soils, hydrologic function, landform, etc and is a more accurate method of classifying the potential natural vegetation. As a result, the VRUs are not tied to stand

boundaries and provide a finer-scale approach to habitat classification and allow for more complete data across ownership boundaries.

Based on additional research and analysis, several standards for vegetation projects from the LCAS were modified, changed to guidelines, or dropped entirely for the NRLMD. However, two vegetation management standards remain essentially the same: 1) if more than 30% of the lynx habitat in a LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat (formerly called "unsuitable"), no additional habitat may be regenerated by vegetation management projects, and 2) timber management projects shall not regenerate more than 15% of lynx habitat on National Forest System lands within a LAU in a ten year period (there are small exceptions to both of these standards for fuels treatment projects within the wildland/urban interface). Additionally, recent research has stressed the importance of multi-storied mature or late-successional forests to snowshoe hare populations. As a result, vegetation management projects that reduce snowshoe hare habitat in these stands are prohibited, with the exception of fuels treatment projects within the wildland/urban interface. Outside of the wildland/urban interface, precommercial thinning of lynx habitat is still not allowed. Finally, the LCAS standards regarding protection of denning habitat were changed to a guideline based on the general consensus of lynx researchers that denning habitat, in most cases, is not limiting in lynx habitat.

Existing Condition

In 2007, the IPNF remapped LAU boundaries based on Lynx Biology Team recommendations to have LAUs of 16,000-25,000 acres in size with at least 6,400 acres of primary habitat. The Northern Prairie project was within the Hall-Mission LAU, but this LAU did not meet recommendations for either size (<13,000 acres) or amount of primary habitat (3,500 acres). As a result, lynx habitat in this area was combined with that of the former Hellroaring and Meadow-Dawson LAUs, forming a single 38,856 acre (35,000 acres in Federal ownership) LAU containing 9,800 acres of primary habitat. While the resulting Round Prairie LAU exceeds recommended size, and the Hall/Mission mountain area is separated from the bulk of the LAU by the Round Prairie valley, this was the most acceptable arrangement for incorporating lynx habitat between the Moyie and Kootenai rivers into viable LAUs.

The Northern Prairie project is completely within the Round Prairie LAU. LAUs are intended to provide the fundamental unit for evaluating and monitoring the effects of management activities on lynx habitat. The IPNF has completed an initial habitat suitability model to predict the amount of lynx habitat present in the project area. As this model was refined and the output verified through aerial photo inspection and field reviews, the acreages were changed to better reflect known conditions. Currently, the Round Prairie LAU contains 14,452 acres of lynx habitat, approximately 2,303 acres of which are within the Northern Prairie project area. A total of 695 acres of lynx habitat (4.8%) in this LAU are in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat. Of these, only 200 acres of lynx habitat (1.4% of habitat on NFS lands) have been regenerated within the last 15 years. Approximately 2,430 acres have been identified as multi-story mature or late successional forests. An additional 4,000 acres of potential denning habitat are well-distributed throughout the LAU. Only a few of the

proposed timber harvest units are on primary (subalpine fir) or adjacent (within 200 m) vegetation and are considered lynx habitat.

Lynx presence has been historically documented throughout the Idaho Panhandle. Unverified lynx sightings have been reported from several locations on the Bonners Ferry Ranger District; including relatively recent sightings in the Boundary, Grass, Trout Creek and Moyie River drainages; and historical accounts from the Blue Joe, Canuck, and Deer Creek and Kootenai River drainages.

(b) Gray Wolf

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 reducing risk of human-caused mortality are considered key components (USDI 1987). The risk of human-caused mortality can be directly related to the density and distribution of open roads.

Reference Condition

In 1994, final rules in the Federal register made a distinction between wolves that occur north of Interstate 90 and wolves that occur south of Interstate 90, in Idaho. Gray wolves occurring north of Interstate 90 were 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 Northern Prairie project occurs north of Interstate 90 within the region where wolves are Federally listed as endangered. The Hall/Mission/Harvey/Hogue mountain area contains year-round resident herds of – and is an important wintering area for – moose, elk, white-tailed and mule deer. Although no specific population numbers are available, these species are common and available enough to provide ample prey base for wolves. While overall open road densities in the lower elevations are generally high (>2 miles/square mile), road densities are lower away from the valley floor. In addition, there is a large unroaded area on the west face of Hall Mountain that could provide secure den sites.

The nearest known pack of wolves is the (unofficial) Solomon Pack, located about 13 miles southeast of the project area. While occasional unconfirmed sightings had been reported from the Round Prairie area for a number of years, these sightings had mostly indicated the presence of transient individuals or lone wolves, unattached from a pack. However, in late December, 2005, the Idaho Department of Fish and Game (IDFG) received several reliable gray wolf sightings in the Hall Mountain area. In early January, 2006, USFWS and IDFG documented the presence of a group (4-5 individuals) of gray wolves that had consumed a domestic calf near where the western portion of Hall Mountain meets the valley floor. Efforts to trap and radio-collar one or more of these animals were unsuccessful, as the group apparently left the area shortly after they were detected. However, there have been additional reliable sightings of wolves and wolf tracks in the Hall Mountain area since the unsuccessful trapping effort.

At this time, it is unclear if the project area is accommodating a resident wolf pack, included in the territory of a pack that dens elsewhere, or being visited by a group of wolves on a long-distance foray. In any case, there is a possibility that wolves may be affected by project activities. As information becomes available, additional restrictions may be placed on Northern Prairie project activities (such as temporal and spatial buffering of den/rendezvous areas) where appropriate.

(c) Grizzly Bear

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 (Volsen 1994).

Reference Condition

The grizzly bear was listed as Threatened in 1975. It was originally distributed in various habitats throughout western North America. Today, it is confined to less than two percent of its original range and represented in five or six population centers south of Canada, including the Cabinet-Yaak and Selkirk Ecosystems that are located in northeastern Washington, northern Idaho and northwestern Montana. Habitat loss and direct and indirect human-caused mortality are related to its decline (USDI 1993).

The Grizzly Bear Recovery Plan (USDI 1993) indicates that the most important element in grizzly bear recovery is securing adequate effective habitat. This is a reflection of an area's ability to support grizzly bears based on the quality of the habitat and the type/amount of human disturbance imposed on the area. Controlling and directing motorized access is one of the most important tools in achieving habitat effectiveness and managing grizzly bear recovery (USDI 1993). By controlling motorized access, certain objectives can be achieved including minimizing human interactions and potential grizzly bear mortality, reducing displacement from important habitats, and minimizing habituation to humans.

Existing Condition

The Northern Prairie project is in an area outside designated grizzly bear recovery zones, but is known to have recurring grizzly bear use. IPNF manages grizzly bears according to standards outlined in the 2001 Biological Opinion (BO) for continued implementation of the IPNF Forest Plan (USDI 2001). Although this document does not discuss occupied areas outside recovery zones, the IPNF manages these areas to achieve no net increase in linear open and restricted drivable road densities until such time that a Forest Plan Amendment addressing motorized access in grizzly bear habitat can be completed.

On lands administered by the IPNF between US Highway 95 and State Highway 1, there are nearly 53 miles of drivable road surface within an approximately 30 square mile area (29.6 mi^2),

resulting in a linear road density of 1.8 mi/mi^2. The portion of this area within the Northern Prairie project area boundary has about 21 miles of drivable roads in an 11.8 mi^2 area, again resulting in a linear road density of 1.8 mi/mi^2. There are several seasonally restricted roads in this portion or the District, but the closure dates do not correlate with the grizzly bear activity period. Since these restricted are open to public traffic for at least a portion of the active bear season, they are considered "open" for linear road density calculation purposes.

Habitat quality is not quantitatively considered in any of the IPNF guidelines for bear management. The Selkirk and Cabinet-Yaak ecosystems have 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 area, and are generally abundant. Spring habitat is present in the form of wet meadow habitat in Round Prairie and steep, low-elevation southerly aspect slopes that provide green-up early in the year.

Grizzly bear numbers are currently estimated at 46 animals in the Selkirk Ecosystem and 30-40 animals in the Cabinet-Yaak Ecosystem (USDI 2001). Although population trend analyses for both ecosystems have been inconclusive, local biologists consider the Selkirk population to be on the increase based on reported bear sightings, number of sows with twins or triplets, and sightings in areas not previously known to be used by grizzly bears (Wakkinen, pers. comm., 2006). However, population estimates for the Cabinet-Yaak ecosystem seem to indicate a slight downward trend.

There have been several confirmed sightings of grizzly bears in the Mission Mountain and Harvey Mountain areas, including an observation by a USFS employee in the Northern Prairie project area in 2000. In the summer of 2005, a grizzly sow was captured in a leg-hold snare on the slopes of Mission Mountain, immediately west of the project area.

3.2-C.2 Sensitive Species

(a) Black-backed Woodpecker

The black-backed woodpecker occurs in montane and pine forests, where it is confined mostly to burned areas (MPF 2000a). In the absence of burns, this woodpecker will forage in areas with diseased trees (Hillis et al. 2002). Black-backed woodpeckers tend to flourish in early post-fire (3-5 years) habitat (Hutto 1995). They are uncommon residents of coniferous forests year-round – naturally occurring at low population levels. Following fire or insect and disease outbreaks that increase populations of wood-boring insects, they experience local population increases and temporary range extensions. Fire suppression and post-fire logging reduce habitat for black-backed woodpeckers by reducing the availability of burned areas and snags (Hutto 1995). In addition to the presence of recently burned areas, key habitat factors for black-backed woodpeckers include the presence of snags and diseased trees for foraging.

This woodpecker nests in a variety of forest types, especially lodgepole pine and western larch. It excavates a nest cavity in a live or dead tree. Nest trees typically have heart rot or other decay. Unlike most other woodpeckers, this species uses relatively small, hard snags (Saab and Dudley 1997). Nest trees can be as small as 5" dbh, and nest selection does not appear to be limited by overstory canopy closure. Research in Oregon found that black-backed woodpeckers' nest sites

were located in habitats with more snags per acre than other woodpecker species (Bull et al. 1986). It is possible that this species requires higher snag densities than other woodpeckers. Black-backed woodpeckers in this study selected pine and western larch nest trees that were less than 20 inches in diameter and were recently (< 5 years) dead for nesting (Bull et al. 1986).

Reference Condition

Historically, ecosystems in north Idaho were shaped by disturbance patterns that altered the size and distribution of forest structures across the landscape. Wildfire, wind damage, insects, and disease, and forest succession created snags in areas that ranged in size from individual trees or small patches, to entire drainages (1,000 acres or larger). Consequently, snag densities would vary across the landscape, from areas with low levels of snags to other areas with abundant snags. In the latter case, densities of black-backed woodpeckers temporarily increased in response to an enhanced foraging and nesting opportunities. In western Montana, black-backed woodpeckers have been found to be most abundant in recent stand-replacing burns. However, in northern Idaho burns have been largely absent for the last 60 years. Black-backed woodpeckers are still found amid bark beetle outbreaks, although at lower densities (Hillis et al. 2002).

During the last century, fire suppression and timber harvest have altered the temporal and spatial distribution of prime black-backed woodpecker habitat. Large wildfires are less frequent and timber harvest often removes trees which are dead, dying or infected with insects. In addition, firewood cutting along open roads can result in a lack of appreciable densities of snags along these corridors. Conversely, fire suppression has resulted in a sharp increase of smaller diameter trees and snag recruitment.

Existing Condition

Suitable black-backed woodpecker habitat likely exists within the project area as a result a small-scale insect infestations and other tree mortality. There are no recently burned areas of any size in the Northern Prairie project area, and very few on the Bonners Ferry Ranger District as a whole. However, aerial surveys in 2005 mapped more than 36,500 acres of mountain pine beetle infestation of lodgepole pine, ponderosa pine, whitebark pine and Western white pine stands on the District; in addition to 20,200 acres of subalpine fir stands infested by Western balsam bark beetle (USDA 2005). While surveys for black-backed woodpeckers have not been conducted within the project area, presence is assumed as a result of habitat created by increasing insect infestations on the IPNF and large wildfires in Canada north of Mission Mountain.

(b) Flammulated Owl

Flammulated owls are seasonal migrants to northern latitudes during the spring and summer. Primary nesting habitat is comprised of the older forests dominated by ponderosa pine and Douglas-fir with 35-65% overstory canopy closure (Goggans 1986, Howie and Ritcey 1987, Reynolds and Linkhart 1992). Reynolds and Linkhart (1992) reported that all published North American records of nesting, except one, came from forests in which ponderosa pine trees were at least present, if not dominant, in the stand. Flammulated owls depend on pileated woodpeckers and flickers to excavate the cavities in which they nest. Their nest trees are at least 14” in diameter (McCallum 1994). Although nesting habitat is thought to be more limiting on

the landscape, the flammulated owl's preference for the ponderosa pine/Douglas-fir cover type can also be linked to food availability. Reynolds and Linkhart (1992) noted a stronger correlation between prey availability and this cover type than with other common western conifer cover types.

Flammulated owls appear tolerant of some human disturbances (Hayward and Verner 1994). This species has been known to nest in campgrounds and other areas of human activity with no apparent adverse effects.

Reference Condition

Based on vegetation estimates, ponderosa pine once comprised 9.1% of the National Forest lands within the Kootenai sub-basin, where the Northern Prairie project is located. Today, only 1.5% of the Kootenai sub-basin consists of sites that are predominately ponderosa pine (Chapter 3 - NZ Geographic Assessment). This is an 84% decrease from an earlier point in history.

Primary factors that have contributed to the loss of older ponderosa pine/Douglas-fir forests include fire suppression and forest management. Fire suppression has led to the advancing succession of species such as Douglas-fir and grand fir that crowd out ponderosa pine. In addition, dry, open-grown forests of ponderosa pine and Douglas-fir were common at lower elevations in areas suitable for human settlement. These areas experienced intensive timber harvest, and the resulting access increased harvest of large snags by firewood cutters.

Existing Condition

Historically, it is estimated that ponderosa pine was the major species on about 36% of the analysis area, or about 2,800 acres. Currently, ponderosa pine is the primary species about 3% (250 acres) of the forested acres in the area. Approximately 43% of the USFS-administered lands in the Northern Prairie project area represent drier forest habitats associated with flammulated owls. These drier habitats are able to produce older, single strata ponderosa pine/Douglas-fir communities, which in turn provide the necessary habitat attributes for flammulated owls. The IPNF has completed a habitat suitability model to predict the amount of flammulated owl nesting habitat present within the project area. National Forest lands within the analysis area encompass approximately 7,700 acres. Of these, 3,326 acres are classified as capable habitat for the flammulated owl, of which 477 acres were modeled as suitable. In the project area, the lack of suitable habitat is mainly due to older stands that have a dense secondary canopy layer that can restrict foraging by flammulated owls.

District personnel conducted surveys of potential habitat on Hogue Mountain and the lower slopes of Harvey Mountain during the summer of 2003. A single vocalizing flammulated owl was identified near the top of Hogue Mountain in 2003. An additional survey of this area in 2006 did not detect any owls. Given the limited amount of currently suitable habitat, flammulated owl populations are likely at very low densities within the project area.

(c) Fisher

Fishers are low density, forest carnivores, occurring most commonly in landscapes dominated by late-successional forests with high cover, especially in riparian areas. All habitats used disproportionately by fishers have high canopy closure with complex forest structure. They avoid areas with low canopy closure (Ruggiero et al. 1994).

Fisher habitat in the Rocky Mountains generally consists of mature and old-growth conifer forests in summer and young, mature, and old-growth forests in winter (Heinemeyer and Jones 1994). Large-diameter snags and logs are used for denning and foraging. The species prefers forests with high canopy closure (greater than 80 percent) and avoids areas with low canopy closure (less than 50 percent) (Powell 1982). Forests within or adjacent to riparian areas appear to be particularly important to fishers (Heinemeyer and Jones 1994). In his study in north-central Idaho, Jones (1991) found that fishers generally preferred grand fir and spruce forests, and avoided dry ponderosa pine and Douglas-fir habitats. However, in winter, fishers also selected stands with relatively high basal areas of Douglas-fir and lodgepole pine. Changes in human access can affect fishers, as the species is easily trapped and over-trapping can jeopardize fisher populations.

Reference Condition

Fishers historically occupied much of the forested habitats in the northern United States (Heinemeyer and Jones 1994). Populations declined in the early 20th century, probably due to habitat loss from human settlement and logging, over-trapping, and poisoning. In the western United States, fishers have remained at low numbers or absent from their former range (Heinemeyer and Jones 1994). Population trend information for fishers in northern Idaho is unavailable, but based on sighting information fishers are currently rare (S. Cushman, pers. comm.).

Existing Condition

The fisher habitat models indicate that approximately 10,872 acres of capable fisher habitat are present on Federal lands within the fisher analysis area, approximately 3,402 acres of which were identified as currently suitable for denning. Alteration of forest structure due to natural and human-caused disturbances (i.e. fire, timber harvesting) can negatively impact habitat for fisher. However, given the relatively low density of fishers in the region and the high percentage of the analysis area occupied by mature moist forest with relatively high canopy cover and sufficient amounts of coarse woody debris, it is unlikely that habitat limits fisher presence.

In 2003, fishers were documented in several locations in the Bonners Ferry Ranger District, including Saddle and Grass creeks, Long Canyon and Parker creeks, and Boulder Creek (S. Cushman, pers. comm.). The District is unaware of any recent confirmed fisher sightings in or near the project area.

(d) Western Toad

Western (boreal) toads are found in a wide variety of habitats including wetlands, forests, and floodplains in the mountains and mountain valleys. Breeding takes place from May to July in shallow areas of large and small lakes, beaver ponds, temporary ponds, slow moving streams,

and backwater channels of rivers. After a brief spring breeding season, adult toads leave aquatic habitats and travel to a variety of upland habitats. Adults and juveniles overwinter and shelter in underground caverns, or more commonly in rodent burrows. Adults can remain away from surface water for relatively long periods of time, and juveniles may disperse up to or more than four kilometers from their natal sites (Maxell 2000).

Reference Condition: Survey results combined with incidental observations indicate that this species is found throughout much of northern Idaho. While toads may be widespread across the landscape, it is unknown in what proportion of suitable habitat they occur. Surveys conducted in the northern Rocky Mountains in the 1990s revealed that toads were absent from a large portion of their historic range and occupied only a small proportion of suitable habitat (Maxell 2000). As a result of these findings, the Northern Region Regional Forester listed the boreal toad as a sensitive species.

Steep roadcuts can be a barrier to toads moving between seasonal habitats, but roads can also provide a barrier-free travel corridor that then provides opportunities for mortality. Juvenile toads are vulnerable to being killed by motorized vehicles when they are dispersing from their natal ponds.

Existing Condition: Western toad presence has been documented on the Bonners Ferry Ranger District. They are known to breed from the Kootenai River Valley to all but the highest elevations. There is no evidence of decline on the District; however, it is assumed that numbers were greater in the past primarily because of the loss of wetland habitat. An increase in roads, particularly in developed, low elevation areas, may be a mortality factor.

The primary risk factor for toads is loss of breeding habitat. Indirect effects to breeding habitat have the potential to occur if there is increased sediment delivery to wetlands and waterways as a result of increased roads and tree removal. Within the project area, the best toad breeding habitat is likely Robinson Lake and several wetland complexes adjacent to Round Prairie Creek.

3.2-C.3 Management Indicator Species

(a) Northern Goshawk

The northern goshawk uses a wide variety of forest age classes, structural conditions, and successional stages, inhabiting mixed coniferous forests in much of the northern hemisphere (Reynolds et al. 1992). Throughout North America, goshawk nest sites have consistently been associated with the later stages of succession (mature and old growth trees) with moderate to high tree densities located near the bottom of hillsides on moderate slopes (Hayward and Escano 1989, Squires and Reynolds 1997, Graham et al. 1999). Foraging habitat includes a wider range of forest age classes and structures that provide a relatively open forest environment for unimpeded movement or flight through the understory. Goshawk territories also contain a Post-Fledging Family Area (PFA) surrounding the nest area that is used by the family group from the time the young fledge until they are no longer dependent on the adults for food. The home range (which includes the nest area, PFA and foraging area) and PFA both contain a more heterogeneous mix of forest age and structural components than the nest area itself (Reynolds et al. 1992).

Reference Condition

Generally, the Bonners Ferry area once contained a greater proportion of old growth than currently occurs. Mature forest is important for northern goshawks not only for prey species habitat but also for the large trees that provide the substrate for their substantial nest structures.

At least three suitable nest areas, as well as three replacement nest areas, should be present per home range (5,000-6,000 acres) to provide long-term nesting habitat for goshawks on the landscape (Reynolds et al. 1992). In the Northern Region, nest stands should be at least 40 acres in size, surrounded by a mix of younger forest and non-forested openings (Clough 2000). Reynolds et al. (1992) suggest maintaining a mix of structural stages within goshawk home ranges and PFAs of roughly 10% each in open (non-forested) and seedling/sapling stands, and 20% each of pole-sized, immature sawtimber, mature sawtimber, and old growth.

Existing Condition

White pine blister rust and fire exclusion have changed the species composition of stands within the project area. Today's landscape contains only remnant examples of white pine, ponderosa pine and western larch. Douglas-fir, grand fir and lodgepole pine have replaced much of the growing space once occupied by these species. This change in dominance has increased the forest's vulnerability to drought stress, insect and disease infestations, and large, stand-replacing fires. This has resulted in unusually high levels of tree mortality, affecting stand structure and subsequent habitat suitability for goshawks.

Over thirty goshawk territories, some with multiple nests, have been recorded on the Bonners Ferry Ranger District since 1979. Canopy cover of 40-90% has been documented within these nest stands. Nest trees are typically found in live, large diameter (≥14") Douglas-fir, western larch, western red cedar, or western hemlock. Live trees are preferred because the overstory canopy protects eggs and nestlings from inclement weather and aerial predators. Of the documented territories in the Purcell Mountains portion of the District, more than one half have been documented experiencing some level of successful breeding during the last decade. There have been intensive District-wide surveys for goshawks in 1989, 1995, 1996 and 2002. Potentially suitable nesting habitat in or adjacent to proposed treatment units was surveyed for occupancy in 2003, and habitat at the western edge of the project area (Mission Mountain) in the vicinity of reported goshawk sightings was surveyed in 2004 and again in 2006. No new goshawk nesting territories were discovered in these surveys.

There is one active goshawk territory within the project area above Gillon Creek. The presence of an active nest was first documented in 1997, although goshawk sightings had been reported in the vicinity as early as 1992. The territory has been active every year since at least 2002, successfully fledging young in 2003, 2005, 2006 and 2007. The territory contains three known nests. The original (1997) nest is adjacent to an area that was commercially thinned in 1995, and was active in 2005 and 2007. The other two nests are on steeper slopes in a mature Douglas-fir stand that has no recent harvest history. One of these nests fledged young in 2003, and the other

fledged young in 2006 and was occupied (unsuccessfully) in 2004. Since 2002, this territory has produced at least nine young. All three nests are within 500 m of one another.

The Northern Prairie analysis area contains 2,958 acres of capable goshawk nesting habitat on USFS-administered lands, 650 acres of which are modeled as currently suitable. Within the analysis area, capable nesting habitat seems limited by steepness of slopes. However, the Gillon Creek territory is unusual on the District because two of the three nest trees are on >40% slope.

(b) Pileated Woodpecker

Pileated woodpeckers are relatively common in both cut and uncut mid-elevation forests, and appear to do well in a matrix of forest types (Hutto 1995). They nest in mature and old-growth forests and in previously harvested stands that contain remnant large trees and snags. Dead trees are preferred over live trees for nesting and roosting, and nest trees usually over 25 inches in diameter in stands with at least 60 percent canopy cover (Bull et al. 1990; Bull and Holthausen 1993). Live or dead western larch, and dead ponderosa pine, aspen, or black cottonwood are preferred nest tree species in the northern region (Warren 1990). Most foraging occurs in logs and dead trees at least 6 inches in diameter, although large diameter (i.e., greater than 12 inches) dead wood is used most frequently (Bull et al. 1990). Since foraging habitat occurs in a wider ecological range of forest age structures, nesting habitat is considered the most critical and limiting feature for pileated woodpeckers. The species was selected as an MIS because its highest densities occur in old-growth forests and because it needs large dead trees for nesting and dead woody material (standing and downed) for foraging (Bull et al. 1990).

Reference Condition

Pileated woodpecker population trends in northern Idaho are unavailable. However, suppression of fire and timber harvest has likely reduced the availability of nesting habitat for the species. Fire suppression has resulted in fewer large snags across the landscape, and timber harvest has resulted in fewer acres of mature and old-growth forests.

The change in species composition, along with past harvest practices and firewood collection, has slowly and methodically replaced such species as ponderosa pine, white pine and western larch, further inhibiting the production and sustainability of large snags. Consequently, snag production is shifting from larger, longer-lived species to smaller, shorter-lived species, which affects the long-term stability and persistence of snag habitat in the Northern Prairie project area. As a result, snag habitat within the project area is generally in decline for species associated with large snags, such as the pileated woodpecker.

Existing Condition

Pileated woodpeckers occur throughout the Bonners Ferry Ranger District. Almost all of the proposed treatment areas for the Northern Prairie project contain pileated woodpecker foraging habitat. Nesting habitat is more limited due to the lack of large snags (and live trees) over 25 inches dbh. Bush and Lundberg (2006) estimate only 1.6 snags/acre >20" dbh in the Bonners Ferry/Kootenai Geographic Area (Bonners Ferry RD) and two snags/acre > 20" dbh in the

Purcell/Boulder Landscape Area. TSMRS data produced similar results within the Northern Prairie analysis area, estimating 1.6 snags/acre >20" dbh (project file – WL001).

National Forest lands within the project area contain approximately 3,132 acres of mature forest (sawtimber or old growth) that may be providing pileated woodpecker nesting habitat. This assessment does not include stands dominated by Engelmann spruce or subalpine fir, since pileated woodpeckers have not been observed nesting in these forest types on the District. The project area contains enough areas of at least 100 acres of contiguous mature/old forest habitat that seven 1,000-acre hypothetical homeranges could be delineated. During field reconnaissance in July 2003, a pileated woodpecker was observed about ½ mile southeast of Unit 79. Based on the bird's behavior, it was likely nesting in the vicinity.

(c) Forest Land Birds

Forest land birds represent a wide variety of species with varying habitat associations. Some species are associated with older forest, others are associated with younger forests; some species prefer wet forest types, while others prefer drier types. Any forest treatment would benefit some species and have a detrimental effect on others. The most prudent way to manage for forest lands birds is to maintain a wide variety of habitat types and to place particular emphasis on protecting and enhancing those habitat types and species which are currently underrepresented and/or declining.

Reference and Existing Conditions

Idaho Partners in Flight (2000) identifies four priority habitats that represent species of moderate to high vulnerability and species with declining or uncertain population trends. These priorities include riparian habitat, non-riverine wetlands, sagebrush shrub habitat, and dry ponderosa pine/Douglas-fir/grand fir forests. The Northern Prairie project area contains two of these four priority types, riparian habitat and dry ponderosa pine/Douglas-fir/grand fir forests.

3.3 Watershed and Fisheries

The Northern Prairie project area is located on predominantly south-facing slopes overlooking the Round Prairie Creek valley. More than half of the annual precipitation in the Idaho Panhandle region falls between November and February (Molnau and Newton 1994), mostly as snow. The rain-on-snow zone is estimated to lie between 3,000 and 4,500 feet elevations in the IPNF, and more than half of the Northern Prairie project area is within this zone. Lower elevation portions of the project area are within the transitory snow zone and may contribute to rain-on-snow flood events. Average annual precipitation in the Round Prairie Creek watershed is 34 inches.

Gillon Creek flows from its headwaters in British Columbia through the project area and enters Robinson Lake, a shallow, 57-acre recreational lake with a campground, boat ramp and small picnic area (Milligan et al. 1983). Robinson Lake discharges to Round Prairie Creek less than three miles from its mouth through a 200-foot-long reach named Monk Creek. Harvey Creek, a second-order tributary, enters Gillon Creek a little over one mile upstream from the lake. A few small, unmapped tributary streams flow seasonally within the project area. These streams generally flow on the surface only through steep-gradient reaches and infiltrate the ground where they enter the valley at the base of the steep slopes (Field Reviews, 2006). Other surface waters in the project area are limited to the extensive riparian wetlands along Round Prairie Creek. Tributaries entering Round Prairie Creek from the south, including Hellroaring Creek and Little Hellroaring Creek, are outside of the project area. Downstream from the project area, Round Prairie Creek enters the Moyie River approximately 18 river miles upstream from its confluence with the Kootenai River.

The Kootenai River basin is an international watershed encompassing about 18,000 square miles of British Columbia, northwest Montana, and northern Idaho (USFS 2000a). Precipitation is relatively plentiful throughout the basin, making it the second largest tributary of the Columbia River in terms of runoff volume.

3.3-A Existing Watershed Conditions

3.3-A.1 Moyie River

A major Kootenai River tributary in Idaho is the Moyie River, a sub-basin (fourth level Hydrologic Unit Code [HUC]) that originates in British Columbia. The entire Moyie sub-basin is about 771 square miles, with roughly 26 percent of the drainage area in the United States (U.S.) (USFS 2000). The dominant land use in the Canadian portion of the watershed is timber management, where much of the land is in public ownership administered by the British Columbia Ministry of Forestry (Harris 2000). Other influences in the watershed include highways, a railroad, a power line right-of-way, and a natural gas pipeline that parallel the river and cross it in several locations. Gauging records taken since 1930 indicate that spring snowmelt rather than rain-on-snow flood events are the dominant factor influencing channel formation and maintenance (Deiter 1996). Bank full and mean annual flood flows for the Moyie River at Eastport, Idaho are roughly 4,400 and 5,600 cubic feet per second (cfs), respectively.

South of the Canadian border, there are two distinctly different segments of the Moyie River, one above and one below the Meadow Creek confluence. The upstream segment has a moderate

gradient and meanders through a broad valley. The relatively uniform depth and velocity and the associated lack of habitat diversity in this segment have been attributed to the historical log drives and channel modifications of the early 1900s (Harris 2000). Large riparian cedar trees were logged or burned during this time; thus, the area lacks woody debris of sufficient size to protect riverbanks and provide fish habitat. Below the Meadow Creek confluence, the Moyie River has a steeper gradient and is confined within a narrower river valley (Harris 2000). This segment of the river is deeply incised, and the channel is controlled by bedrock.

The State of Idaho has designated all segments of the Moyie River in their jurisdiction as Special Resource Waters recognized as needing intensive protection to preserve outstanding or unique characteristics or to maintain current beneficial uses (IDEQ 2003a). Designated and protected beneficial uses for the Moyie River are cold-water aquatic-life communities, salmonid spawning, primary contact recreation (e.g., swimming and boating), and domestic water supply. The City of Bonner's Ferry also uses the Moyie River to generate hydropower. The State of Idaho (IDEQ 2003a) has designated no streams in the project area as Outstanding Resource Waters.

Portions of the Moyie River were listed in the recently approved Idaho Department of Environmental Quality (DEQ) 2002 303(d) list as not supporting beneficial uses. The most recent listing of TMDL streams for Idaho was approved by the Environmental Protection Agency in December 2005. Recent DEQ reports (IDEQ, 2002a) suggested that sediment was a pollutant of concern in the Moyie River. Since that time, the DEQ has been working with the Kootenai Valley Resources Initiative and a technical committee was assigned to develop a plan and determine the Total Maximum Daily Load (TMDL) sediment allocation for the Moyie River. As an outcome of this effort, it was concluded that the sediment listing decision was based on anecdotal understandings and information. DEQ has evidence that the listing resulted from a single fine sediment deposition event (in 1984) and that the stream has recovered since that event. In conclusion, the Moyie River was removed from the §303(d) list and therefore did not develop a sediment TMDL for this river. The TMDL plan for the remainder of the streams in the Kootenai basin was completed in February 2007.

3.3-A.2 Round Prairie Creek

Round Prairie Creek is one of the largest Moyie River tributaries in the U.S., with a watershed (5th level HUC) area of 23,983 acres and approximately 79 percent of the watershed managed by the U.S. Forest Service (Table 3-2). Stream density in this watershed is 1.7 miles per square mile. Approximately 45 percent of the watershed lies within the rain-on-snow zone (project file). The underlying geology of the Round Prairie Creek watershed is heavily influenced by past glaciation. According to USFS Geologist Jim Nieman.

"*Glaciation has modified all of the landforms in the area while leaving a mantle of sediment throughout much of the area. The sediments consist of glaciofluvial and glacial deposits, and consist of various heterogeneous tills, sorted to semi-sorted gravels and sands, along with silts. The glaciofluvial and glacial deposits are generally thicker in the lower elevations and drainages in the area. These deposits are varied and can change in relatively short distances.*"

Table 3-2. Summary of Basic Information on Round Prairie Creek and Gillon Creek Landscape and Geography

Landscape/Geographical Characteristic	Round Prairie Creek	Gillon Creek	Gillon Creek Canada
Watershed Area (acres)	23,938	5,344	2,493
Watershed Area (mi^2)	37.5	8.4	
Federal Ownership (%)	79	52	
Stream Density (mi/mi^2)	1.6	2.0	
Rain-on-Snow Zone (acres)	10,716	2,530	
Rain-on-Snow Zone (%)	45	47	
Total Road Distance (miles)	132.08	23.8	
Road Density ($miles/mi^2$)	3.5	2.9	
RHCA[1] Roads (miles)	23.5	5.7	

[1] RHCA = riparian habitat conservation area

Because of the extensive glacial deposition, the valley through which Round Prairie Creek flows has numerous wetlands and groundwater recharge plays a prominent role. Where the glacial deposits are located further up the slope on steeper gradients, landforms tend to be more susceptible to erosion and destabilization.

Round Prairie Creek has designated beneficial uses for cold-water aquatic life, salmonid spawning, and primary contact recreation (IDEQ 2003a). According to the Idaho Department of Water Resources (IDWR), there are 38 recorded domestic water rights within the Northern Prairie Project area. (project file). The Round Prairie Creek watershed is not considered a Priority Watershed for bull trout (USFWS 2003). Round Prairie Creek is identified on the current 303(D) list as an impaired water within the Panhandle Basin (IDEQ 2005) and the pollutant of concern is temperature. (Note: Sediment is not identified as a pollutant of concern for Round Prairie Creek). All but about one mile of Round Prairie Creek just upstream from Robinson Lake, flows through private land. This one-mile reach is not designated in the Forest Plan as a primary riparian area; however, this segment is managed as part of Management Area 16 (MA 16) (Behrens 2003). MA 16 includes important fisheries streams on the IPNF and identifies specific goals to manage riparian-dependent resources (e.g., fish, water quality, and maintenance of natural channels; USFS 1987). One of these goals states that continuing unacceptable sediment sources on all high-value fisheries streams will be corrected as necessary to meet water quality standards.

Logging began in the Round Prairie Creek drainage in the 1920's. Early logging activities were fairly extensive, but not very intensive. High-value species (ponderosa pine, white pine, cedar, and western larch) were selectively cut and the volume of timber removed per acre varied greatly depending on the location of high-value species. This was validated by reviewing the historical aerial photos of the area (project file). The existing condition of Round Prairie Creek is primarily controlled by the grazing, cultivation, and channelization that began in the early 1900s. Road density within the Round Prairie Creek watershed is relatively high on private lands, particularly in the Miller Creek sub-watershed, resulting in a moderate overall road density (3.5 miles per square mile) for the Round Prairie Creek watershed (Table 3-2). Relatively lower road density (2.9 mi/mi^2) exists in the Gillon Creek sub-watershed and most of those roads are on private land. Most of the road miles within riparian habitat conservation areas also occur on private lands. Observations during fish habitat surveys did not indicate that stream habitat quality in Round Prairie Creek was

correlated with road density and the occurrence of roads in riparian areas. The extensive wetland ponds in Round Prairie Creek trap sediments and stream reaches between wetlands are generally not degraded by fine sediment deposits. Fine sediment deposits in Gillon Creek did not appear to be road-related. With a few exceptions (e.g., lower Harvey Creek and upper Miller Creek culvert washouts) road stream crossings appear to have had little direct influence on aquatic habitat conditions. A review of roads in 1996, 2005 and 2006 noted isolated road drainage problems. These problem sites did not deliver sediment to fish bearing streams nor were the majority of the affected drainages even year round streams. See project file for field reports and photos documenting observations.

3.3-A.3 Gillon Creek

A tributary to Round Prairie Creek, Gillon Creek was surveyed in 1993, 1996 and field checked in 2003 and 2006. Harvey Creek is the largest tributary of Gillon Creek. The Gillon Creek subwatershed (6th level HUC) has an area of 5,344 acres and a stream density of 2.0 miles per square mile. Approximately 47 percent of the subwatershed is in the rain-on-snow zone. Nearly half of the Gillon Creek watershed lies north of the Canadian border, including a small portion of the Harvey Creek headwaters. Within the U.S., most of the Gillon Creek subwatershed is under Forest Service management. Gillon Creek flows into the south side of Robinson Lake, a 57-acre recreational lake within the project area.

A report authored by Huff and Palmer (1996) supplied some historical information regarding historical activities in the Gillon Creek drainage. Originally known as “Long Shorty Creek”, Gillon Creek has been affected by historic mining, roading and logging. According to the Geological Survey notes, the “Wild Horse Trail” followed Gillon Creek north to Canada. This trail was mapped in 1893 and delineated as “Wild Horse Trail from Bonners Ferry to British Possession”. This route was established as a foot and pack horse trail which was used extensively by gold prospectors, Native Americans and pioneers. It became the primary route in the 1860s to Fort Steele as part of the gold rush. In 1893, a galena ore strike was discovered in Gillon Creek.

Gillon Creek has designated uses for cold-water aquatic life, salmonid spawning, and primary contact recreation (IDEQ 2003a). Information on the current status of Gillon Creek for compliance with Section 303(d) of the Clean Water Act indicates that, based on 2000 water temperature monitoring data, Gillon Creek is not supporting the beneficial uses of cold-water biota and salmonid spawning due to thermal modifications (IDEQ 2003c, 2005, 2006).

A stream survey of Gillon Creek was conducted in 1996 that included nine reaches covering the entire stream length from Robinson Lake to the Canadian Border. Gillon Creek consisted of mostly “B” and “C” channel types along with “E” type channel habitats and gradients that ranged from 1 to 5 percent. In general, habitat was dominated by low gradient riffles, runs, and pools formed by LWD.

Using the same procedures applied for Round Prairie Creek surveys, stream habitat surveys were conducted in two reaches of Gillon Creek in July of 2003. The two reaches surveyed are considered “B” type channels, generally characterized by being moderately entrenched and having a moderate gradient and a stable plan and profile shape. Gradients for B channels generally range from 2 to 4 percent. However, a wide range of gradients are applicable to B channels including <2 percent if

other conditions, such as cross-section profiles and sinuosity, are consistent with the B channel definition.

In summary, Gillon Creek is in a properly functioning condition and is hydrologically stable.

3.3-A.4 Harvey Creek

Harvey Creek, a tributary to Gillon Creek, was surveyed in 1996 and field checked in 2003 and 2006. Harvey Creek, a second-order stream, is the largest tributary of Gillon Creek. Only a small portion of the Harvey Creek headwaters lies north of the Canadian border. Most of the Harvey Creek drainage is under Forest Service management. Harvey Creek does not have any specific designated beneficial uses, but is recognized and protected for cold-water aquatic life, salmonid spawning, and primary contact recreation.

A reconnaissance of the lower reaches found the channel of Harvey Creek flowing northeast along the edge of a large alluvial fan. The discharge of Harvey Creek flowed subsurface approximately 500 feet before the Gillon Creek confluence. Where the channel flows onto the alluvial fan, Harvey Creek was characterized by channel instability which could be attributed to a debris torrent in 1997 (Palmer, pers. Comm.. 2006). Stream banks were highly unstable, the channel was incised about 4 feet, and there was significant sediment deposition. The observed channel types progressed from, an E6 near the mouth to a B4/B3 and finally to A3/A2 channels upstream (Palmer and Huff, 1996). Heading up the drainage, the average map gradient increased to as much as 20 percent and numerous complete fish passage barriers (falls and cascades) were observed. The stream was field checked in 2006 by Palmer who reported a possible encroachment in the stream (see project file for Harvey Photos).

No culvert or bridge is currently located where Harvey Creek crosses road FS 273 at the edge of a private parcel. Rather, the channel cuts through the roadbed. Substrate consists of cobbles and small boulders and the road fords the creek at this location.

Electrofishing surveys found four adult brook trout in the lower wetted 300 feet of Harvey Creek. These individual fish are completely isolated from Gillon Creek until Harvey Creek flows increase sufficiently enough to reconnect the wetted stream channels. In addition, these fish are prevented from moving upstream by impassable barriers (falls and cascades) shortly upstream. Electrofishing upstream of the first significant (approximately 6 ft high) barrier falls found no fish. It is likely that fish use of Harvey Creek is extremely limited and is the result of incidental movement of adult fish upstream from Gillon Creek when flows are great enough to connect the streams.

In summary, Harvey Creek is functioning at risk because of past land practices and the more recent mass failure. Still, field surveys in 2006 suggest that the watershed is trending towards improvement.

3.3-A.5 Robinson Lake

Robinson Lake is a natural lake basin located near the east end of the project area. Gillon Creek enters on the south side of the lake and is the only stream that flows to the lake. A State-wide research project on Idaho lake classification determined the lake area to be 57 acres, but did not

include any other information to characterize the lake (Milligan et al. 1983). Observations in July 2003 and May 2006 indicated that it is a shallow nutrient rich lake with nearly half its surface area covered by floating water hyacinths. The Idaho State Parks and Recreation department manages a boat launch on the north side of Robinson Lake with a restroom and 10 parking spaces (ISPR 2003). Robinson Lake Campground, on the south side of the lake near the Gillon Creek inflow, offers 10 campsites, potable water, pit toilets, a boat ramp, and a day use area with two picnic sites (USFS 2003a).

3.3-B Affected Fisheries

3.3-B.1 Westslope Cutthroat Trout

In August of 2003, the USFWS determined that listing of westslope cutthroat trout as threatened or endangered is not warranted at this time (Federal Register, Vol. 68, No. 152). However, westslope cutthroat trout are considered a USFS sensitive species on the Idaho Panhandle National Forest (USFS 2003b). Identified risks to westslope cutthroat trout populations include harvest, habitat disruption, and competition and hybridization with introduced species (Quigley and Arbelbide 1997). Populations considered as "strong" (greater than or equal to 50 percent of historical potential) by Idaho Department of Fish and Game biologists remained in only 11 percent of the historical range and less than 4 percent of the historical range supported strong populations not threatened by hybridization (Rieman and Apperson 1989).

Characteristic of many salmonids, westslope cutthroat trout have distinct life history strategies that contribute to population resilience under variable environmental conditions; namely, resident and migratory populations, as described above for bull trout. Resident and fluvial populations are most common in Idaho. Waters inhabited by cutthroat trout are often cold and nutrient poor (Liknes and Graham 1988). Cutthroat trout spawn in the spring and fry emerge from the substrate in April and May. Emergence and survival are influenced by fine sediment and water flow through interstitial spaces (Chapman 1988). After emergence, fry inhabit slow shallow stream margins or off-channel habitats and gradually occupy deeper swifter habitats as they grow (Hillman et al. 1987). Juveniles overwinter within interstitial spaces of substrate and survival is affected by fine sediment (McIntyre and Rieman 1995).

Westslope cutthroat trout are known to occur in the upper reaches of the Round Prairie Creek drainage. Electrofishing surveys conducted in 2003 found the presence of westslope cutthroat trout in Gillon Creek, but no westslope cutthroat trout were found in either Round Prairie or Harvey Creeks. However, the surveys conducted in 2003 were not exhaustive and the entire lengths of Round Prairie and Gillon Creeks within the cumulative effects area potentially support westslope cutthroat trout. Because of limited suitable salmonid habitat and numerous natural barriers, it is likely that westslope cutthroat trout do not occur in Harvey Creek.

3.3-C Critical Management Issues

Critical management issues for protecting water resources include hydrologic integrity, riparian function, mass slope failures and soil erosion, stream crossings, water yield, cumulative watershed effects, and fisheries.

3.3-C.1 Hydrologic Function

Hydrologic function addresses how the landscape performs in the hydrologic cycle of water as precipitation passes through the forest canopy, over and through the soil, and through streams, rivers, and lakes on its way to the ocean. Roads directly contribute to the disruption of hydrologic function and increased sediment delivery to streams, and indirectly effect streams from activities that accompany road access (e.g., timber harvest and livestock grazing) (ICBEMP 1996). Roads contribute to increases in peak stream flows by increasing drainage efficiency as roads intercept and concentrate runoff from hill-slopes. Changes that may result from increased peak flows include alteration of stream geomorphology and ecology, more rapid turnover of riparian zone vegetation, and increased transport of woody debris and sediment (Jones and Grant 1996).

The streams and roads within the project area are relatively stable as described in the "Existing Watershed Condition" discussion above. Still, road densities are moderately high for the drainages at 3.5 mi/mi^2 for Round Prairie Creek and 2.9 mi/mi^2 for Gillon Creek. The existing roads indirectly affect the hydrologic function by disrupting overland flow and increasing sediment delivery at specific locations. It was revealed in the field surveys that though the road densities are relatively high, the damage(s) to the streams was largely done at the time of construction. According to our records, the Federal Highway and private roads were largely built in the 1930s, whereas the Forest Service Road Network was constructed during the 1950s. Since the 1950s, very little new road construction has occurred. The roads within the project area were surveyed and it was determined that there were only limited instances where roads were contributing sediment. Although, field surveys within the Northern Prairie project area documented that sediment delivery from these roads is minimal, the high road densities continue to alter hydrologic runoff patterns and overall hydrologic function.

Issue indicator: road density in miles per square mile.

3.3-C.2 Riparian Function

Many aquatic and terrestrial wildlife species are dependent on riparian (i.e., streamside) habitat. Forested riparian areas provide the large woody debris (i.e., fallen trees in streams) that creates scour pools, dissipates erosive energy, controls bedload movement, stabilizes stream channels, and provides cover and food supplies for fish and other aquatic life. Live and fallen vegetation in riparian areas filters sediment from overland flow before it reaches stream channels. Riparian vegetation also provides shade to moderate stream temperatures and protects cold-water fisheries. Timber harvesting, road construction, or catastrophic stand-replacing fires can adversely affect these critical riparian functions.

Generally, the amount of road erosion in a watershed is a function of road density and the conditions of cutslopes, road surfaces, fillslopes, and road drainage structures. Where road erosion occurs close to streams, sediment is more likely to be delivered to channels and impact water quality and fish habitat. Studies have shown that for non-channelized flow, sediment rarely travels more than 300 ft (Belt et al. 1992). Non-channelized sediment transport distances increase with slope and decrease with the amount of obstructions (e.g., vegetation, rocks, logs, etc.) between the road and stream. Ditch relief culverts or other road drainage systems that convey runoff to hill-slopes away from

stream channels usually do not deliver sediment to streams. The risk of sedimentation from road washouts or other road-related mass slope failures impacting aquatic habitat is also far greater where these incidents occur near streams in riparian zones.

The riparian zone of the Round Prairie Creek drainage is dominated by large wetland complexes that moderate the flow through the watershed. Currently, there are over 23 miles of road within 300 feet of the streams of the Round Prairie Creek watershed. This mileage of riparian roads equates to 3.7 miles/mi^2 for road density. According to the IPNF Watershed Characterization database (2006), within in the Round Prairie Creek watershed, 6% of the riparian zone is considered hydrologically open.

Issue indicators: equivalent clearcut area (ECA; i.e., hydrologic openings) within RHCAs, riparian road density in miles per square mile.

3.3-C.3 Soil Erosion and Mass Wasting

The belt (mostly glacial till), granite, schist, and basalt geologic parent materials of the IPNF, with overlying surface volcanic ash, commonly produce sediment from a variety of sources (Niehoff 1998). The most common processes that accelerate sediment production are (1) road cut and fill slope failures; (2) erosion of road cuts, fills, and driving surfaces; (3) mass wasting; and (4) hot burning. Forests generally have very low erosion rates unless they are disturbed (Elliot et al. 2000). Common disturbances include timber-harvesting operations, prescribed burning, and wildfires. The impact of these activities on soil erosion rates generally only lasts for a few years before the rapid regrowth of vegetation covers the surface with protective plant litter. If the year following disturbance has above-average precipitation, substantial soil erosion can occur.

Erosion impacts from soil-disturbing activities are not all short-lived. Forest roads are the source of long-term increases in surface soil erosion because road construction, use, and maintenance compact soils, reduce infiltration of rainfall and snowmelt, intercept and concentrate surface runoff and subsurface water, and limit vegetation regrowth.

In addition to accelerating the rate of surface erosion and the efficiency of sediment delivery to streams, the soil disturbance and drainage alterations caused by road construction may increase the frequency and magnitude of mass wasting. Mass wasting (e.g., landslides), a category of natural landscape processes, occurs when large masses of soil are rapidly displaced down slope. Naturally occurring landslides function to deliver important aquatic habitat components to streams, such as spawning gravel and LWD.

Land disturbances that change the hydrologic regime (e.g., reduced transpiration following timber harvest or fire) may increase the occurrence of mass wasting and harm aquatic habitats. In addition to the land clearing and soil compaction associated with roads, construction of improper road alignments may undercut the base of unstable slopes. Where roads intercept and concentrate surface runoff and subsurface flow, water may be diverted to hillsides causing soil saturation and slope failures. Finally, if culverts or other drainage structures become plugged with sediment and debris, road fill can be washed out and cause mass wasting. The probability of mass wasting increases beyond normal frequencies where roads are located on sensitive land types.

The Watershed Erosion Prediction Project (WEPP) model was used as a means to compare sediment delivery from physical disturbances such as road construction, timber harvesting and burning. The WEPP model is a physically based soil erosion model that provides estimates of soil erosion and sediment yield considering site-specific information about soil texture, climate, ground cover, and topographic settings (Elliot et al. 2000). The accuracy of the predicted values from X-DRAIN and WEPP:Road models are, at best, within plus or minus fifty percent. True erosion rates are highly variable due to large variations in local topography, climate, soil properties, and vegetative properties, so predicted values are only a single estimate of a highly variable process (Elliot 1999).

WEPP differs from some other erosion and sedimentation models by accounting for sediment transport distance and gradient in predicting the amount of eroded soil that will be delivered to stream channels. Research has demonstrated that the distance from an erosion source to the stream and the steepness of the intervening slope largely determine the amount of sediment delivered to stream channels (Ketcheson and Megahan 1996). WEPP was used to estimate average annual erosion and sediment yield from each land management unit under different vegetation treatment scenarios that relate to Northern Prairie project alternatives. WEPP was also used to estimate erosion and sediment yield from FS 2481, a road in the Harvey Creek headwaters area that is currently delivering some sediment to stream channels (Watershed and Fisheries Report - Appendix C). Though actual erosion rates are highly variable, thirty-year averages from WEPP model runs are useful for comparing the relative effects between different management alternatives for the proposed Northern Prairie project. Given the inherent variability of the model results, WEPP outputs should not be considered predictions of absolute sediment quantities. Rather the strength of the WEPP model is for relative comparisons between management alternatives.

Within the Round Prairie Creek watershed, the soil scientist's report (Rone 2007) stated that while evidence of soil compaction and disturbance from logging operations several decades ago still exists, the degree of detrimental disturbance is relatively low. According to the soil scientist's calculations, approximately 1.3% (17.5 acres) of the project area is has detrimentally disturbed soils. The majority of the detrimentally impacted soils were concentrated on the skid trails. The presence of elevated rock fragment levels and bedrock in the subsoil throughout the project area likely lessened some of the past equipment impacts which otherwise would have been higher.

The existing road density on sensitive land types within the Round Prairie Creek watershed is 0.78 mi/mi^2. In summary, there is currently very little active or potential soil erosion or mass wasting within the Round Prairie Creek watershed.

Issue indicator: percent of ground with detrimentally impacted soils, WEPP model erosion and sediment delivery estimates in tons per acre, road density on sensitive land types in miles per square mile.

3.3-C.4 Stream Crossings

The amount of sediment delivered to stream channels from road erosion is affected by the road drainage system design, including road prism shape, proximity of the road to the stream system, and the length of road draining directly into streams at crossings (WFPB 1994). Ditches along in-sloped roads deliver nearly 100 percent of the sediment eroded from road sections near stream crossings.

Thus, the number of roads crossing streambeds can be used as an indicator of potential sedimentation from roads.

In addition to sediment delivered from surface erosion, undersized and/or poorly maintained culverts are vulnerable to catastrophic failures when they cannot accommodate stream flows, bedload movement, and debris transported during flood events. Water backed up above a culvert can overtop the road causing the rapid erosion and delivery of fill material into the stream. The pulse of water, sediment, and debris released from a road washout often causes extensive flood damage downstream. The risk of culvert failures is an important qualitative consideration in evaluating the potential impact of management alternatives on streams.

In the Round Prairie Creek watershed, there are currently 90 stream crossings. Of these 90 stream crossings, most but not are on highly sensitive landtypes. In reviewing the project file maps displaying stream crossings and landtype sensitivities, the lower risk crossings are generally higher on the landscape. As described earlier in the "Existing Watershed Conditions, field reviews noted only very isolated road drainage problems. See project file for field reports and photos documenting observations.

Issue indicator: number of stream crossings and risk of failure.

3.3-C.5 Water Yield

Forest canopy cover functions in the hydrologic cycle to moderate precipitation runoff by intercepting and transpiring water. Generally, removal of the forest canopy can result in increased water yield and hydrograph modification (e.g., increased peak flows, particularly in areas subject to rain-on-snow events). Increased peak flows may result in more extensive stream bank erosion, channel scouring, and bedload deposition. The Northern Prairie project area has relatively dry site conditions as evidenced by the vegetation patterns and limited streamcourses. Most of the annual precipitation occurs as snowfall that is gradually released to streams through infiltration and shallow groundwater discharge.

There are no streamflow gauging station records established for Round Prairie Creek or its tributaries; therefore, peak flows cannot be directly related to changes in watershed activities. Even with streamflow records, the influence of land use changes on peak flows would not likely be measurable given the greater effects of wide-ranging climatological variables on peak flows. In other words, any incremental changes in peak flows due to watershed activities may not be distinguishable from natural variability. For these reasons, peak flows are not used here as an indicator for comparing the hydrologic risks between management alternatives. An indicator of the overall relative risk of impacts to the hydrologic functions of a forested watershed may be calculated as the ECA (Belt 1980). The ECA is calculated from the total amount of tree crown removal in forest stands that has resulted from timber harvesting, road construction, fire, and other activities.

Researchers have attempted to quantify the value of using Equivalent Clearcut Acres method (or similar approaches) to evaluate the response of drainages to openings. Despite numerous research efforts (Stednick 1996, Menning 1997, Beschta 2000) there is no absolute ECA value that serves as a threshold for concern for openings that maximize runoff. Much of the variability has to do with the unique responses of the specific drainages to stochastic events (i.e. rain on snow events). Other

variabilities in watershed response have to do with the spatial distribution of the openings across the landscape and the underlying geology. Recognizing the range of watershed variability (i.e. geology, basin size, orientation and climate) along with the potential impact of stochastic climatic events, supports using a range of ECA values for analysis. In Stednick (1996), the review of past research showed extremely variable results: In some cases, removal of very little vegetation caused elevated water yields and conversely in other studies, drainages with 100% harvest have had no measurable increase in annual water yield. Stednick attributed the variability to harvest location, harvest type, pretreatment vegetation cover or measurement error. After reviewing the studies, Stednick (1996) determined that approximately 20% of the catchment vegetation cover must be harvested for a measurable increase in annual water yield. Thomas and Megahan (1998) summarized the ECA discussion well. "Given the complex nature of the effects of forest cutting and roads on stream flows, it is not surprising that the literature provides mixed messages about peak flow responses".

On a more local level, ECA values less than 15% are considered low for the IPNF and canopy openings (ECA) less than 20% are unlikely to result in measurable water yield changes. On the IPNF, an ECA approaching 30 percent is used as an indicator that more intensive field surveys are warranted to determine if a watershed is at a threshold for hydrologic impacts. Within the Round Prairie Creek watershed, the existing ECA is 9.8 percent, well below any levels of concern.

While increased water yields may be problematic to streams, there is no similar concern with low flows. Keppeler (1998) found that changes in base flows occurred during the late summer season only after 50% or more of a watershed was harvested: The proposed treatments for Northern Prairie would not begin to approach this level of harvesting.

Issue indicator: ECA in acres.

3.3-C.6 Cumulative Hydrologic Effects

The cumulative effects of all management activities in a watershed may have a greater effect on hydrologic conditions over time than the analysis of an individual project would indicate. Current watershed conditions may be measured and analyzed based on past activities in the watershed. A review of past watershed conditions in light of past activities can help us understand current watershed conditions and how the channel conditions are trending.

The IPNF is preparing a watershed assessment of the Kootenai River basin and Moyie River sub-basin in Idaho (USFS 2000a). A primary issue being addressed is that water quality and associated hydrologic conditions may have been modified or compromised by natural or developmental processes to the extent that the beneficial uses of the water are at risk of being or are no longer fully supported. Data on the physical condition and biological variables of each watershed and subwatershed are compiled and analyzed in assessing the perceived water quality and watershed integrity relative to undisturbed conditions. This properly functioning condition (PFC) analysis is a measure of cumulative hydrologic effects from past watershed activities and the basin's inherent sensitivity.

The PFC analysis provides three status ratings (USFS 2000a). Watersheds considered to be <u>not properly functioning</u> (NPFC) are not capable of fully supporting beneficial uses without significant intervention and/or extremely long recovery periods, and often include aquatic resources that are

seriously degraded or no longer viable. Watersheds that are functioning at risk (FAR) have high watershed integrity, but present or ongoing adverse disturbances are likely to compromise that integrity if they are not modified or corrected; or they have at least moderate watershed integrity that has been significantly compromised by adverse disturbances. Watersheds in properly functioning condition (PFC) have streams in dynamic equilibrium with their watersheds and fully support their integral biological system. The watersheds that are functioning at risk are the highest priority within the basin for watershed and aquatic restoration efforts.

Within the project area, all of the drainages are considered to be functioning at risk, except for the following: Miller Creek is considered not properly functioning and Gillon Creek is considered to be properly functioning. In all instances, all of the drainages are trending towards improvement as evidenced by the field reviews in 2006.

Issue indicator: PFC analysis and trend.

3.3-C.7 Fisheries

Fish populations are primarily affected by adverse impacts on habitat conditions, and by interactions with other species either through competition or hybridization. Impacts on habitat include the alteration of hydrologic and riparian functions and increased sediment yields as discussed in Chapter 4. Timber harvesting can lead to increased peak flows that alter stream geomorphology and ecology and increase the transport of woody debris and sediment. Alteration of the timing and magnitude of flows can lead to substrate, habitat, or flow conditions that are unsuitable for some fish life stages. Such alterations may not only be detrimental to all fish species, but habitat changes may favor one or more species and cause a change in fish species assemblages. In addition, forested riparian areas are the source of LWD recruitment and stream shading that provide habitat for fish (pool formation, cover, food supplies) and moderate stream temperatures.

INFISH in-stream habitat criteria are intended to provide guidelines for evaluation of existing in-stream habitat conditions. INFISH in-stream habitat features include mean width-to-depth ratio, LWD frequency, percent bank stability, percent undercut banks, and pool frequency. Under INFISH, RHCAs establish recommended riparian buffer widths necessary to support the proper functioning of in-stream habitat-forming processes.

Issue indicators: Mean width-to-depth ratio, LWD frequency, percent bank stability, percent undercut banks, pool frequency

3.3-D Regulatory Framework

3.3-D.1 Forest Plan

The Forest Plan (USFS 1987) guides all natural resource management activities in the IPNF, including this Northern Prairie project. The Forest Plan, developed with public input through the National Environmental Policy Act (NEPA) Environmental Impact Statement process, describes resource management practices, levels of resource protection and management, and the availability

and suitability of lands for resource management. It was written to comply with all Federal and State regulations and requirements, including the Clean Water Act designed to protect water quality.

The Forest Plan requires that management activities comply with State water quality standards through the use of Best Management Practices (BMPs) (USFS 1987). These BMPs are monitored to determine their effectiveness. According to the Forest Plan, water quality that falls below Forest Plan standards is to be improved through restoration projects and through the scheduling of timber harvest and road building activities, where appropriate. Lands within public water systems are to be managed for multiple uses within the water quality standards for public water supplies. The application of appropriate conservation practices is intended to ensure that the quality of individual water bodies will not be significantly affected by sediment production. Within the Forest Plan there are specific goals, objectives and standards. Goals were used to develop the Forest Plan. Objectives describe how the various resources would be managed under the Forest Plan. Standards are intended to supplement, not replace, the National and regional polices, stands and guidelines found in the Forest Service manuals and handbooks and the Northern Regional Guide. The Standards set the overall management direction for the Idaho Panhandle National Forests.

Goals: As specified in the IPNF Forest Plan (USFS 1987), the goals of IPNF forest-wide management direction pertaining to the protection of water quality and fisheries resources in Round Prairie, Gillon, and Harvey creeks, include the following:

- Maintain high-quality water to protect fisheries habitat, water-based recreation, and public water supplies, and to comply with State water quality standards.
- Manage resource development to protect the integrity of the stream channel system.
- Manage riparian areas to feature dependent resources (fish, water quality, maintenance of natural channels, vegetation, and wildlife communities) while producing other resource outputs at levels compatible with the objectives for dependent resources.

Objectives: IPNF Forest Plan objectives pertaining to water quality and fisheries include the following:

- Management activities will comply with state water quality standards.
- Apply BMPs to ensure that the quality of individual water bodies will not be significantly affected by sediment production.
- Maintain 80 percent fry emergence success relative to pristine conditions. This objective was removed from the IPNF Forest Plan (USDA 2005).
- Manage the habitat of species listed in the Regional sensitive species list to prevent further declines in populations, which could lead to federal listing under the ESA.
- Water quality that is below Forest Standards will be improved through restoration projects and through the scheduling of timber harvest and road building activities where appropriate.

Standards: Specific Forest Plan management standards (USFS 1987, page II-27-II-33) pertaining to water, soils and fisheries resources are as follows:

- 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.

- Maintain concentrations of total sediment or chemical constituents within State standards.
- Implement project-level standards and guidelines for water quality contained in the BMPs.
- Cooperate with the states to determine necessary in-stream flows for various uses.
- Manage public water system plans for multiple uses by balancing present and future resources with public water supply needs.
- Plan and execute activities within non-fishery drainages, including first and second-order streams to maintain existing biota, defined as "maintaining the physical integrity of these streams."
- Use models as a tool to approximate the effects of National Forest activities on water quality values.
- Soil disturbing management practices will strive to maintain at least 80 percent of the activity area in a condition of acceptable productivity potential for trees and other managed vegetation.
- Provide fish passage to suitable habitat.
- Manage fisheries to provide a carrying capacity that will allow an increase in the Forest's trout population.
- Pursue fish habitat improvement projects to improve habitat carrying capacities on selected streams.
- Coordinate fishery and timber management activities to maximize the contribution of riparian vegetation to aquatic habitats.
- Manage habitat and security needs for threatened and endangered species will be given priority in identified habitat.

The Forest Plan is currently under revision, and the completion of the public involvement process and documentation is scheduled for early 2007 (Kramer, pers. comm). Watersheds and aquatic species are among the preliminary revision topics identified for change (USFS 2003d). Possible revision strategies currently under discussion are aimed at addressing streams not meeting Clean Water Act requirements, watersheds identified as not properly functioning or functioning at risk, and protection of threatened or endangered fish and amphibian species (USFS 2003e).

3.3-D.2 Inland Native Fish Strategy

More stringent requirements for riparian protection have been adopted as Forest Plan amendments. One of the primary amendments to the 1987 Forest Plan is the Inland Native Fish Strategy (INFISH). INFISH requires that riparian habitat conservation areas (RHCAs) be delineated and classified in all forest watersheds (USFS 1995). RHCAs are portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. Widths of interim RHCAs that are adequate to protect streams from non-channelized sediment are considered in the INFISH to be sufficient to protect other riparian functions, including delivery of organic matter and woody debris, stream shading, and bank stability (USFS 1995). A review of studies in Idaho and elsewhere concluded that nonchannelized sediment flow rarely travels more than 300 ft and that 200-300-ft riparian filter strips are generally effective at protecting streams from this sediment source (Belt et al. 1992). Within the INFISH Summary, there is a listing of Priority watersheds: None of the watersheds within the Northern Prairie Cumulative Effects Analysis area are considered as Priority watersheds under INFISH. For Category 1, fish-bearing streams (e.g., Round Prairie Creek and Gillon Creek), the standard interim RHCAs consist of the stream and the area on either side of the stream extending to: (1) the top of the inner gorge, (2) the outer edges of the 100-year floodplain, (3) the outer edges of riparian vegetation, (4) a distance

equal to the height of two site-potential trees, or (5) 300 ft slope distance, whichever is greatest (USFS 1995). For Category 4, seasonally flowing streams, the minimum RHCAs must include the area from the edge of the stream channel to a distance equal to one-half the height of one site-potential tree or 50 ft slope distance, whichever is greater. INFISH also provides interim riparian management objectives (RMOs) for water temperature and specific fish habitat parameters (USFS 1995).

In addition to RHCA standards and interim RMOs, INFISH includes standards and guidelines for specific management activities (USFS 1995). Timber harvest is generally prohibited in RHCAs, unless it follows a catastrophic event resulting in degraded riparian habitat conditions. For existing or planned road management activities, measures to meet RMOs include implementing a Road Management Plan, avoiding sediment delivery to streams from road surfaces, avoiding disruption of natural hydrologic flow paths, and reconstructing road and drainage features that do not protect priority watersheds from increased sedimentation. Fire/fuels management standards and guidelines call for recognition of the role of fire in ecosystem function and the identification of areas where fire suppression or fuel management actions could perpetuate or be damaging to long-term ecosystem function or inland native fish.

The INFISH provides the most recent guidelines for protection of inland fisheries resources in the Intermountain, Northern, and Pacific Northwest Regions of the USFS. INFISH goals are to maintain or restore:

- water quality, to a degree that provides for stable and productive riparian and aquatic ecosystems.
- stream channel integrity, channel processes, and the sediment regime under which the riparian and aquatic ecosystems developed.
- in-stream flows to support healthy riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges.
- natural timing and variability of the water table elevation in meadows and wetlands.
- diversity and productivity of native and desired non-native plant communities in riparian zones.
- riparian vegetation to provide an amount and distribution of LWD characteristic of natural aquatic and riparian ecosystems.
- riparian vegetation to provide adequate summer and winter thermal regulation within the riparian and aquatic zones.
- riparian vegetation to help achieve rates of surface erosion, bank erosion, and channel migration characteristic of those under which the communities developed.
- riparian habitat conservation areas along perennial fish-bearing streams to be 300 ft in width.

Examples of some key functions of riparian buffers include:

Protection from sediment delivery. Logging and roads have been shown to increase sediment deposition in streams, particularly in steep terrain susceptible to mass movements of soil (Reid and Dunne 1984, Swanston 1991). Increased sediment deposition negatively affects salmonid habitat by filling interstitial spaces in the streambed. Interstitial spaces are important for incubation and survival of eggs and embryos, overwintering of juvenile salmonids, and macroinvertebrate

production (Bjornn and Reiser 1991). Riparian buffers filter out sediment before it enters the stream channel (Belt et al. 1992).

Large woody debris recruitment. Riparian buffers are the source for LWD that can substantially contribute to stream habitat by controlling channel-forming processes (i.e., bank stability, width-to-depth ratio, formation of pools) that regulate sediment movement, reduce water temperatures, and provide cover (Bryant 1983). LWD also provides cover from predators and minimizes fish energy expense when feeding or maintaining stream positions (Fausch 1984). Adequate LWD recruitment is generally provided with a high degree of certainty by riparian buffer widths of 100 to 200 ft (about 1 Site-Potential-Tree-Height), depending on the site and stream size (Murphy and Koske 1989; Robison and Beschta 1990; McDade et al. 1990; Spence et al. 1996; Knutson and Naef 1997). However, the role of LWD varies relative to stream size; riparian vegetation exerts a greater influence on small streams (Knutson and Naef 1997). LWD is not easily transported in small streams and thus individual pieces can greatly influence channel morphology, in-stream cover, food resources, and sediment transport.

Pool formation. Pools are an important habitat component for all salmonid life stages. Pool formation in small streams can be heavily influenced by LWD recruitment. In addition, increased sediment delivery to streams fills pools and reduces pool depth and function (Chamberlin et al. 1991). Therefore, riparian buffers maintain pools by reducing fine sediment inputs.

Bank stability. Bank stability contributes to the formation of undercut banks, riparian vegetation, reduced sediment deposition, and reduced stream temperatures. Bank stability is affected by events that alter discharge, sediment loads, or channel stability, whether due to natural events (e.g., floods, fires, mass wasting) or management practices (e.g., logging, roading, livestock grazing, recreation) (Meehan 1991).

Microclimate Control. Microclimate, the local climate (humidity, wind, and air temperature) within the stream-riparian ecosystem, is primarily affected by the quality and extent of riparian vegetation. Riparian buffer widths necessary for microclimate control are generally much wider than those necessary for other functions. A riparian buffer width of 200 ft may provide minimum or partial microclimate function in some circumstances; however, widths greater than 300 ft are generally required to provide full microclimate protection (Spence et al. 1996; Knutson and Naef 1997).

3.3-D.3 Clean Water Act

The Clean Water Act requires that each State adopt an antidegradation policy as part of its water quality standards. The first section of this policy states that the existing in-stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected (IDEQ 2003a). Section 303(d) of the Clean Water Act further requires that each State maintain a list of those water bodies where existing and designated beneficial uses may not be fully supported. In 1994, the U.S. Environmental Protection Agency (EPA), under Section 303(d) of the Federal Clean Water Act, listed as impaired those stream segments and lakes in Idaho with water quality problems. These water bodies were listed based on evidence indicating that water quality standards were not met for one or more water quality constituents, despite the application of required pollution controls (IDEQ 2002a).

The Clean Water Act mandates that water bodies listed as not fully supporting designated or existing beneficial uses require the development of TMDL (total maximum daily load) standards for the specific constituents causing impairment. A TMDL is the sum of all contributions for a given constituent pollutant allowable in a specific waterway each day, plus some seasonal variations and a margin of safety (IDEQ 2002b). TMDLs must be established at or below the level established for protection of the waterway's designated uses. TMDLs become the basis for plans to restore water quality to support all designated uses. The TMDL process provides a quantitative assessment of the sediment problem and contributing sources, and specifies the reduction in sedimentation from these sources that will be required to attain water quality standards (IDEQ 2002d). Given the recent approval of the 2002/2003 integrated list, it is anticipated that a TMDL process will likely be scheduled for newly listed stream segments, including those streams preliminarily listed for water temperature impairment. Until the TMDL processes are completed, the goal is to reduce those pollutants that impair beneficial uses. The most recently approved 303(d) list for the State of Idaho identifies the segments listed in Table 3-3 in or near the Northern Prairie project area as being impaired (IDEQ 2005).

This IDEQ data documenting the condition of these and other impaired streams was approved by the Environmental Protection Agency in September of 2005. A TMDL plan for the Moyie has been drafted and is undergoing technical editorial review (Steed, IDEQ, 2006). The TMDL process provides a quantitative assessment of both the pollutants of concern and possible contributing sources. The final product of the TMDL process is a report which specifies the required amount of reduction for each pollutant that will be required to attain water quality standards (IDEQ 2002b). In the interim, any activities undertaken or permitted on NFS lands will be designed to reduce pollutants of concern, where feasible.

Table 3-3. Approved 303(d) Segments In or Near the Northern Prairie Project Area

Stream Segment	Length	Pollutant of Concern
Moyie River: Idaho Canadian Border down to Round Prairie Creek	22.86	Unknown and temperature
Moyie River: Meadow Creek to Moyie Falls Dam	9.19	Temperature
Moyie River: Moyie Falls Dam to mouth	1.88	Total Suspended[1] Sediment and Temperature
Gillon Creek: Idaho Canadian Border to mouth	7.34	Temperature
Round Prairie Creek: Source to Gillon Creek	2.96	Temperature

3.3-D.4 Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies to ensure that actions do not jeopardize the continued existence of a threatened or endangered species, or the critical habitat for threatened or

[1] This designation was based on reports of sediment flushed from the reservoir above Moyie Falls Dam that impacted two community water sources: the Three Mile and Moyie Springs systems (Harris 2000).

endangered species. Section 7 of the ESA requires federal agencies to ensure that their actions do not jeopardize listed species or their habitat. In this regard, federal actions include providing funding or issuing federal permits for a project. If a listed species is known to occur in the project vicinity, the lead agency must complete a Biological Assessment (BA) describing how the project would affect the species. If the evaluation determines that a listed species is likely to be harmed by the project, the agency must enter formal consultation with FWS and/or National Oceanic and Atmospheric Administration Fisheries to ensure that its actions will conserve the species and its critical habitat.

3.3-D.5 Governor's Bull Trout Conservation Plan

Actions occurring within the range of bull trout must be consistent with the State of Idaho Governor's Bull Trout Conservation Plan (State of Idaho 1996). The mission of this plan is to "…maintain and/or restore complex interacting groups of bull trout populations throughout their native range in Idaho."

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.

In June 2005 the Council on Environmental Quality (CEQ) provided guidance on the extent to which agencies of the Federal government are required to analyze the environmental effects of past actions when they describe the cumulative environmental effect of a proposed action in accordance with Section 102 of the National Environmental Policy Act (CEQ 2005):

> *The environmental analysis required under NEPA is forward-looking, in that it focuses on the potential impacts of the proposed action that an agency is considering. Thus, review of past actions is required to the extent that this review informs agency decision-making regarding the proposed action. This can occur in two ways:*
>
> *First, the effects of past actions may warrant consideration in the analysis of the cumulative effects of a proposal for agency action. CEQ interprets NEPA and CEQ's NEPA regulations on cumulative effects as requiring analysis and a concise description of the identifiable present effects of past actions to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have a continuing, additive and significant relationship to those effects. In determining what information is necessary for a cumulative effects analysis, agencies should use scoping to focus on the extent to which information is "relevant to reasonably foreseeable significant adverse impacts," is "essential to a reasoned choice among alternatives," and can be obtained without exorbitant cost. 40 CFR 1502.22. Based on scoping, agencies have discretion to determine whether, and to what extent, information about the specific nature, design, or present effects of a past action is useful for the agency's analysis of the effects of a proposal for agency action and its reasonable alternatives.*
>
> *Agencies are not required to list or analyze the effects of individual past actions unless such information is necessary to describe the cumulative effect of all past actions combined. Agencies retain substantial discretion as to the extent of such inquiry and the appropriate level of explanation. Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 376-77 (1989). Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.*
>
> *Second, experience with and information about past direct and indirect effects of individual past actions may also be useful in illuminating or predicting the direct and indirect effects of a proposed action. However, these effects of past actions may have no cumulative relationship to the effects of the proposed action. Therefore, agencies should clearly distinguish analysis of direct and indirect effects based on information about past actions from a cumulative effects analysis of past actions.*

Past Actions

Given the above discussion, the analysis of past actions for the Northern Prairie EA has focused primarily on the effects of past timber harvest (Appendix E, Figure E1) and road building, fire suppression, and historical fire occurrence, which were the primary management actions, or processes, that shaped the existing environmental conditions in the Northern Prairie assessment area.

The assessment of these past actions and processes is incorporated in Chapter 3, which provides the environmental baseline. Included in Chapter 3 is a list of past timber sales, including date of harvest, harvest prescriptions and acres harvested was provided in Chapter 3 (Table 3-1).

Present Actions

The Mission Brush EIS (Appendix E, Figure E2) is an existing project that includes more than 4,000 acres of vegetation treatments (timber harvest and prescribed fire). The analysis that follows incorporates the effects of the activities included in the Mission Brush EIS that could potentially affect the resource issues that are relevant to the Northern Prairie Assessment.

Reasonably Foreseeable Actions

Actions that are expected to occur in the reasonably foreseeable future include:

- Firewood cutting
- Fire suppression
- Road maintenance
- Off-road recreation
- Pre-commercial thinning (Appendix E, Figure E3) - i.e., thinning of young, small-diameter trees would be designed to increase the overall health and vigor of treated stands by favoring development of long-lived white pine, western larch, and ponderosa pine. These activities would occur as routine maintenance throughout the project area.

4.1 Forest Vegetation

4.1-A Methods

The SIMPPLLE model (Simulating Patterns and Processes at Landscape Scales) was used to help predict changes in vegetation through time. The model provides a modeling tool for managers to integrate and interpret concepts such as desired future conditions, range of variability, and the interaction between vegetation patterns and disturbance processes. SIMPPLLE offers an environment in which the knowledge developed by scientists and managers can be integrated into the quantification of potential vegetative conditions, disturbance process probabilities, and the logic for the interaction between processes and vegetation patterns. SIMPPLLE provides a way to help evaluate proposed management scenarios within a future that includes stochastic processes. Stochastic simulations with SIMPPLLE can help in designing management strategies by quantifying what processes may have a higher occurrence on the landscape, or what parts of the landscape are more prone to disturbance processes. Like any model, SIMPPLLE does have its limitations. To predict the probability of many processes requires knowledge of plant community vertical structure. This information can be difficult to obtain from some forms of inventory such as satellite imagery. The size of polygons can also have an influence on process behavior and since the model is polygon-based the entire polygon is affected when the model predicts a specific process. Additionally, potential users should be careful how they use maps because maps tend to convey the idea that particular conditions occur in particular places (Barrett 2001) and SIMMPLLE is designed to predict specific stand level outcomes. The initial validation work with the Coram Experimental Forest in

Northwest Montana indicates that the approach used for capturing and integrating process knowledge in SIMPPLLE does predict realistic results at landscape scales (Chew, et. al. 2004). However, the strengths of the model lies in the comparison of strongly differentiated alternatives, rather than in prediction (Barrett 2001).

The SIMPPLLE model simulations conducted by the District relied on on-the-ground TSMRS inventory data taken from National Forest system lands and satellite imagery for private lands. Existing forest structure, composition, and density reflect past disturbance (e.g., timber harvest listed in Appendix E). The model includes a comparison of the proposed action alternatives and foreseeable pre-commercial thinning. The model has a function that allows users to simulate predictions with or without fire suppression in the future. For the purposes of this analysis it was assumed fire suppression activities would continue in the future. The model does not include firewood cutting since it does not have the sensitivity to detect activities of such limited intensity.

4.1-B Forest Composition

4.1-B.1 Alternative 1

(a) Direct Effects

In dry forest types Douglas-fir and grand fir would continue to dominate and western larch and ponderosa pine and silvicultural treatments would not be used to regenerate these species. Douglas-fir and grand fir are both more susceptible to insect and disease problems than ponderosa pine and larch (Harvey 1994a). 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 less significant components of these stands.

In summary, the direct effects of Alternative 1 would be a continued reduction in the percentage of long-lived seral species (ponderosa pine, western larch, and white pine) across the landscape and an increase in the percentage of species like Douglas-fir and grand fir.

(b) Indirect and Cumulative Effects

An estimated 70% of dry-forest types in the project area were once dominated by ponderosa pine. Currently, about 1.5% of these forests are dominated by ponderosa pine. Under Alternative 1, with

fire and insects and diseases as the major disturbance processes, the SIMPPLLE model predicts this percentage to increase to 2%, which is still significantly below historic levels of 17%. Historic levels of white pine were estimated above 20% and current levels are at just over 1%. The model projects there will be no acres dominated by white pine in another 50 years. The historic composition of larch was also estimated above 20% and current levels are at just over 14%. Under the no action alternative the model projects an estimated 10% reduction in western larch dominated forests. One of the biggest concerns with all these species would be a significant loss of natural seed sources from severe fire. Severe fires could also lead to losses in productivity, especially on dry forest types. Harvey et al (1994) state that with continued overcrowding of Douglas-fir and grand fir the competition for water and nutrients would increase, ultimately increasing the susceptibility of these forests to lethal fires and losses in productivity.

4.1-B.2 Alternatives 2 and 3

(a) Direct and Indirect Effects

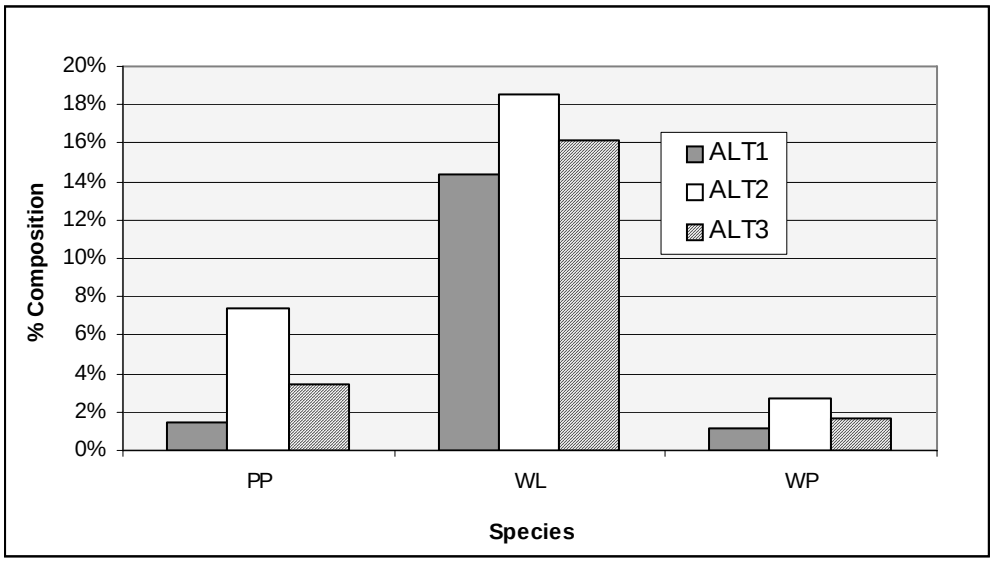
Silvicultural treatments would be used in conjunction with prescribed fire to begin the restoration of ponderosa pine, white pine, and western larch toward historic levels on the Northern Prairie landscape. A primary goal of restoration treatments is to create more open stand structures, thereby improving tree vigor and reducing vulnerability to insects, disease, and severe fire. A primary advantage of cutting is that it allows for the controlled removal of specific trees in terms of number, size, species, and location (Fiedler 1996). In a study on the Lolo National Forest Sala and Calloway (2001) found that removing understory Douglas-fir trees increased soil moistures compared to the control. Results three years later showed old growth trees had increased sap flow, higher foliar nitrogen content, and higher foliage production, indicating improve tree vigor and increase resistance to insects and disease. Stone et al (2001) also found that restoration of pre-settlement stand structure by thinning would improve the vigor of ancient pre-settlement ponderosa pines. Increased canopy growth and increased uptake of water, nitrogen, and carbon indicated tree vigor.

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). 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 or natural regeneration. Restoring these species to the Northern Prairie landscape would improve overall ecosystem health by replacing overcrowded forests of Douglas-fir, grand fir, western hemlock, cedar, and lodgepole pine 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 (Harvey et al 1994a).

The direct effects of Alternatives 2 and 3 would be to increase the percentage of long-lived seral species (ponderosa pine, western larch, and white pine) across the landscape and decrease the percentage of short-lived species like Douglas-fir and grand fir, although Alternative 2 would covert more acres than Alternative 3. The changes in long-lived seral species as compared to Alternative 1 are shown in Figure 4-1. Under Alternative 2, the percentage of ponderosa pine across the landscape would increase by nearly five times, white pine would increase by more than two and half times, and western larch would increase by nearly 30%. The composition of these species would also increase

under Alternative 3, but the increases would be more modest compared to Alternative 2, given Alternative 3 includes considerably fewer acres of shelterwood harvesting, which would provide more open spaces suitable to regenerate long-lived seral species. Under Alternative 3, the acres of ponderosa pine would increase by nearly two and half times, white pine would increase by over 50% and western larch would increase by just over 10%.

Figure 4-1. Changes in Species Composition by Alternative



Long-term (50-year) changes in forest composition were estimated using SIMPPLLE. Again, the model was run assuming fire and insects and diseases would continue to effect changes on the landscape. Alternatives 2 and 3 provide the largest increases in restoration of long-lived seral species (Figure 4-2), particularly the gains in ponderosa pine. Under both alternatives, the model projects ponderosa pine dominated forests to increase by over five and a half times their current level. Given the emphasis on restoration of dry forest types under both of the action alternatives, this would make sense. Additionally, under no action, the model predicts that white pine would not be the major species on any acres within the project area in another 50 years. Only in Alternatives 2 and 3, where blister rust-resistant white pine is used for reforestation, does the model show white pine increasing in the project area. Western larch is projected to increase slightly under each alternative. The SIMPPLLE model implies that increasing the composition of long-lived seral species, without some measure of mechanical treatments and prescribed fire, would be difficult. Fiedler (1996) concluded that restoring ponderosa pine forests to more healthy and sustainable conditions will generally require some kind of silvicultural cutting. This is because effective application of fire without prior removal of understory trees would be difficult since any burn sufficiently intense to kill understory trees would probably damage the already stressed overstory (Arno et al 1997). For white pine, the most effective strategy available to combat this disease is to capture and deploy plants with natural genetic resistance to the rust. Regenerating stands with harvests that create suitable openings for white pines while saving uninfected trees to promote natural genetic resistance is one of the actions necessary to restore white pine (Samman et al 2003).

4.1-B.3 All Alternatives

(a) Cumulative Effects

The Mission Brush project also seeks to improve species composition by increasing the level of long-lived seral species in that project area. When combined with any of the all alternatives, including no action, the net effect would be an increase long-lived seral species, although the action alternatives would combine with Mission Brush to provide a much larger increase in the level of these species.

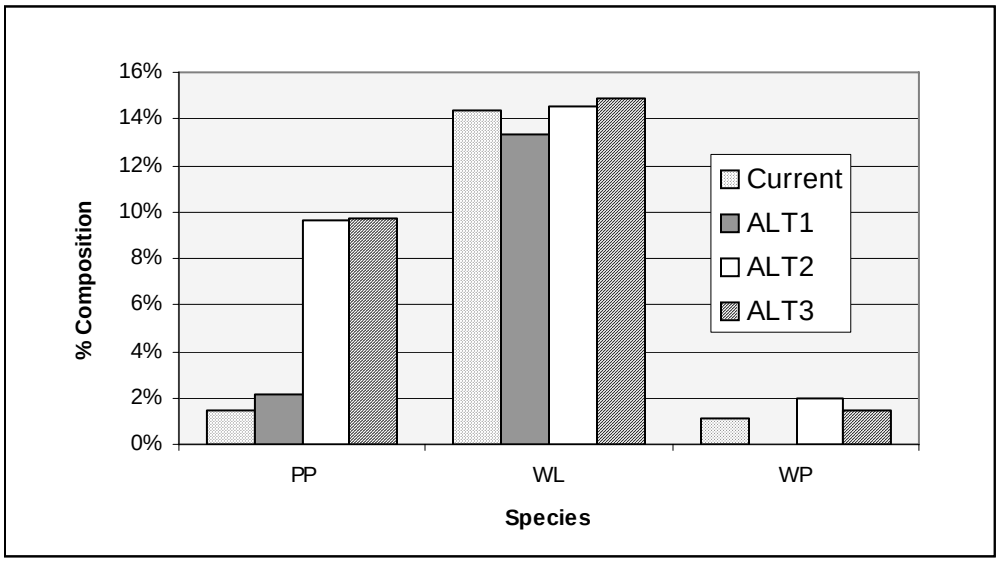
Timber stand improvement projects would favor development of long-lived seral species (white pine, western larch, and ponderosa pine). The cumulative effect would be an increase in the long-term health and vigor of treated stands through improved forest composition.

Firewood cutting would have minimal effects on species composition. Firewood removal typically occurs in overstocked stands that have very little regeneration of long-lived seral species and because these operations affect such a small part of the landscape, and only dead trees can legally be removed, this activity is expected to have negligible effects on species composition.

One of the primary objectives of fire suppression is to limit fire size before intensities can reach stand-replacing proportions that can affect life and property. However, as discussed in Chapter 3 stand-replacing is one of the primary ecosystem processes responsible for regeneration of long-lived seral species, especially western larch. Therefore, continued fire suppression would reduce the level of long-lived seral species on the landscape in the short-term. In the long-term, given no management related fuels reduction are conducted on the landscape, continued fire suppression would eventually lead to increases in natural fuel loads that would lead to an inevitable stand-replacing event. On dry sites, such and event would probably result in depletion of ponderosa pine seed source (Arno et al 1997) and dominance of Douglas-fir and larch (Arno et al 1985).

Road maintenance is expected to have negligible effects on species composition since this activity is limited to such a small portion of the right-of-way and effects on forest composition is not measurable. Off-road recreation in the form of off-road vehicles, regulated or unregulated, could potentially affect forest composition, but again the level off-road vehicle activity that could affect forest composition is also not measurable.

Figure 4-2. Species Composition: 50-Year SIMPPLLE Simulations



4.1-C Forest Structure

4.1-C.1 Alternative 1

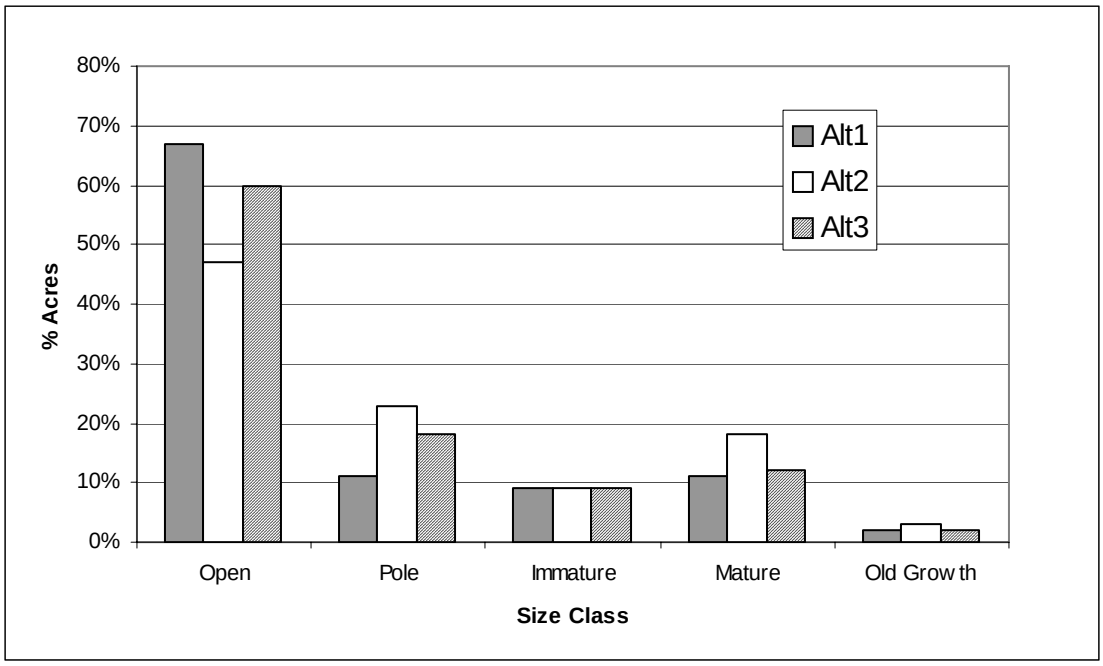
(a) Direct and Indirect Effects

Currently, immature and mature size classes account for two-thirds of the total forest structures on the Northern Prairie landscape. In the short-term (less than 10 years), these forest structures are expected to continue to dominate the landscape. There would be no change in the IPNF's old growth allocation in the short-term. Assuming there would be no significant landscape disturbances (i.e., fire, insects, and disease) the amount of mature and old growth forests would increase.

With no major landscape disturbances (e.g., fire, insects, and disease) and no human intervention (e.g., timber harvest or prescribed fire) to interrupt forest succession, mature and old growth forests would become the dominant forests structures over the next 50 years. Under such a scenario, the estimates are that at least 30% of the Northern Prairie landscape would be comprised of old growth forests. However, assuming forest biomass will continue to build over time, without some sort of landscape change, is not realistic because of dynamic nature of ecosystems. The SIMPPLLE model was used to assess potential long-term changes in forest structure. Under Alternative 1, natural succession along with insects and disease, and fire are projected to be the dominant processes that shape forest structures. Natural fuels are expected to increase vertically (standing live and dead trees) and horizontally (dead trees on the forest floor). The model estimates nearly 11,000 acres of stand replacing fire would occur on the landscape over a 50-year simulation period, at which point, over 70% of the landscape would be comprised of forest openings, due to the changes from fire and insect and disease. Such a scenario is not unprecedented on the Northern Prairie landscape. The late 1890's fire burned nearly the same number of acres and likely created a mixture of forest structures quite similar to those projected with the SIMPPLLE model (Figure 4-3). Historically, large-scale fires played a major role in shaping the Northern Prairie landscape and the Kootenai River sub-basin.

Without some measure of fuels treatment, large-scale disturbances are expected to be the major factors that affect changes in forest structure.

Figure 4-3. 50-Year Simulated Changes in Forest Structure



4.1-C.2 Alternative 2

(a) Direct Effects

Shelterwood with reserves prescriptions on 945 acres of dry forest types would be designed to create two-storied stands of mostly ponderosa pine and western larch (Figure 4-4). The forested openings would be created round naturally occurring clumps of old growth, mostly ponderosa pine, but some larch and Douglas-fir as well. In these openings the younger, smaller-diameter, less fire resistant species (Douglas-fir, grand fir lodgepole pine) would be removed and the large-diameter, more fire resistant trees (ponderosa pine and larch, plus larger Douglas-fir), would be favored. Harvesting the smaller diameter trees, followed by prescribed burning or mechanical piling, would create stand structures that are to a more open grown and more resistant to insects, disease, and fire. Prescriptions in allocated dry forest old growth (332 acres) would be designed to maintain the old growth structure in these stands, while creating canopy openings that would allow for ponderosa pine and larch to regenerate, as occurred periodically with historic fire. Fairly uniform stand densities of about 40-60 ft^2 of basal area, which would be closer to the lower level of conditions that existed historically (Arno et al 1997), would be maintained.

Figure 4-4– The picture above depicts a typical target stand the District would try to create using the ***Shelterwood with Reserves*** method and prescribed burning on dry forest types. Such prescriptions would focus on retention of large-diameter ponderosa pine like those shown in the foreground.

Shelterwood with reserves prescriptions on 117 acres of moist, cool-moist, and cold-dry forest types would be designed to create two-storied stands of mostly western larch, Douglas-fir, and western white pine, where they are part of the overstory. These openings would be created in the immature and mature forest structures, which currently comprise about 68% of the forested structures in the project area.

Free selection prescriptions on 141 acres of moist forest types would be designed to create multi-storied stands featuring retention of large-diameter western larch, Douglas-fir, and white pine, while maintaining a diversity of species including western red cedar, western hemlock, grand fir, Engelmann spruce, and subapline fir. The free selection system would incorporate openings of sufficient size to regenerate white pine and western larch, but not necessarily provide them optimum space for long-term development (Graham et al 2007). An estimated 1/4 to 1/3 of the acres would be regenerated with this entry.

Free selection prescriptions on 14 acres of dry forest types would be designed to create multi-storied stands featuring retention of large-diameter ponderosa pine and western larch in the overstory and regeneration of these same species in the understory. An estimated 1/4 to 1/3 of the acres would be regenerated with this entry. The forested openings would be created round naturally occurring clumps of large-diameter ponderosa pine, larch and Douglas-fir. In these openings the younger, smaller-diameter, less fire resistant species (Douglas-fir, grand fir lodgepole pine) would be removed and the large-diameter, more fire resistant trees (ponderosa pine and larch, plus larger Douglas-fir), would be favored.

An underburn with no timber harvest would be prescribed for 114 acres of cool-moist forest types that area characterized by a mixture of natural forest openings and patches of mature forest composed of mostly 90-100 year old subalpine fir, Douglas-fir, and lodgepole pine. Underburning these stands would maintain the existing diverse forest structure by killing small conifers that are encroaching in the natural forest openings.

In summary, the direct effects on forest structure would be an increase in forested openings from 17% to 29% and a reduction in the combined total of immature and mature forests from 68% to 56% on all forest types. Several openings greater than 40 acres would be created. These openings would blend into the existing openings, either natural, or those created through past timber harvest. Most of the changes would occur on dry forest types where forested openings would increase from 10% to 35% and the combined total of immature and mature forests would decrease from 72% to 57%. These openings will improve composition, structure, and diversity of the landscape. The openings would more closely resemble those created historically through natural fire because natural fire was not limited to arbitrary 40-acre limits. The average opening size would increase from 54 to 66 acres, which represents an increase of about 20%. Reforestation of long-lived seral species will improve the long-term health of these forests by converting to species that are more resistant to insects, disease and fire. Similar prescriptions have been implemented on the IPNF (Figure 4-5). Limiting treatment units to 40 acres or less would not effectively address insect and disease concerns or natural fuel loads in the project area. A list of the openings greater than 40 acres is provided in Table 4-1.

Figure 4-5– This photograph, taken on the Sandpoint Ranger District, provides an example of an opening greater than 40 acres (middlegound) that would be created under Alternative 2. The harvested area, logged with tractor, skyline, and helicopter systems, is about 280 acres.

Table 4-1. Openings Greater Than 40 Acres – Alternative 2

Unit(s)	Unit Acres	Existing Opening Acres	Total Opening Acres
71, 74, 92	94	135	229
80, 81	35	42	77
93, 94, 137	285	48	333
89, 90, 91, 138	127	20	147
96, 98, 99, 100	150	49	199
75, 76, 78, 82	146	54	200
103	65	14	79
104	41	7	48
121	45	32	77

4.1-C.3 Alternative 3

(a) Direct Effects

Free selection prescriptions (Figure 4-6 and 4-7) on 959 acres of dry forest types would be designed to create multi-storied stands featuring retention of large-diameter ponderosa pine and western larch in the overstory and regeneration of these same species in the understory. An estimated 1/4 to 1/3 of the acres would be regenerated with this entry. The forested openings would be created round naturally occurring clumps of old growth, mostly ponderosa pine, but some larch and Douglas-fir as well. In these openings the younger, smaller-diameter, less fire resistant species (Douglas-fir, grand fir lodgepole pine) would be removed and the large-diameter, more fire resistant trees (ponderosa pine and larch, plus larger Douglas-fir), would be favored. Harvesting the smaller diameter trees, followed by prescribed burning or mechanical piling, would create stand structures that are to a more open grown and more resistant to insects, disease, and fire. Prescriptions in allocated dry forest old growth (332 acres) would be designed to maintain the old growth structure in these stands, while creating canopy openings that would allow for ponderosa pine and larch to regenerate, as occurred periodically with historic fire. Stand densities would be restored to conditions where a diversity of structures is maintained that more closely resemble conditions that existed historically.

Free selection prescriptions on 179 acres of moist forest types would be designed to create multi-storied stands featuring retention of large-diameter western larch, Douglas-fir, and white pine, while maintaining a diversity of species including western red cedar, western hemlock, grand fir, Engelmann spruce, and subapline fir. The free selection system would incorporate openings of sufficient size to regenerate white pine and western larch. An estimated 1/4 to 1/3 of the acres would be regenerated with this entry.

Irregular shelterwood prescriptions on 79 acres of moist, cool-moist, and cold-dry forest types would be designed to create two-storied stands of mostly western larch, Douglas-fir, and western white pine, where they are part of the overstory. These treatments would be designed to create optimum growing conditions for western larch and white pine.

Figure 4-6- The picture above depicts a typical target stand the District would try to create using the ***Free Selection*** method and prescribed burning on dry forest types. Such prescriptions would focus on retention of large-diameter ponderosa pine while creating openings like those shown in the foreground. These openings would allow for regeneration of ponderosa pine and western larch.

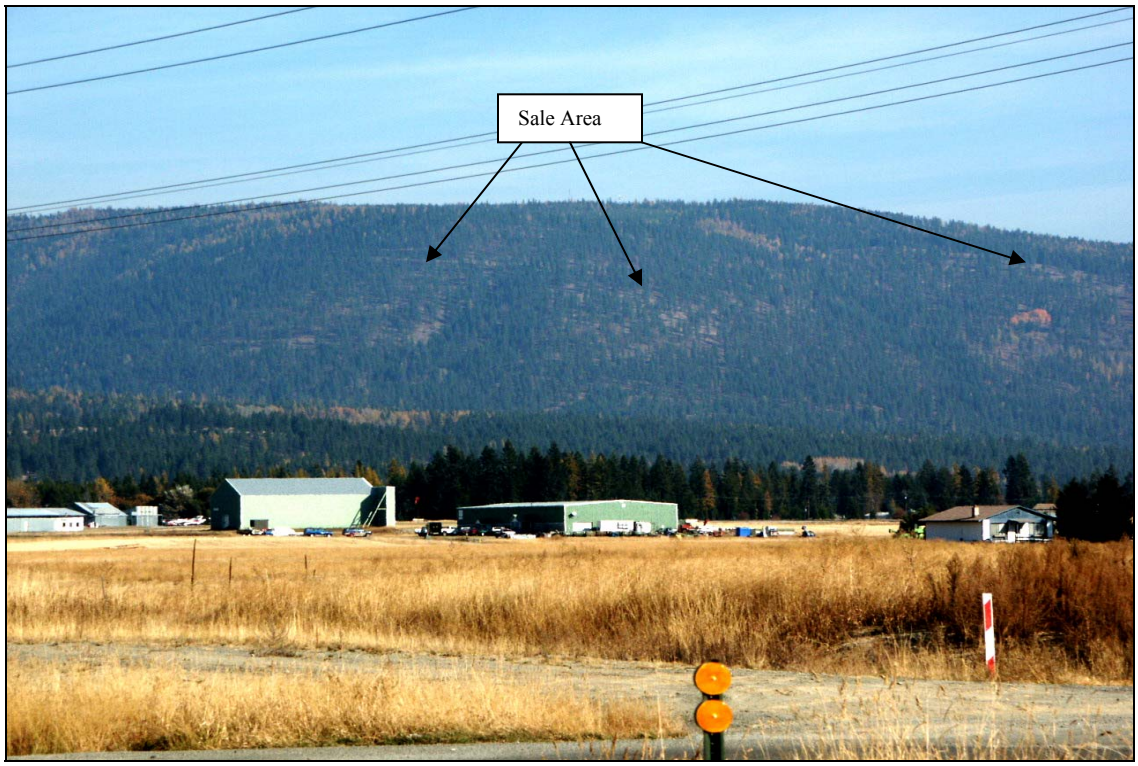


Figure 4-7– The same area shown in Figure 4-6 is shown at a distance from Highway 95 near Three Mile Junction, north of Bonners Ferry, ID.

The direct effects on forest structure would be a small increase in forested openings from 17% to 17.5% and a reduction in the combined total mature forests from 50% to 49.5%. No openings greater than 40 acres would be created, but as with Alternative 2, these openings would blend into the existing openings, either natural, or those created through past timber harvest, and they would improve composition, structure, and diversity of the landscape. There would be no measurable change in opening size under Alternative 3.

Free selection prescriptions in both dry and moist forest types will change relatively homogenous single-story stand structures to forests with a high degree of canopy diversity. Reforestation of long-lived seral species will improve the long-term health of these forests by converting to species that are more resistant to insects, disease and fire. A high percentage of forest cover will be maintained in about 2/3 to 3/4 of the treated acres, while 1/4 to 1/3 of the treated area will provide openings suitable to regenerate western larch, white pine and ponderosa pine. Openings would be 1-3 acres. Openings would be considered areas where less than 40% canopy cover is retained.

4.1-C.4 Alternatives 2 and 3

(a) Direct and Indirect Effects

Changes in stand structure from prescribed treatments would alter the potential fire behavior in treated stands from a stand-replacing crown fire to a more low severity ground fire. In particular, the risk of losing old growth ponderosa pine and larch to a crown fire would be greatly reduced. A low-severity fire-would burn rapidly across the forest floor and for shorter period of time, but not into the crowns of the trees. In addition, promoting the development of more open grown stands of white pine and larch would reduce the risk of high severity fires in these forest types as well. Consequently, the indirect and cumulative effects of Alternatives 2 and 3 would be to reduce the long-term risk of stand-replacing fire, as well as insect and disease occurrences across the landscape, especially on dry site forest types.

As indicated in Figure 4-3, SIMPPLLE predicts continued changes in forest structure across the landscape over a 50-year period. The model was run assuming continued treatments would be conducted in the treated stands, as per the silvicultural prescriptions. Agee et al (1999) state that sustained alteration of fire behavior requires effective and frequent maintenance of any fuel treatment. However, no treatments were scheduled outside of the areas proposed for treatment under either action alternative. In other words, the “No Action” alternative would continue in the untreated areas. Under these assumptions, the model estimates nearly 30% of landscape would be in forested openings in 50 years and stand-replacing fire would affect nearly 2,900 acres under Alternative 2. Under Alternative 3, just over 50% of the landscape would be in forest openings and stand replacing fire would affect nearly 7,500 acres. Insects and diseases would continue to be effect landscape changes, but mostly in the untreated areas.

4.1-C.5 All Alternatives

(b) Cumulative Effects

The Mission Brush project also seeks to diversify forest structure by increasing the level forested openings and reducing the percentage of dense immature and mature forest structures in that project

area. When combined with any of the all alternatives, including no action, the net effect would be an increased diversity of forest structures across the landscape, although the action alternatives would combine with Mission Brush to provide a much larger increase in the level of these species.

Timber stand improvement projects would reduce the density of young sapling stands. The cumulative effect would be an increase in the long-term health and vigor of treated stands through improved forest structure.

Firewood cutting would have minimal effects on forest structure. Because these operations affect such a small part of the landscape, and only dead trees can legally be removed, this activity is expected to have negligible effects on forest structure.

In the short-term, continued fire suppression would increase the level of dense forest structures on the landscape. On dry sites stand-replacing fires tend to occur when fire free-intervals exceed 50 years. These types of fires tend to create even-aged structures (Smith and Fischer 1997). Consequently, on dry sites stand-replacing fire would remove the all-aged structures created by non-lethal and mixed severity fires that account for the presence of old growth ponderosa pine (Smith and Fischer 1997). In moist and cool moist forest types fire-free intervals in excess of 100 years were more common, and therefore, even-aged structures were more common in these forest types (Smith and Fischer 1997). Given the current fire free interval is approaching 90 years in the project area continued fire suppression (assuming no management related fuels reduction activities are conducted) would have the greatest long-term effect on dry forest types.

Road maintenance is expected to have negligible effects on forest structure since this activity is limited to such a small portion of the right-of-way and effects on forest structure is not measurable. Off-road recreation in the form of off-road vehicles, regulated or unregulated, could potentially affect forest structure, but again the level off-road vehicle activity that could affect forest structure is also not measurable.

4.1-D Risk of Stand Replacing Fire in Dry Forest Types

The risk of stand-replacing fire in dry forest types, as compared to Alternative 1 (No Action), was calculated for Alternatives 2 and 3. Using the SIMPPLLE model the probability of stand-replacing fire was projected for proposed treatment units and their neighboring stands. The model calculates a probability of stand replacing fire based on a number of factors including, but not limited to, existing stand conditions (species, structure, composition, etc.), insect and disease occurrences, and overall probability of fire occurrence in a given area. The model works in a stochastic nature, which means processes that affect an individual stand may affect adjacent stands, depending on the condition of these adjacent stands. For example, if a fire starts in a given stand and a neighboring stand is fairly open, the fire may burn as a low-severity fire. However, if the neighboring stand is a dense, multistoried stand with root disease, the fire may burn as a stand-replacing event. Consequently, the model is sensitive to changes in forest composition and structure at the landscape level.

4.1-D.1 Alternative 1

(a) Direct and Indirect Effects

As discussed in Chapter 3 the average fire return interval in dry forest types within the project area was estimated at about 23 years. Nearly 90 years have past since the last fire in these forest types, or nearly four times the average interval. Smith and Fischer (1997) state that as the fire return interval in these forest types increases, the likelihood of a severe stand-replacing event also increases. Currently, there is no "wildland fire used for resource benefits" policy for the Northern Prairie area. Therefore, active fire suppression is expected to continue in the area, which would further extend the fire return interval. Continued fire suppression and no silvicultural treatments, would further trend vegetation patterns away from historical conditions and increase the risk of stand-replacing fire. Given these circumstances the risk of stand replacing fire is expected to increase over time compared to Alternatives 2 or 3.

Morgan and others (1994) stated that when ecosystems are outside their historical range of variability, changes may occur dramatically and rapidly. 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 would be much more susceptible to catastrophic changes from fires and insects and diseases. Consequently, the cumulative effects of no action in these dry forest types would result in fires that are more costly and difficult to manage and changes in ecosystem structure and composition that are outside their historical range.

4.1-D.2 Alternative 2

(a) Direct Effects

Under Alternative 2 the SIMPPLLE model estimates that the probability of stand-replacing fire in the dry forest types within the project area would be reduced by nearly 60% and the risk on treated dry forest types would be reduced by an estimated 85% (project file – VEG040). Given the nature of the proposed dry forest treatments this is not surprising. These treatments would change forest structures to more open conditions with large-diameter fire resistant trees, which would be more similar to historic conditions when low-severity fires were the primary fire regime. The direct effects of this alternative would be to reduce the risk of stand-replacing fires in dry forest types within the project area.

4.1-D.3 Alternative 3

(a) Direct Effects

Under Alternative 3 the SIMPPLLE model estimates that the probability of stand-replacing fire in the dry forest types within the project area would be reduced by nearly 30% and the risk on treated dry forest types would be reduced by an estimated 78% (project file – VEG041). As with Alternative 2, these treatments would change forest structures to more open conditions with large-diameter fire resistant trees, but the uneven-aged prescriptions would create more diverse forest mosaics. This may create an increased risk of severe fire compared to Alternative 2, but the risks of severe fire area considerably lower than Alternative 1. The direct effects of this alternative would be to reduce the risk of stand-replacing fires in dry forest types within the project area.

4.1-D.4 Alternatives 2 and 3

(b) Indirect Effects

Scientific research (Fiedler et al 2003, Mason et al 2001, Graham et al 1999) shows that specific types of thinning treatments can drastically alter fire behavior. Thinnings in general will lower crown bulk densities and redistribute fuel loads significantly, thus decreasing fire intensities if the surface fuels are treated (Agee 1993, Alexander 1988, Alexander and Yancik 1977). Timber harvesting included in Alternatives 2 and 3 would immediately cause an increase in surface fuel loading, as well as an immediate decrease in canopy bulk density. The unmerchantable branches and other fuels that are left after harvest can substantially increase the fuel load, and consequently the potential flame lengths on any given site. This fuel load would then pose a slash fire hazard for a short period of time (1-3) years, until the fuel on the site was treated with an underburn or other slash treatment method. This period is needed to allow nutrients like potassium to leach into the soil and to allow fuels time to dry for burning. Any type of human activity increases the possibility of ignition and wildfire. Common ignition sources include: equipment and vehicle operation, smoking, and arson. The Myrtle Creek Fire (September 2003), which was human-caused, started in activity fuels created through timber harvest (Mama Cascade Timber Sale) and eventually burned over 3,600 acres. Given the level of timber harvest that has taken place on the District over the past 40 years, this incident was an extremely rare occurrence (project file – VEG001). However, many factors of weather played a part in the behavior of this fire. Precipitation amounts were well below normal. The area typically receives 22 inches of rain each year. From 1999-2002 the average rainfall was 14.6 inches. These conditions led to the abnormally low 1000-hour fuel moistures in addition to very dry live fuel moistures. Relative humidity was very low, with mid-teens in the afternoon and recoveries reaching the 20's and 30's in the evenings. The energy release component (ERC) levels were above the 97th percentile or near record levels (USFS 2003f).

A timber purchaser would be required to have fire suppression equipment on site and to take necessary fire precautions to prevent a wildfire from occurring. A timber sale administrator closely monitors the fire prevention requirements of the timber contract throughout the timber harvest operations. In the event of extreme fire conditions, as was the case with the Mama Cascade Timber Sale, harvest activities would be regulated or suspended until conditions improved. The short-term risk is weighed against the long-term benefits generated on treated areas. These benefits include reduced long-term risk of severe crown, improved forest composition and structure, reduced risk of insect and disease occurrence, and improved defensible space where firefighters could work effectively in case fires do occur in these areas.

4.1-D.5 All Alternatives

(a) Cumulative Effects

The Mission Brush project also seeks to reduce the risk of stand-replacing fire by reducing the percentage of acres on the landscape that are in an overstocked condition, especially on dry forest types. When combined with any of the all alternatives, including no action, the net effect would be a reduced risk of stand-replacing fire across the landscape, although the action alternatives would provide a greater reduction in the risk of stand-replacing fire.

Slash created from timber stand improvement projects would not substantially increase the short-term risk of stand-replacing fire in dry forest stands. In the long-term, timber stand improvement projects could provide a cumulative small reduction in the risk of stand-replacing fire by developing more open-grown stand conditions.

Firewood cutting is expected to have negligible effects on reducing the risk stand-replacing fire because these operations affect such a small part of forest structure at the landscape level. Unintended ignitions from these activities have the potential to the develop into stand-replacing events, but the risk is relatively low given that most firewood cutting occurs within 200 feet of the road prism, which are areas that suppression crews are able to access extinguish relatively quickly.

In the short-term, continued fire suppression would increase the risk of stand-replacing fire on the landscape. Given the current fire free interval is approaching 90 years in the project area continued fire suppression (assuming no management related fuels reduction activities are conducted) would have the greatest long-term effect on dry forest types that had historic fire free intervals of less than 25 years in the project area (project file – VEG023).

Road maintenance is expected to have negligible effects on the risk stand-replacing fire since this activity is limited to such a small portion of the right-of-way. Unintended ignitions from road maintenance equipment are a possibility, but as with firewood cutting potential ignitions would occur within an area where the likelihood of such fires developing into stand-replacing events before they can be extinguished by initial attack crews is extremely low. There are no recorded occurrences of such activities leading to stand-replacing events on the District (project file – VEG001).

Off-road vehicles are another source of unintended ignitions that could potentially develop into stand-replacing events forest structure is also not measurable. Off-road vehicles have the potential to access more National Forest system lands than road maintenance equipment, but once again there are no recorded occurrences of such activities leading to stand-replacing events on the District (project file – VEG023).

4.1-E Insects and Disease

4.1-E.1 Alternative 1

(a) Direct and Indirect Effects

Douglas-fir and true firs (grand fir and subalpine fir), species that are more susceptible to root diseases than larch and pine species (Hagle and Shaw 1991), are currently the dominant species, or a significant stand component, on more than 10,000 acres in the project area. Root disease pockets are currently scattered throughout the proposed treatments units. Formerly, recurrent low intensity fires regulated competition for limited site resources on dry forest types (e.g., water and nutrients) by eliminating fire intolerant trees (e.g., Douglas-fir and grand fir). These frequent fires also prevented excessive buildups of live and dead fuels. In the absence of fire, native insects and pathogens (e.g., root diseases) regulate stocking by killing susceptible individuals and species. With exclusion of fire, excessive live and dead fuels have accumulated (Harvey et al 1994). The long-term indirect effects of Alternative 1 would be an increase in the number of acres dominated by species more susceptible to root diseases. With species more susceptible to root diseases dominating the

landscape excessive live and dead fuels are expected to continue to accumulate. Consequently, the indirect cumulative effects of Alternative 1 would be not just increased risk of stand-replacing fire, but a wildfire with fuel accumulations so high that resulting burns are extremely hot, resulting in critical reductions in stored nutrients through volatilization, with accompanying losses to potential productivity (Harvey et al. 1993). Such fires would be more of concern on dry forest types where stand-replacing fires were less common historically than moist and cool-moist forest types (Smith and Fischer 1997).

The project area also contains over 4,000 acres of moderate and high-hazard Douglas-fir beetle stands (Randall and Tensmeyer 1999). Stands with higher densities are more susceptible to beetle attack. Data suggest stands over 80 percent of normal stocking are most vulnerable. Average age of most Douglas-fir killed exceeds 120 years. In outbreaks and in more densely-stocked stands, younger trees may be killed (Kegley 2006). Given the preponderance of mature and old growth forests, as discussed in Chapter 3, where Douglas-fir is a significant component (greater than 30% of the basal area) the indirect effects of Alternative 1 would be an increased risk of Douglas-fir beetle outbreaks in the future.

Because mountain pine beetle outbreaks usually develop in mature to over mature forests, especially in lodgepole pine, large reserves of these forests pose a constant hazard in areas climatically favorable for the mountain pine beetle (Gibson 2006). Currently, the project area contains more than 1,600 acres of moderate and high-hazard mountain pine beetle stands (Randall and Tensmeyer 2000) where lodgepole pine is more than 30 percent of the existing basal area. Additionally, more than 2,400 acres have moderate-high hazard ratings where large-diameter ponderosa pine is a component of dry forest stands. In the long-term, the risk of infestation would increase over time in stands where the mountain pine hazard rating lodgepole pine and ponderosa pine is moderate to high. The indirect effects would be increased risk of natural fuel accumulations that would in turn increase the risk of stand-replacing fire on the landscape. Losses of large-diameter and old growth ponderosa pine to mountain pine beetle attacks would result in the loss of a primary component of mature and old growth forests.

Alternative 2

(a) Direct and Indirect Effects

One of the most effective management tools is to reestablish resistant species on these sites, i.e., long-lived seral species (Williams et al 1989 and USFS 1999). The direct effects of Alternatives 2 would be a reduction in the number of acres susceptible to root disease occurrences. Under Alternative 2, an estimated 1,114 acres[2] would be regenerated with ponderosa pine, western larch, and white pine. These long-lived seral species would replace Douglas-fir, grand fir, and subalpine fir, which are more susceptible to root diseases, as the dominant forest cover type where regeneration prescriptions are applied. These conclusions are also supported by the SIMPPLLE model, which was used to predict the probability of root disease occurrences in treated stands. According to the model, Alternative 2 would reduce the risk of root diseases in treated stands by an estimated 84% (project file – VEG038). In the long-term, conversion to open-grown stands of

[2] This includes the 1,062 acres of irregular shelterwood cutting and approximately 1/3 of the free selection acres (52 out 155 acres)

ponderosa pine, western larch, and white pine that are less susceptible to root disease occurrences would reduce the competition for limited water and nutrients, especially on dry forest types. The direct and indirect effects of reducing the numbers of acres susceptible to root disease occurrences would be a decrease in the probability of stand replacing fires throughout the treatment area.

Alternative 2 would treat nearly 1,100 acres (more than 80% of the proposed treatment acres) that are considered moderate to high hazard for some type of bark beetle. Approximately 385 acres are considered moderate to high hazard for mountain pine beetle in *lodgepole pine* and another 880 acres are considered moderate to high hazard for *ponderosa pine*. Another 745 acres are considered moderate to high hazard for Douglas-fir beetle attack.

Controlling stand density is the primary means for reducing the bark beetle hazard. Sartwell and Dolph (1976) found that thinning of overstocked second-growth ponderosa pine stands can have a profound effect on beetle-caused mortality. An un-thinned stand stocked at a basal area of 152 square feet per acre had 8 percent of the stand killed by mountain pine beetle in a 5-year period. A similar stand, thinned to 15- by 15-feet spacing (80 square feet per acre basal area) showed only 0.2% mortality in the same period. In addition to reduced mortality, thinned stands showed a net growth. Amman and others (1989) state that silvicultural control measures sucn as thinning are the most efficient at preventing or minimizing beetle-caused mortality in stands of lodgepole and ponderosa pine. Patch cutting in lodgepole pine stands creates a mosaic of age and size classes, which reduces the acreage of lodgepole pine that will be highly susceptible to beetles at one time.

Schmitz and Gibson 1(997) state that the likelihood of a Douglas-fir beetle infestation developing within a stand is related to the proportion of susceptible Douglas-fir and overall stand density. Generally, in unmanaged stands, attacks are most successful on trees that are mature or over-mature, largest in diameter, and found in more densely stocked stands. A very high stand density may increase the susceptibility of younger and smaller diameter trees. Stands with higher proportion of trees with susceptible characteristics have a higher degree of susceptibility to beetle attack. Correspondingly, silvicultural manipulations which reduce the proportion of the stand having those characteristics limit beetle-caused damage.

In total, shelterwood prescriptions would convert approximately 995 acres of moderate and high hazard bark beetle stands to young, thrifty stands of regeneration that are less susceptible to some type of bark beetle attack. Another 105 acres of moderate and high hazard bark beetle stands would be treated with free selection prescriptions. Large diameter ponderosa pine would be retained in dry forest stands and the reduced stand density would reduce the risk of mountain pine beetle attack, which would increase the probability these significant components of the ecosystem are retained.

Alternative 3

(a) Direct and Indirect Effects

The direct effects of Alternatives 3 would be a reduction in the number of acres susceptible to root disease occurrences. Alternative 3 would convert over 458 acres[3] to long-lived seral species.

[3] This includes the 79 acres of irregular shelterwood cutting and approximately 1/3 of the free selection acres (379 out 1138 acres)

According to the SIMPPLLE model Alternative 3 would reduce the risk by an estimated 66% (project file – VEG039). This seems reasonable given the reductions of species that area more susceptible to root diseases. In the long-term, conversion to open-grown stands of ponderosa pine, western larch, and white pine that are less susceptible to root disease occurrences would reduce the competition for limited water and nutrients, especially on dry forest types. The direct and indirect effects of reducing the numbers of acres susceptible to root disease occurrences would be a decrease in the probability of stand replacing fires throughout the treatment area.

Alternative 3 would also treat nearly 1,100 acres that are considered moderate to high hazard for some type of bark beetle, but the treatments would feature considerably more free selection prescriptions than the shelterwood prescriptions that would be the primary prescription under Alternative 2.

Under Alternative 3 free selection prescriptions would reduce the bark beetle hazard on approximately 1,050 acres of moderate and high hazard bark beetle stands and shelterwood harvest would be used to convert 50 acres of moderate and high hazard stands to young, thrifty stands of regeneration that are less susceptible to bark beetle attack. As with Alternative 2, large diameter ponderosa pine would be retained in dry forest stands and the reduced stand density would reduce the risk of mountain pine beetle attack, which would increase the probability these significant components of the ecosystem are retained.

All Alternatives

(a) Cumulative Effects

The Mission Brush project also seeks to reduce the risk of insect and disease occurrence by reducing the percentage of acres on the landscape that are that are susceptible to root disease an bark beetle attacks. When combined with any of the all alternatives, including no action, the net effect would be a reduced risk of insect and disease occurrence across the landscape, although the action alternatives would provide a greater reduction in the risk of insect and disease occurrence.

Timber stand improvement projects would feature development of mixed species stands that feature species that are less susceptible insect and disease. In the long-term, timber stand improvement projects that diversify forest composition would reduce the risk of root disease and bark beetle occurrence on the landscape.

Firewood cutting is expected to have negligible effects on insect and disease occurrence because these operations affect such a small part of forest structure at the landscape level. Mountain pine beetle and Douglas-fir beetles attack live trees, but once attack trees have been killed the beetles move on to other live host species. Therefore, removal of dead trees would provide no direct control measures of these types of bark beetles. Since root diseases such as *Armillary, spp.* may live for decades in coarse woody material (Williams and others 1989) there is the possibility cutting host species (e.g., Douglas-fir) could provide a source to spread to a living host, but this risk is small and unmeasurable given the relatively small magnitude of firewood cutting.

In the short-term, continued fire suppression would increase insect and disease occurrence on the landscape and lead to increased natural fuel accumulations. Inevitably this would lead to an

increased risk in stand-replacing fire over time. Given the current fire free interval is approaching 90 years in the project area continued fire suppression (assuming no management related fuels reduction activities are conducted) would have the greatest long-term effect on dry forest types that had historic fire free intervals of less than 25 years in the project area (project file – VEG023).

Road maintenance is expected to have negligible effects on insect and disease occurrence since this activity is limited to such a small portion of the right-of-way and has unmeasurable effects on forest composition and structure.

Off-road vehicles are also expected to have negligible effects on insect and disease occurrence since this activity also has unmeasurable effects on forest composition and structure.

4.1-F Consistency with the Forest Plan

4.1-F.1 Old growth

These forests have a unique structure and composition that provides critical habitat for a wide range of plants, animals, and other biota. The IPNF includes nine Forest Plan standards that are designed help the Forest maintain a well distributed high quality old growth allocation.

(a) Alternative 1

In the short-term, since there would be no proposed treatments in any old growth type, there would be no direct effects on old growth forest structures and no changes in their allocation to the Forest Plan.

In the dry forest types, old trees need relatively open conditions to maintain modest growth rates and survive several hundred years. Low-vigor trees are unable to marshal enough resources to maintain adequate defense. Large trees growing in a dense layer of smaller trees are especially vulnerable to attack, underscoring the importance of maintaining reasonable growth rates (Arno and Fiedler 2005).

In their study of old growth ponderosa pine and Douglas-fir stands on three National Forests in Montana, Arno et al (1995) found that eight out of nine plots had pre-1900 basal areas of less than 145 ft^2 and that seven out of nine plots had pre-1900 basal areas of 100 ft^2, or less. The dry forest old growth stands in the Northern Prairie assessment area are typically stocked with more than 250 trees per acre (TPA) larger than three inches DBH and overall stand densities average about 145 square feet (ft^2) of basal area. An historical stand dominated by large fire-resistant trees growing at wide spacing would likely respond to a summer lightning fire quite differently than its modern counterpart. Under historical conditions, the large fire-resistant trees could continue to dominate the forest whereas modern stand structures favor stand replacement burning (Arno and Fiedler 2005). Absent fire, understory trees out-compete the old trees for moisture and nutrients. The old trees lose vigor and often succumb to insects and disease, or the stress imposed by even low- moderate intensity fires (Arno et al 1995, Biondi 1996).

Given their current composition and structure, the indirect and cumulative effects of no action in dry forest old growth stands in the assessment area would be an increased long-term risk of losing valuable components to insects, disease, stress, and ultimately severe fire, which would not only kill

smaller diameter Douglas-fir, but would likely kill the old growth ponderosa pine, western larch, and Douglas-fir as well.

(b) Alternatives 2 and 3

Both action alternatives include 113 acres of treatments in allocated dry forest old growth and 219 acres of treatments in potential dry forest old growth. Alternative 2 would use even-aged prescriptions and Alternative 3 would use free selection prescriptions. Treatments would be designed to restore the historic integrity of this type of old growth, although Alternative 3 is designed to develop stand structures that more closely resemble historical conditions. Silvicultural prescriptions would be designed to retain the old growth ponderosa pine, western larch, and Douglas-fir, in the treated stands. These alternatives would result in no net loss of allocated old growth. Consequently, Forest Plan standards for old growth maintenance and distribution would be met under either alternative.

(c) Alternative 2

Under Alternative 2 even-aged shelterwood with reserves prescriptions would be implemented in dry forest old growth stands. These prescriptions would feature maintenance of the old growth ponderosa pine, larch, and Douglas-fir (greater than 21" DBH) and additional large diameter trees needed to attain a residual density of between 40-60 ft^2 of basal area. Regeneration featuring ponderosa pine and western larch would occur throughout the entire treatment unit. The residual old growth and additional large-diameter trees would be retained through time. In the long-term, relatively open stand conditions would be maintained and replacement old growth trees would be cultured through time through a combination of prescribed burning and silvicultural treatments every 20-30 years.

The treatment stands that include dry forest old growth under Alternative 2 would meet the criteria for dry forest old growth based on Green et al (1992 – corrected 02/2005), but conditions would be maintained closer to the lower end of the recommended criteria.

(d) Alternative 3

Under Alternative 3 uneven-aged free selection prescriptions would be implemented in dry forest old growth stands. These prescriptions would feature maintenance of large (greater than 21" DBH) old growth trees (ponderosa pine, larch, and Douglas-fir), culturing of intermediate size trees, especially ponderosa pine and larch, and create small openings of 2-3 acres to promote regeneration these species, which will not regenerate in shade. These openings would retain a density of about 40 ft^2 of basal area and they would be concentrated in areas where stand composition is primarily smaller diameter Douglas-fir (generally less than 12" dbh) and only scattered large-diameter and old growth trees exist. The openings would be created as a result of removing the preponderance of smaller trees, while of the old growth trees and additional large-diameter trees are retained. Although it is obviously critical to retain the larger old growth trees, it is equally as critical in the long-term maintenance of dry forest old growth to develop replacement cohorts within the these stands that would eventually develop into large diameter and old growth trees themselves.

Fiedler et al. (1988) recommended residual densities of 50-80 square feet of basal area for management of uneven-aged ponderosa pine stands in the Northwest. For ponderosa pine, maintaining stand densities of less than 100 ft^2 of basal area will minimize tree mortality from mountain pine beetle (Schmid and Mata 1992). Stands cut to 60ft^2 would remain relatively unsusceptible for about 50 years, those cut to 80 ft^2 for about 25-30 years, and those cut to 100 ft^2 for about 11-15 years (Schmid and Amman, 1992).

The average basal area of the dry forest old growth stands in the assessment area is 143 ft^2 (project file – VEG026). In their study of old growth ponderosa pine and Douglas-fir stands Arno and Fielder (1995) found that pre-1900 basal areas were less than 145 ft^2 on and eight out of nine plots, nearly the same as the current densities in the Northern Prairie area, and most often densities were less than 100ft^2. Treatments in an old growth larch and ponderosa pine stand on the Lolo NF in the late 1990's reduced basal area about 16% from 144 to 121 ft^2 per acre using the least intensive treatment, compared to the most intensive treatment that reduced basal area by about 48% from 145 to 76 ft2. Prior to treatment, increment borings showed growth rates slowing in old growth trees and several old pines succumbed to beetle attacks (Arno and Fiedler 2005). Results three years later showed old growth trees had increased sap flow, higher foliar nitrogen content, and higher foliage production (Sala and Calloway 2001), indicating improved tree vigor and increased resistance to insects and disease. Stone et al (1999) also found that restoration of pre-Euro-American stand structure by thinning improved vigor of ancient, presettlement ponderosa pines in northern Arizona. Increased canopy growth and increased uptake of water, nitrogen, and carbon indicated improved tree vigor. They concluded in their study that the negative influence of postsettlement trees on presettlement trees likely resulted from competition for soil resources. Their conclusion agreed with correlative studies conducted at their study site by Sutherland (1983) and Biondi (1996).
Using these above reference conditions and recommendations the average target density for the proposed free selection prescriptions in dry forest stands would be 70-90 ft^2 of basal area. In dry forest old growth stands the objective would be to maintain slightly higher densities of 80-100 ft^2 of basal area. Based on data taken from similar prescriptions on the District it is estimated that the average size tree harvested would be less than 11 inches (project file – VEG029) DBH and that 90% of the trees would be less than 14 inches DBH. Douglas-fir, grand fir, and lodgepole pine would be the primary species selected for cutting. Although average densities would be 70-100 ft^2, there would be considerable within stand variability. Some areas where old growth-sized trees dominate would exceed the average density and may be as high as 200ft^2. Other areas, with predominantly small diameter trees, would be opened up to less that 50 ft^2.

The mere presence of old growth ponderosa pine indicates intervals of less than 50 years (Smith and Fischer 1997). As discussed earlier the estimated *average* historic fire interval in dry forest types in the project was 23 years, with the *shortest* fire free interval estimated at 14 years and the *longest* at 34 years (project file – VEG023), which correlates well with data collected on similar dry forest types on the District (project file – VEG002). Subsequent treatments would be scheduled about every 15-30 years, similar to historic disturbance intervals, and the objective would be to develop stand structures that approximate those created under frequent disturbance. A variety of management options could be used ranging from a combination of prescribed fire and thinning, or just prescribed fire only. The options chosen would be based on meeting target stand objectives. In the long-term, these variable treatment cycles would capture the natural variability of the disturbance cycles in these dry forest types. Most importantly, these treatments, after 90 years of fire

suppression, would trend these stands in a direction that would provide future managers with a much broader array of management options.

The treatment stands that include dry forest old growth under Alternative 3 would meet the criteria for dry forest old growth based on Green et al (1992 – corrected 02/2005) and conditions would be maintained not only meet the recommended criteria, but more closely resemble historical dry forest old growth structure.

4.1-F.2 Old Growth Standards

A detailed old growth review was conducted to validate the amount of old growth in the TSMRS database for the Northern Prairie project area. This included a review of all allocated old growth stands (codes 9 and 11), all stands coded as recruitment (code 8), and any stand with a size class origin year of 1880 or earlier. Each stand that was reviewed was measured against Green and others (errata corrected- 2005) standards and given the appropriate TSMRS code. The date of the latest exam was noted and any significant disturbances (i.e., timber harvest, wildlfire, insects, and disease) that could have changed the character of the stands were noted. All of the stands included in the old growth allocation have been field examined. This detailed old growth review is included in the Northern Prairie project file (project file – VEG028).

Standard 10(a) – This standard incorporates the definitions of old growth developed by the Regional Old Growth Task Force, documented in Green et al (1992 - errata corrected 02/2005), "Old Growth Forest Types of the Northern Region. USDA, Forest Service, Northern Region." The allocated old growth within the Northern Prairie EA project area meets the old growth definitions included in Green et al. The Northern Prairie EA complies with Forest Plan standard 10 (a).

Standard 10(b) – This standard calls for maintaining "at least 10% of the forested portion of the Idaho Panhandle National Forests as old growth". The forest plan identified 2,310,000 forested-acres on the Idaho Panhandle National Forests. Therefore, the forest plan standard requires maintaining 231,000 acres of old growth on the forest. Based on FIA monitoring data (project file – VEG031) and IPNF stand level inventory (project file – VEG021) the IPNF is maintaining approximately 12% allocated old growth on its forested acres. As part of the Forest Plan strategy, 65,853 acres (16.7%) on Bonners Ferry Ranger District are allocated for old growth management (USDA 2005). The Northern Prairie EA complies with Forest Plan standard 10 (b).

Standard 10 (c) – For distribution purposes, the Forest Plan directs Districts to select and maintain at least 5% of the forested portion of those old-growth units that *have* 5% or more 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 (OGMU) must be maintained as old growth. The Northern Prairie assessment area intersects OGMU 23, which includes approximately 16,820 acres and 1,387 acres (8%) of allocated old growth. The Northern Prairie EA complies with Forest Plan standard 10 (c).

Standard 10 (d) – Existing old growth stands may be harvested when there is more than 5% old growth in an old-growth management unit, and the Forest total is more than 10%. The proposed action includes entry into allocated dry-forest old growth. Silvicultural prescriptions would be

designed to retain the old growth ponderosa pine, western larch, and Douglas-fir, in the treated stands. Additionally, trees from smaller size classes would be retained to provide additional structural diversity and replacement old growth for the future. In the long-term, these conditions would be more sustainable. The proposed action would result in no net loss of allocated old growth. The Northern Prairie EA complies with Forest Plan standard 10 (d). Even if the 332 acres of allocated old growth that is proposed for treatment were to be excluded from the old growth calculation, the amount of old growth within the OGMU would be 6.2%, which still exceeds the 5% requirement.

Standard 10(e) – At the Forest level, old-growth stands should reflect approximately the same habitat type series distribution as found on the IPNF. As discussed in the 2004 IPNF Forest Plan Monitoring report (p.72), old growth on the IPNF does reflect approximately the habitat type series distribution of the forest. The OGMUs within the assessment area are dominated by Douglas-fir (59%) types, with lesser amounts of subalpine fir (18%), western hemlock (11%), and western red cedar (11%) old growth. The amount of old growth in each forest type is directly related to past disturbance patterns. The Northern Prairie EA complies with Forest Plan standard 10 (e).

Standard 10 (f) – The Forest Plan also has standards for size of old growth stands (Forest Plan II-29). Preference is to have at least one stand per OGMU over 300 acres and stands should be at least 25 acres. Preference should be given to a contiguous stand; however, the stand may be subdivided into stands of 100 acres or larger if the stands are within one mile. This old growth review showed that there is one contiguous old growth patch larger than 300 acres in OGMU 23 and five additional patches larger than 100 acres (Figure 4-8). In OGMU 23, stands less than 25 acres in size account for about 6% (81 acres) of the total old growth. Consequently, even if these acres were not considered as part of the allocation, OGMU 23 would still meet old growth standard 10(c), which calls for maintenance of 5% old growth in each OGMU, if available. The Northern Prairie EA complies with Forest Plan standard 10 (f).

Standard 10 (g) – This standard states that roads should be planned to avoid old-growth management stands to maintain unit size. No roads will be built through old growth under either action alternative. The Northern Prairie EA complies with Forest Plan standard 10 (g).

Standard 10 (h) –Existing grazing allotments will be honored, however, a long-term objective should be to minimize or exclude domestic grazing within old-growth stands. New allotments in old-growth stands will not be allowed. There are no grazing allotments in the Northern Prairie HFRA project area, and consequently, no allotments in old growth. Furthermore, no new allotments are planned for the area. The Northern Prairie EA complies with Forest Plan standard 10 (h).

Standard 10 (i) –Goals for lands to be managed as old growth within those lands suitable for timber production are identified in the management area prescriptions. The 2004 IPNF Forest Plan Monitoring report (p.71) both those goals by management area, and what we have currently allocated for old growth. Only the four management areas have specific Forest Plan old growth goals. Current old growth allocations meet and far exceed these Forest Plan goals.

4.1-F.1 Reforestation

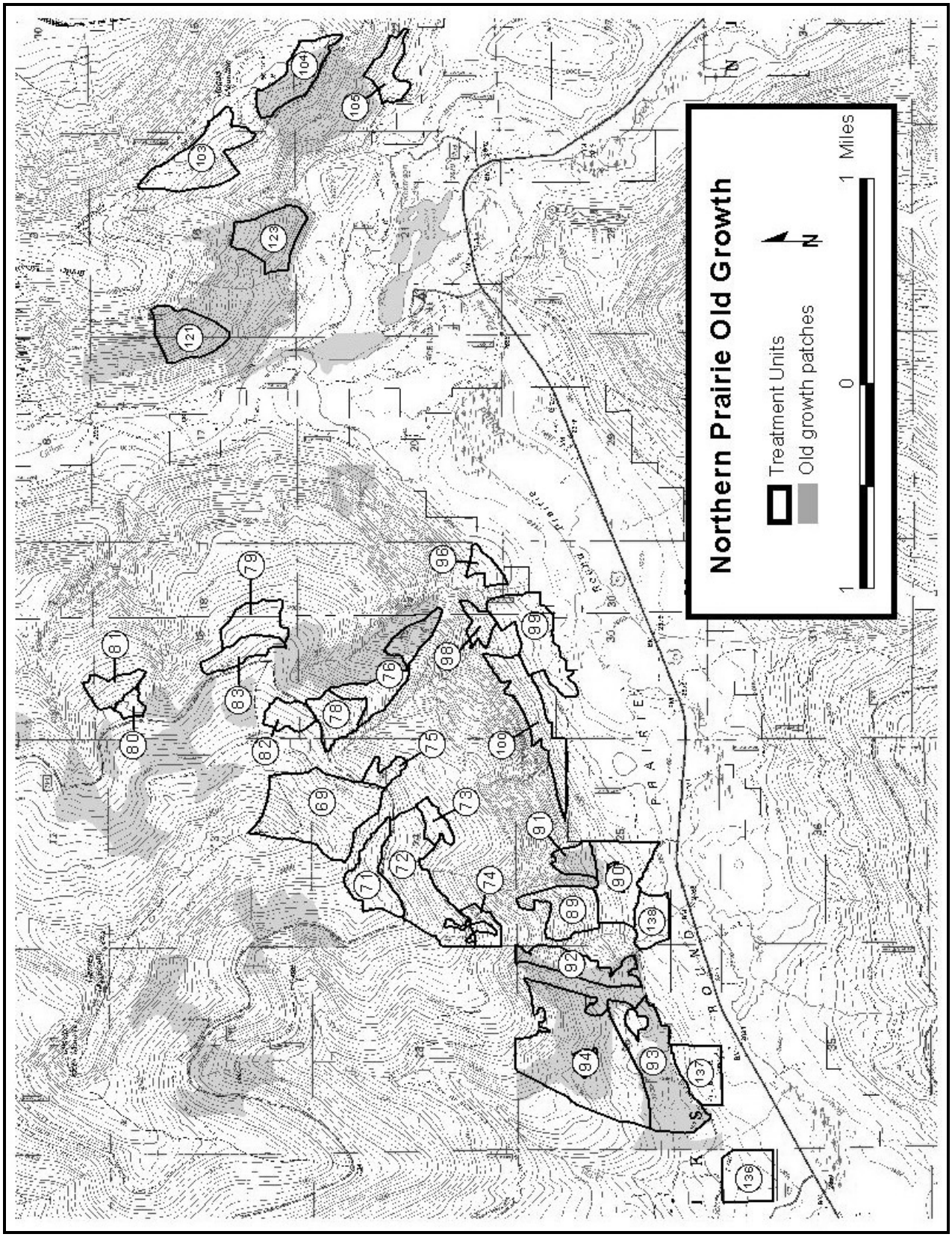
(a) Alternative 2

Regeneration harvests are proposed for stands under this alternative. Site preparation and fuels reduction activities are planned to provide appropriate sites for planting. Following site preparation, usually underburning, regeneration would occur through artificial (planting) and natural methods. 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. The best quality ponderosa pine, western larch, and white pine would be retained for a natural seed source. This is consistent with Forest Plan direction that "reforestation would 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).

(b) Alternative 3

Under this alternative forested openings would be created through the use of prescribed fire only. 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. Some of the best quality ponderosa pine, western larch, and white pine natural seed sources would be lost in prescribed burning, but enough would survive to provide some natural seed. This alternative is consistent with Forest Plan direction that "reforestation would feature seral tree species."

Figure 4-8. – Northern Prairie Old Growth and Treatment Areas



4.2 Wildlife

This section displays and discusses the effects on those wildlife species identified in the preceding section that may be affected by the proposed actions and the No Action Alternative. Effects discussions include direct, indirect and cumulative effects, all of which may have positive or negative consequences. Information presented in this section is based on scientific literature, wildlife databases, professional judgment, recent field surveys, and habitat evaluations.

4.2-A Cumulative Effects Analysis

Past actions and other disturbances have laid the foundation for today's forest vegetation and are depicted or accounted for in the baseline condition descriptions. This is especially true for habitat suitability analyses, which characterizes the changes in vegetation (succession) from past disturbances.

Cumulative effects discussions for alternatives include these past actions in combination with other relevant present, ongoing, and reasonably foreseeable actions, regardless of the source (past, present and reasonably foreseeable actions are described in Chapter 1). The appropriate scale or geographic bounds for cumulative effects analysis relates to an area that would be affected by the proposed action or reasonable alternative. This area is referred to as the cumulative effects analysis area and may vary between resources (see Table 4-2). Determining this area for wildlife depends upon a species' relative home range size in relation to its available habitat, topographic features that influence how species move and utilize their home range (e.g. watershed boundaries), and boundaries that represent the point of diminishing potential effects.

Table 4-2. Project Impact Zones

Species Analyzed	Cumulative Effects Area
Canada lynx	Lynx Analysis Unit (Round Prairie LAU)
Gray wolf	USFS-managed lands between US Hwy 95 and State Hwy 1
Grizzly bear	USFS-managed lands between US Hwy 95 and State Hwy 1
Black-backed woodpecker	USFS-managed lands north of Hwy 95 within Round Prairie watershed
Flammulated owl	USFS-managed lands north of Hwy 95 within Round Prairie watershed
Fisher	USFS-managed lands between US Hwy 95 and State Hwy 1
Western toad	USFS-managed lands north of Hwy 95 within Round Prairie watershed
Northern goshawk	USFS-managed lands north of Hwy 95 within Round Prairie watershed
Pileated woodpecker	USFS-managed lands north of Hwy 95 within Round Prairie watershed
Forest Land Birds	USFS-managed lands north of Hwy 95 within Round Prairie watershed

Lynx Analysis Units (LAUs) were delineated following standards outlined within the Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000). LAUs were not intended to represent actual lynx home ranges, but their scale approximates the size of area used by an individual lynx. The size of LAUs would generally be from 16,000 to 25,000 acres in contiguous habitat, and likely be larger in less contiguous, poorer quality, or naturally fragmented habitat. While other (state and private) ownerships within LAU boundaries may provide some suitable lynx habitat, standards and guidelines of the Northern Rockies Lynx Management Direction (NRLMD) generally apply only to capable lynx habitat under Federal ownership within individual LAUs. USFWS has determined that the LAU is a suitable cumulative effects analysis area for lynx.

For other wide-ranging forest carnivores (gray wolf, grizzly bear and fisher), the cumulative effects analysis area is the portion of USFS-administered lands between US Highway 95 and Idaho State Highway 1. The total area is approximately 21,500 acres, about 18,200 acres of which are under USFS management. This area is appropriately sized for fisher analysis, but may be somewhat small for large carnivores (gray wolf and grizzly bear). However, the Hall/Mission/Harvey/Hogue mountains area is generally isolated from the remainder of the District by the Kootenai Valley (west), Moyie River (east), and Round Prairie (south). This island of forested mountains likely provides an area of at least seasonally concentrated use for one or both of these species. Both the Kootenai River valley and the portion of the Moyie River valley adjacent to the project area contain areas of high residential development that may inhibit wildlife movement. While the cumulative effects analysis area could be extended across the more sparsely developed Round Prairie into habitat to the south (Tungsten/Bethlehem mountains), this extension would only dilute project effects, since ongoing USFS activities in this area (including the Mission-Brush timber sales) are already incorporated into the environmental baseline.

For the remainder of the species analyzed, the cumulative effects analysis area is defined as the portion of the Round Prairie Creek drainage north of US Highway 95 under USFS management. This area totals approximately 7,700 acres, is large enough to accommodate at least single, and more often multiple, home ranges for even highly mobile species such as goshawks; and provides adequate habitat to sustain the complete life cycle of most non-migratory wildlife as well as breeding/nesting habitat for migrating songbirds. The project area is defined by Round Prairie to the south, the US/Canada international boundary to the north, and the extent of the Round Prairie Creek watershed to the east and west.

The Northern Prairie project area includes several thousand acres of private ownership in the Miller and Gillon creek drainages and in Round Prairie. Non-Federal ownerships within the project area are generally highly developed (homesites) or managed for the primary purpose of timber extraction. Since these timber stands are on relatively short rotations, they are usually precluded from reaching suitable habitat conditions for species that require mature forest structure. As a result, other ownerships are highly susceptible to adverse habitat modifications, and the presence of suitable habitat cannot be relied upon over time. Through aerial photograph interpretation, the District can determine how many acres are currently forested, and roughly estimate overstory canopy cover on these properties. However, determining habitat suitability for species analyzed using this incomplete information would be of limited value. Important structural habitat components such as tree diameter, number of canopy layers, and presence of snags and down woody material would not be discernable from aerial photos. The cost of obtaining this information through field reviews of these properties would be exorbitant and of little value, given their propensity toward irretrievable habitat alterations. Therefore, while adjacent private lands both outside of and within the IPNF Administrative Boundary may provide suitable habitat for species analyzed, we lack data to adequately assess these areas, and assume that they are providing no habitat for these species.

4.2-B Analysis Indicators for Selected Species

Table 4-3 displays the indicators that will be used to measure effects on wildlife species. Indicators for each species vary and are based on those factors that could result in a measurable adverse or

beneficial effect. For most species being analyzed, appropriate habitat parameters were measured to distinguish suitable habitat (specific parameters for individual species are located in the project file). A discussion of the changes in suitable habitat for each relevant species and the effects on species are disclosed in the following discussions.

Table 4-3 Issue Indicators by Species/Habitat

Species	Principle Issue Indicators
Canada lynx	Amount of lynx habitat in a LAU currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, amount of lynx habitat regenerated in the previous 10-year period, and impacts to multi-storied mature or late-successional forests
Gray wolf	Changes in prey densities or human access
Grizzly bear	Changes in linear road densities
Black-backed woodpecker	Changes in quality of post-fire and insect-infested forest habitat
Flammulated owl	Changes to large snag habitat and trend toward suitable habitat conditions
Fisher	Changes to suitable denning habitat, changes to mature forest habitat
Western toad	Impacts to breeding habitat
Northern goshawk	Trends in suitable nesting habitat, structural changes in post-fledging family area (PFA)
Pileated woodpecker	Changes to large snag habitat and old growth habitat
Forest Land Birds	Impacts to priority habitats

4.2-B.1 Threatened and Endangered Species

(a) Canada Lynx

Methodology

Lynx habitat was evaluated using a habitat suitability model derived from data in the Forest timber stand database (TSMRS), with corrections from field sampling and aerial photo interpretation. The habitat components identified by the model were based upon recommendations from an interagency review of published lynx literature (Ruggiero et al. 2000). The model breaks down lynx habitat into four major components, although standards in the Northern Rockies Lynx Management Direction (NRLMD) (USDA 2007a) only specifically address the stand initiation structural stage that does not yet provide winter snowshoe hare habitat (formerly called “unsuitable”) and multi-storied mature or late-successional forests (loosely grouped as “late successional forage”). While surrounding private lands may make contributions to lynx habitat, most NRLMD standards only apply to the Federal land base within LAUs.

The Round Prairie LAU contains 14,452 acres of lynx habitat within 604 delineated stands, approximately 2,303 acres (77 stands) of which are within the Northern Prairie project area. USFS personnel field verified 93 stands in the LAU, totaling approximately 2,325 acres. Approximately

1,573 acres (46 stands) were verified in the project area. The potential effects on Canada lynx and its habitat were determined by predicting the changes in acres in the stand initiation structural stage and multi-storied mature forest that would result from the proposed action.

Alternative 1

In the absence of mechanical treatments, habitat conditions would continue to change in this LAU. There would be a continued shift toward more shade tolerant species, and small stem density and understory congestion would continue to build up in most stands. Insects, disease and competition for sunlight and nutrients would hasten tree mortality and trigger increases in down woody material. More lynx denning habitat would be produced, and existing denning habitat would be enhanced. Mature, multi-storied stands would likely improve, while some winter snowshoe hare habitat will move out of the stand initiation stage and lose its value as preferred hare habitat.

The scenario described above assumes that there would be no stand-replacing fire in this area. Given the history of active fire suppression, existing high fuel loads in many stands, and increased fuel concentration that lack of management action would provide, it is reasonable to assume that the area will be affected by wildfire at some point in the future. The magnitude of this fire would depend upon area accessibility, available suppression resources, weather and other environmental factors. A mixed-severity fire would not likely alter large portions of available habitat, but a large stand-replacing fire would convert denning stands to a stand initiation phase, which would take 20-30 years to mature to the point where they would support high densities of snowshoe hares.

Alternative 2

Direct and Indirect Effects

The Northern Prairie project proposes approximately 139 acres of timber harvest in lynx habitat in the Round Prairie LAU, plus an additional 114-acre underburn where no timber harvest will take place. Of the harvested acres, approximately 99 acres are a regeneration (shelterwood) prescription, and roughly 40 acres would be treated by free selection. Treatment areas generally currently contain high densities of small lodgepole pine individuals that have effectively prevented shrubs and other hare forage species from growing in these sites.

The regeneration of about 100 acres of lynx habitat from the proposed activity, in addition to the 695 acres (4.8%) of lynx habitat in the Round Prairie LAU that are currently in the stand initiation structural stage not yet providing winter snowshoe hare habitat, would result in a total of 5.5% of lynx habitat being in this stage. Only 200 acres of lynx habitat (1.4% of lynx habitat on NFS lands) have been regenerated within the last 15 years, resulting in 2.1% that will have been converted in a 15-year period. No multi-story mature stands will be treated, and no pre-commercial thinning is proposed for this project. There are currently over 700 acres (23%) of potential denning habitat in the Northern Prairie portion of the Round Prairie LAU. Less than 15 acres of potential denning will be impacted by project activities.

Approximately 865 acres are proposed for underburning, including the 114-acre underburn. Portions of these units will be bordered with fireline dug by hand crews (approximately 18” wide), but

firelines are expected to support vegetation within five years of burning. No permanent firebreaks will be constructed. Reconstructed (reopened) roads will be unavailable for general public use during implementation, and will be decommissioned following project activities. The USFS does not expect the maintenance of designated haul routes to significantly increase traffic speeds or volumes. Most of the roads to be reconditioned are open routes that currently receive vehicular traffic throughout the snow-free season. Currently restricted roads will continue to be managed under the same restriction dates.

The Northern Prairie project is in an identified linkage area that may provide connectivity between the Purcell and Selkirk mountain ranges, as well as to Canadian populations of lynx to the north. On USFS-administered properties, free selection harvest prescriptions, as well as retention of riparian ("INFS") buffers, would provide nearly contiguous overstory cover through even heavily harvested areas. Regenerated areas can provide hiding cover for medium-sized animals as soon as 5-10 years post-harvest. Given the current rate of timber harvest on USFS lands in the Northern Region (in 2006, 6,876 ha of 9,045,255 ha or 0.08% of the forested landscape) (http://www.fs.fed.us/r1/forest_range/timber_reports/timbersales.shtml), it is unlikely the timber harvest activities on National Forest lands will substantially impede movement of wide-ranging carnivores in the foreseeable future.

A complete list of NRLMD Standards and Guidelines and demonstrated project compliance can be found below ("Consistency with Forest Plan" section).

Alternative 3

Direct and Indirect Effects

Alternative 3 would treat the same areas as Alternative 2, but less than 80 acres would be shelterwood harvested. As a result, only 5.4% of lynx habitat in the Round Prairie LAU would be in the stand initiation structural stage not yet providing winter snowshoe hare habitat, only 1.9% of which will been converted in the previous 15-year period.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for Canada lynx:

Past Activities and Events – Approximately 2,000 acres of lynx habitat in the Round Prairie LAU have experienced some level of timber harvest since 1980. However, only about 430 acres of this is in the vicinity of the Northern Prairie project, and approximately 120 of these acres were regeneration harvested. As discussed above, the relative lack of recent major disturbance (wildfire or timber harvest) in the area has resulted in only 4.8% of lynx habitat in the Round Prairie LAU currently in the stand initiation structural stage not yet providing winter snowshoe hare habitat. The road construction associated with older timber sales may have resulted in negative impacts to lynx through increased access for trappers. However, motorized use of these roads during summer had a relatively minor impact, since lynx are not normally displaced by human presence. All past

activities and events would not have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Personal use firewood gathering, non-motorized recreation, and standard road maintenance would not significantly impact Canada lynx as these activities would result in inconsequential changes to forest structure, and lynx are not particularly vulnerable to human disturbance. Continued fire suppression would keep denning habitat intact, but also has the potential prevent habitat from reaching an early successional structural stage since fewer acres would be allowed to burn. As a result, continued fire suppression would offset the impacts of this proposal to some degree. Off-road motorized recreation would have minor impacts to lynx during the summer months, since low population densities of lynx and the preference of these recreationists for more open areas make it unlikely ORV use would occur in the same general vicinity as lynx at the same time. The effects of oversnow motorized use on lynx is unclear, but the lack of groomed routes and play areas limits snowmobile use within lynx habitat in the project area.

Other Restoration Projects – Silvicultural treatments of regenerating stands, including white pine pruning, weed and release, and shrub control projects, may only be implemented under the restrictions set forth during informal consultation between USFS and USFWS regarding ongoing activities and existing projects within lynx habitat on the IPNF. These treatments are designed so they would have inconsiderable effects on snowshoe hare habitat (cover/forage would be reduced on small percentages of treated areas), so there would be no significant cumulative effects when considered collectively with the proposed action. Similarly, noxious weed treatments would take place along roads and other disturbed areas, and would cause inconsiderable changes in vegetative structure with respect to snowshoe hare habitat because these areas offer very little shrub or tree cover. Future underburning is unlikely to impact Canada lynx since this would take place in low elevation dry forest stands that do not supply lynx habitat. Juvenile tree thinning may only take place under specific circumstances outlined in the NRLMD (USDA 2007a), and would be limited to 6% of lynx habitat in the planning area (IPNF) and subject to formal consultation with USFWS.

Currently active USFS timber sales – Timber sales authorized under the Mission Brush EIS would regenerate an additional 343 acres of lynx habitat, resulting in a total of 7.9% of lynx habitat in the Round Prairie LAU being in the stand initiation stage if Northern Prairie Alternative 2 is adopted. Collectively, the two projects will have converted 4.4% of lynx habitat in the Round Prairie LAU to the stand initiation structural stage in the previous 15-year period.

Activities on other ownerships – Timber harvest or other activities on non-Federal ownerships may provide a source of disturbance or adversely modify habitat that lynx are currently utilizing to some degree. However, NRLMD standards generally apply only to the Federal land capable of providing lynx habitat within a LAU. Since non-Federal ownerships are assumed not to provide lynx habitat, activities on these ownerships would not affect reported percentages of lynx habitat components. As a result, there would be no cumulative effects on Canada lynx as a result of activities on other (non-USFS) ownerships in the project area.

<u>Conclusion</u>

Activities covered by this document would be consistent with all standards and guidelines in the NRLMD. The proposed action would not result in greater than 30% of lynx habitat in the Round Prairie LAU being in the stand initiation structural stage not yet providing winter snowshoe hare habitat, and not more than 15% of lynx habitat in the LAU would have been regenerated within a ten-year period. There will be no impacts to multi-story mature stands as a result of this proposal, and no pre-commercial thinning is proposed. Denning habitat will continue to be abundant and well distributed throughout the LAU. While there would be a small amount of regeneration harvest within an identified linkage area, retention of intact riparian areas, unharvested areas between units, and residual tree cover in harvested units should serve to maintain connectivity through USFS lands in the project area. For these reasons, the action alternatives are unlikely to result in adverse impacts to lynx or their habitat.

Consistency with Forest Plan and Other Regulations

Standards and Guidelines in the Northern Rockies Lynx Management Direction (USDA 2007a) have been amended to the IPNF Forest Plan. All action alternatives are consistent with this document, and therefore meet Forest Plan direction to "contribute to the conservation and recovery of the listed species on the Forest" (USDA Forest Service 1987 p. II-6).

Relevant Standards and Guidelines from the Northern Rockies Lynx Management Direction are addressed as follows:

Standard ALL S1: New or expanded permanent development and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.

- The Northern Prairie project will occur in an identified linkage area that may provide connectivity between the Purcell and Selkirk mountain ranges, as well as to Canadian populations of lynx to the north. On USFS-administered properties, frees selection harvest prescriptions, as well as retention of riparian ("INFISH") buffers, provide nearly contiguous overstory cover through even heavily harvested areas. Regenerated areas can provide hiding cover for medium-sized animals as soon as 5-10 years post-harvest. Given the current rate of timber harvest on USFS lands in the Northern Region (in 2006, 6,876 ha of 9,045,255 ha or 0.08% of the forested landscape) and IPNF (1,397 ha of 999,733 forested ha or 0.14%), it is unlikely the timber harvest activities on National Forest lands will substantially impede movement of wide-ranging carnivores in the foreseeable future.

Standard VEG S1: Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance in each LAU as follows: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.

- Currently, 695 acres (4.8%) of lynx habitat in the Round Prairie LAU is in the stand initiation stage, plus an additional 343 acres (2.4%) of regeneration from the Mission Brush project. Proposed activities will result in an additional 100 regenerated acres (a total of 7.9% of lynx habitat in the stand initiation stage).

Standard VEG S2: Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period.

- Within the Round Prairie LAU, only 200 acres of lynx habitat (1.4% of habitat on NFS lands) have been regenerated within the last 15 years, in addition to the 343 acres of planned regeneration harvest in Mission Brush. The proposed action will treat an additional 100 acres, resulting in 4.4% having been converted in the previous 15-year period.

Standard VEG S5: Precommercial thinning projects that reduce snowshoe hare habitat may occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat only under certain specified circumstances.

- No precommercial (juvenile tree) thinning is proposed for this project.

Standard VEG S6: Vegetation management projects that reduce snowshoe hare habitat in multi-story mature or late successional forests may occur only under certain specified circumstances.

- No multi-story mature stands will be treated by this proposal.

Guideline VEG G1: Vegetation management projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.

- Treatment areas within the Round Prairie LAU will only impact 264 acres of lynx habitat (spruce/fir stands), and generally currently contain high densities of small lodgepole pine individuals that have effectively prevented shrubs and other hare forage species from growing in these sites.

Guideline VEG G4: Prescribed fire activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.

- Approximately 865 acres are proposed for underburning, including a 114-acre underburn (no timber harvest). Portions of these units will be bordered with fireline dug by hand crews (approximately 18" wide), but firelines are expected to support vegetation within 5 years of burning. There will be no permanent firebreaks constructed for this project.

Guideline VEG G5: Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.

- The Round Prairie LAU will contain in excess of 20,000 acres of mature forest after implementation, providing substantial habitat for alternate prey species such as red squirrels.

Guideline VEG G11: Denning habitat should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees ("jack-strawed" piles). If denning habitat appears to be lacking in the LAU, then projects should be designed to retain some coarse woody debris, piles, or residual trees to provide denning habitat in the future.

- There are currently over 700 acres (23%) of potential denning habitat in the Northern Prairie portion of the Round Prairie LAU. Less than 15 acres of potential denning will be impacted by project activities.

Guideline HU G6: Methods to avoid or reduce effects on lynx should be used in lynx habitat when upgrading unpaved roads to maintenance levels 4 or 5, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.

- The USFS does not expect the "roadside and surface maintenance, etc." of designated haul routes to significantly increase traffic speeds or volumes. Most of the roads to be reconditioned are open routes that currently receive vehicular traffic throughout the snow-free season. Currently restricted roads will continue to be managed under the same restriction dates.

Guideline HU G7: New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.

- No permanent roads are being constructed for this project.

Guideline HU G8: Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.

- Brush cutting is limited to the travelway, cut slope up to 8' horizontal distance from road's edge, and fill slope up to 4' horizontal distance from road's edge. No more vegetation would be removed than necessary.

Guideline HU G9: On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.

- Reconstructed (reopened) roads will be unavailable for general public use during implementation and will be decommissioned following project activities.

Northern Prairie is not a fuel treatment project within the wildland urban interface (WUI) as defined by HFRA, so Guideline VEG G10 and exceptions to Standards VEG S1, S2, S5 and S6 related to fuels treatments are not applicable. Since the project does not involve grazing management, guidelines pertaining to this issue (Guidelines GRAZ G1-G4) are not addressed. In addition, the project will not involve expansion of snow-compacting activities (winter logging is exempt from

these standards and guidelines), ski areas or other recreation, mineral exploration and development, or permanent road construction. Therefore, Guidelines HU G1-G5 and G10-G12 are not discussed.

(b) Gray Wolf

Methodology

The analysis of effects on gray wolf focuses on changes to the available prey base and increases in human access, particularly in the vicinity of den or rendezvous sites.

Alternative 1

The No Action alternative would not have immediate impacts on gray wolf, as there would be no changes to human access or prey densities. In the absence of disturbance, forested stands would continue to become more congested with smaller diameter trees. Hiding cover would increase, but wolf populations would ultimately suffer from lowered densities of prey animals that these conditions would support. However, this alternative would increase the probability of a large, stand-replacing wildfire, which after the initial disturbance, would increase forage quality and quantity for wolf prey animals.

Alternative 2

Direct and Indirect Effects

The proposed timber harvest would take place on predominantly south-facing slopes north of Round Prairie Creek. While big game distribution may shift around in response to logging and other project activities, these animals will generally re-colonize treated areas relatively quickly once activities cease. The long-term effect of timber harvest and prescribed burning would be an increase in quality and quantity of big game forage in treated areas. There would be a loss of hiding cover, particularly in shelterwood-harvested areas. However, assuming the areas harvested using the free selection prescription would still offer some degree of cover, almost 70% of USFS-administered lands in this portion of the project area would continue to provide hiding cover after harvest. As a result, this project would likely create a net benefit to big game species, and consequently to wolves. Winter use of the area would not be substantially increased, so this feature of the proposed action is unlikely to affect prey populations. Since this proposal would not increase motorized access to previously inaccessible areas, there would be no increased mortality risk.

Timber harvest and associated fuels treatments may represent a persistent source of disturbance to gray wolves and their prey, but this impact would be likely be confined to a few years in any given area, after which use would resume. Approximately 431 acres of timber harvest would be by helicopter, on dry, south-facing slopes below Harvey and Hogue mountains. There is a possibility that these areas could accommodate den and/or rendezvous sites. Helicopter use has a higher potential to affect wolves from a greater distance than other harvest activities, since it is audible from farther away.

Currently, it is unclear to what extent a wolf pack is using the Northern Prairie project area. As additional information becomes available, the appropriate conservation requirements will be applied. There is a possibility that a resident pack could be disturbed at den or rendezvous sites by project activities, as these areas have not yet been identified for this suspected pack. However, since the project area is within an area of recurring grizzly bear use, sale activity is currently restricted from April 1-June14 – eliminating the risk of disturbance at den sites during the time period when wolf pups would be most vulnerable.

Alternative 3

Direct and Indirect Effects

Since the same areas would be harvested, effects of Alternative 3 are similar to those of Alternative 2. Because there would be more free selection harvest and less shelterwood harvest, this alternative would result in less of an increase in forage quality and quantity (resulting stands would be less open, so forage plants would receive less sunlight and have less growing space), but would retain more hiding cover. Also, the duration of disturbance emanating from timber harvest would be shorter since less timber volume would be removed.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for gray wolf:

Past Activities and Events – Road building associated with past timber harvest may have led to indirect wolf mortality by increasing human access, as well as reduction of potential wolf prey items by increasing deer/elk vulnerability to hunters and poachers. However, timber harvest (particularly regeneration harvest) generally would have improved forage quality and quantity for prey species, especially white-tailed deer, and resulted in long term increases in prey availability.

Current Management Activities – Personal use firewood gathering, non-motorized recreation, winter motorized recreation and standard road maintenance would not significantly impact gray wolves since these activities are not expected to increase mortality risk. Continued fire suppression would help retain forest cover, further contributing to reduction of foraging habitat for prey species (ungulates). Off-road motorized recreation could have impacts to wolves, particularly in the vicinity of den sites during the denning season. However, wolves prefer to den in rocky, secluded areas that would not be easily accessible by motorized vehicle.

Other Restoration Projects –Thinning young, small diameter trees would be designed to increase the overall health and vigor of the stands. This activity would originate from existing roads, so while it may cause a minor disturbance to wolves during implementation, there would be no long-term effects. Similarly, noxious weed treatments and underburning would take place along roads and other disturbed areas, and would have a minor disturbance effect on gray wolves. Future underburning would probably be beneficial to gray wolves, as it would enhance ungulate forage value in low elevation dry forest stands that serve as traditional big game winter range.

Currently active USFS timber sales – Similar to this proposal, timber sales authorized under the Mission Brush EIS are likely to increase prey densities and decrease mortality risk (minor reductions in motorized human access). Potential disturbance as a result of project activities should be minimized through grizzly bear timing restrictions in units north of Highway 95. Additionally, any wolf den or rendezvous sites identified in the analysis area will be buffered from project activities by one mile from April 1-July 1 for den sites and from July 1-August 15 for rendezvous sites.

Activities on other ownerships – Forest Capitol Partners, LTD (FCP) manages nearly four square miles of forestland in the Hall Mountain/Mission Creek area. These lands are managed for wood fiber production, and subsequently contain relatively few acres of mature, dense forest. Since this pattern is expected to continue in the future, FCP lands will provide ample big game forage but relatively little hiding cover in the project area. Other private lands in Round Prairie and the Gillon Creek drainage will continue to experience development, logging and small-scale livestock production. These activities may somewhat constrain the amount of habitat available to a resident wolf pack, on both a temporary (logging) and permanent (home building) basis. Livestock production may pose a special risk of conflict with this wolf pack. It is unknown at this time whether the calf adjacent to the Mission Brush project area was actually killed by these animals or merely opportunistically fed upon by them. Either way, the presence of livestock could indirectly result in wolf mortality in the future. The Idaho Department of Transportation will soon improve the segment of Highway 95 that traverses Round Prairie. This highway experiences a relatively large volume of high-speed traffic through much of the day, so currently may pose a barrier to travel or result in direct wolf mortality in the future. It is unlikely that the scheduled highway improvement will considerably increase this risk.

Conclusion

The most important criteria for wolf management are maintenance of an abundant prey base and minimizing the risk of illegal mortality. It is unlikely that the Northern Prairie project will increase the vulnerability of wolves or influence their ability to use these areas. Prey availability is expected to increase, and mortality risk would not change as a result of this action. According to USFWS, successful wolf recovery in the northern Rocky Mountains does not depend on land-use restrictions, with the possible exception of temporary restrictions around active den sites on federally managed lands, due to the ability of gray wolves to thrive under a variety of land uses (USDI 2003). Any gray wolf den or rendezvous sites identified in or adjacent to proposed activity areas will be spatially and temporally buffered as appropriate, or both. No project activities would be allowed within one (1) mile of occupied sites from April 1-July 1 for den sites and from July 1-August 15 for rendezvous sites. For these reasons, the action alternatives are unlikely to result in adverse impacts to gray wolves or their habitat.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction to manage the habitat of species listed under the Endangered Species Act (USDA Forest Service 1987 p. II-6).

(c) Grizzly Bear

Methodology

The analysis of effects on grizzly bears focuses changes in linear road densities within the area of recurring grizzly bear use. Roads closed by earthen barriers or roads that are physically impassable to motorized vehicles do not figure into road density calculations. Since the IPNF does not have a vegetation-based grizzly bear habitat suitability model, possible changes to vegetation will be addressed qualitatively.

Alternative 1

If no action were taken, there would be fewer disturbances in grizzly bear habitat since there would be no need for helicopter use or other off-road mechanized activities. However, these activities represent a relatively short-term point-source disturbance and low risk of grizzly mortality. Artificial openings that are presently providing forage will close in as forest succession advances. In the absence of fire, grizzly bear habitat would probably decline in this area. Conversely, a large stand-replacing fire would create a temporary flush of high quality foraging habitat.

Effects Common to Action Alternatives

The effects of timber harvesting on grizzly bears can reasonably be categorized as short-term (during implementation) or long-term (post-implementation). Long-term habitat effects include changes in forest structure (reduction of cover and increased foraging habitat) and ongoing disturbance from newly constructed roads. Conversion of stands from cover areas to foraging areas probably improves habitat conditions for grizzly bears, since it is unlikely that forest cover is limiting in the project area. This proposal will not permanently increase motorized route miles, so disturbance effects are limited to the short-term impacts of timber harvesting and subsequent fuels treatment. The level of potential disturbance is influenced by a number of factors including: 1) the intensity and duration of activity, 2) the correlation of the activity with seasonal habitat preferences of bears, 3) the association of activity with quality habitat, and 4) additive impacts from other sources of disturbance.

The roadside/surface maintenance (road reconstruction or reconditioning) identified for designated haul routes generally involves minor improvements within the road prism (brushing, blading, culvert replacement, and gravelling), and will take place either on roads that are currently open to the public for at least a portion of the active bear season, or on roads that are currently impassable and will be decommissioned following project implementation. Since an ambient level of disturbance is presumed to originate from open roads, it is unlikely that improved surface conditions would result in additional displacement. Improvements to restricted roads will not result in long-term increases in traffic, as use of these roads during project implementation will be limited to the contractors and administrative purposes.

Alternative 2

Direct and Indirect Effects

The project proposes 1,218 acres of timber harvest outside of designated grizzly bear recovery zones, but within an area of recurring grizzly bear use. Most timber harvest (960 acres) will take

place on dry forest types that likely receive little grizzly bear use outside the spring season, while the remaining approximately 258 acres are on moist or cool/moist habitats. Approximately 431 acres will be yarded by helicopter (all on dry forest types), while the remaining acres are adjacent to roads and will be tractor or cable yarded.

With the exception of approximately ½ mile of drivable road (Road 2481F), the road segments proposed for decommissioning are currently not passable to passenger vehicles. As a result, the project would make an insignificant improvement to grizzly bear habitat regarding human access, although there would be obvious benefits to other resources (hydrology, etc.) from 11 miles of road decommissioning. Approximately ¾ mile of Road 2573F would be reopened and utilized as a timber haul route, but this road segment will be kept unavailable for general public use during implementation, and will be restored to an undrivable condition upon completion of post-harvest fuels treatments. As a result, there would be no permanent increase (and would be a small decrease) in linear total road density, and no increase in the linear miles of roads open for public use.

Fuels treatment will be a combination of grapple piling and broadcast burning. All grapple piling will take place in units that are within the influence zone of drivable roads. Broadcast burning will require some combination of hand lighting and aerial ignition, and may require up to two days of helicopter use during the spring following harvest.

Proposed dry-site treatments are on the steep, rocky south- or southwest-facing lower slopes of Harvey and Hogue mountains. These treatment areas are generally dominated by Douglas-fir and lodgepole pine, with smaller amounts of ponderosa pine and Western larch. These areas provide succulent forage early in the season and maintain populations of wintering ungulates. However, potential forage species dry out and lose palatability by early summer, even in shaded areas. Due to the relative unavailability of forage plants, grizzly bear use is likely uncommon outside the spring season. These features, in combination with the fact that treatment areas are geographically situated between wet meadow (spring) habitat in Round Prairie and higher elevation summer habitat, suggest that the greatest potential for disturbance to grizzly bears by project activities is likely to be during the spring. Helicopter logging is more intrusive on wildlife than ground-based harvest systems, but this activity would take place in areas of marginal grizzly bear forage value, during daylight hours, at times of year when bears are not expected to be present.

By contrast, proposed treatments higher up on Harvey Mountain would impact more mesic habitats containing spruce-fir stands with a component of lodgepole pine and occasionally Douglas-fir. These proposed units generally contain a dense canopy layer of small diameter (<8” dbh) trees that restrict movement and impede the amount of herbaceous vegetation that grows there. These stands may have value to grizzly bears as cover, but may be limited in their usefulness as forage areas.

Fuels treatment will be a combination of grapple piling and broadcast burning. All grapple piling will take place in units that are within the influence zone of drivable roads, and piling will take place in late summer or fall, with piles burned by hand crews in late fall or early winter. Broadcast burning will require some combination of hand lighting and aerial ignition, and may require up to two days of helicopter use during the spring following harvest.

Alternative 3

Direct and Indirect Effects

Differences in canopy retention between Alternatives 2 and 3 are not expected to have a significant effect on grizzly bear habitat. Changes in road access under Alternative 3 would be the same as under Alternative 2.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for grizzly bears:

Past Activities and Events – It is unknown to what extent past timber harvest impacted grizzly bears in the short term (during implementation), since it is likely that grizzly bears were at low densities in North Idaho at the time of Federal listing in 1975. The longer term effect of some of the more recent regeneration harvests, as well as the larger clearcut harvests done in the late 1970s and early 1980s, is the reduction of forest cover and increase of foraging habitat. The road construction associated with these harvests likely degraded grizzly habitat effectiveness. These activities would not have cumulatively significant impacts when added to the proposed action, since the measurable effects (increased road miles) are already incorporated into the environmental baseline.

Current Management Activities – Personal use firewood gathering, non-motorized recreation, winter motorized recreation and standard road maintenance would not significantly impact grizzly bears since none of these activities would elevate road densities. Continued fire suppression would help retain forest cover, further contributing to reduction of foraging habitat. Off-road motorized recreation can displace bears from preferred habitat, particularly recurrent use in a particular area.

Other Restoration Projects – Thinning young, small diameter trees would be designed to increase the overall health and vigor of the stands. This activity would originate from open roads, or would take place on seasonally restricted roads during times of year that these roads are open to the public. While juvenile tree thinning may cause a minor disturbance to grizzly bears during implementation, there would be no long-term negative effects once the source of disturbance is removed (thinning would result in inconsequential changes to future grizzly bear habitat). Similarly, noxious weed treatments and underburning would take place along roads and other disturbed areas, and would have a minor effect on grizzly bears since an existing source of disturbance is already present.

Currently active USFS timber sales – Timber sales authorized under the Mission Brush EIS would harvest timber on approximately 2,800 acres in the grizzly bear analysis area. About ½ mile of currently undrivable road would be reopened for timber hauling, and placed into long-term storage following project implementation. An additional 5.3 miles of drivable road would be decommissioned as part of this project. The net effect would be to lower linear total road densities in the analysis area to 1.6 mi/mi^2. Like the Northern Prairie project, roads reopened for project activities will be kept unavailable for general public use during implementation, and will be restored to an undrivable condition upon completion of post-harvest fuels treatments.

Activities on other ownerships – Forest Capital Partners owns almost four square miles of property in the Hall/Mission mountains area. These lands are already roaded, so any future activities would probably emanate from existing roads. As a result, road building on FCP lands is unlikely to significantly increase linear road densities in this area.

Conclusion

Road reconstruction would temporarily raise linear total road density an insignificant amount, and these roads will be unavailable for general public use during implementation and will be decommissioned following project activities. All harvest activities, including timber hauling on seasonally restricted roads, will take place outside the spring season. Up to two consecutive days of helicopter use (aerial ignition) may take place in the spring following harvest, but is unlikely to disturb bears since it is an ephemeral event at a time when grizzly bears are not expected to be in the immediate area (limited forage value of units and sporadic historical use as a travelway).

None of the action alternatives would require permanent road building, linear open road density would not change since restricted and reconstructed roads would be unavailable for general public use, and timber harvest would not be allowed during the grizzly bear spring season. As a result, the action alternatives are unlikely to cause adverse impacts to grizzly bears or their habitat.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction to manage the habitat of species listed under the Endangered Species Act (USDA Forest Service 1987 p. II-6). Alternatives are also consistent with the Terms and Conditions of the *Amended Biological Opinion for the Continued Implementation of the IPNF Land and Resource Management Plan* (USDI 2001).

4.2-B.2 Sensitive Species

(a) Black-backed Woodpecker

Methodology

As discussed in Chapter 3, black-backed woodpeckers will utilize a wide range of habitats if sufficient forage is available. This analysis focuses on post-fire areas or areas with bark beetle outbreaks because of their importance as foraging habitat. The analysis applies Samson's (2006) habitat threshold analysis, which concludes that 30,000 acres is the critical habitat estimate needed in the Northern Region to maintain a minimum viable population.

Evaluation of black-backed habitat is based on recommendations from the Northern Region overview (USDA 2007b). The analysis consists of determining if post fire or bark beetle infested areas are impacted by the proposal, ascertaining whether sufficient habitat exists in the planning area to support a minimum viable population based on Samson's estimate of approximately 30,000 acres, and documenting project effects on available habitat in the analysis area. For project analysis purposes, it was assumed that acres affected by timber harvest (including selective harvest) would no longer be considered black-backed woodpecker habitat, and the 114-acre ecosystem burn would convert to foraging habitat.

Alternative 1

Within the analysis area there are about 7,388 acres of USFS-administered lands capable of supporting forested habitats. While there are no recently burned habitats in the project area, pockets of insect infestations (particularly mountain bark beetle) can be found throughout the Bonners Ferry Ranger District. As discussed in the "Affected Environment" section, aerial surveys in 2005 mapped more than 36,500 acres of mountain pine beetle infested stands on the District, and an additional 20,200 acres of stands infested by Western balsam bark beetle (USDA 2005). Consequently, there is adequate beetle-infested habitat on the District alone to meet the 30,000-acre recommendation to maintain a minimum viable population in the Region (Samson 2006) or in the Province (USFS 2007b).

No immediate changes in snag habitat would occur as a result of implementing this alternative. Habitat conditions would change according to natural events over time. As a healthy forest matures, some trees die from competition and other natural forces, resulting in higher quality and quantity of snags. Consequently, nesting and foraging habitat would be improved for snag dependent species in healthy, low risk stands.

In the high risk stands, the prevalence of root disease and insect damage would be expected to spread in this alternative, resulting in higher levels of tree mortality. The dead trees would be replaced by other shade tolerant species, which would be re-infected and die, perpetuating the cycle. This change would slowly and methodically replace such species as ponderosa pine, white pine, and western larch, preventing many stands from reaching mature structures.

Tree mortality would continue to provide an abundance of nesting and foraging habitat for some species. Because black-backed woodpeckers are nearly restricted to post-fire habitat, their populations would remain at low endemic levels. However, high fuel accumulations resulting from elevated tree densities would lead to a higher risk of fires, increasing the chance of stand-replacing fires. If a stand-replacing fire were to occur, it would create a temporary flush of habitat for black-backed woodpeckers.

Alternative 2

Direct and Indirect Effects

The Black-backed Woodpecker Overview (USDA 2007b) does not define the level of bark beetle infestation necessary for areas to be considered "infested", and an argument could be made that practically every mixed conifer stand in the Northern Region has some level of bark beetle infestation. Given the amount of forested habitat on the District identified by Forest Health Protection personnel as infested by mountain pine beetle and Western balsam bark beetle, it is assumed that some beetle-invested stands (and related snag availability) would be impacted by the action alternatives. The proposed action would treat about 1,218 acres that could potentially be providing black-backed woodpecker habitat. In all likelihood, treatment will reduce small snag densities below what this species prefers, although untreated portions of the 155 acres of free selection units would remain as habitat. Tree mortality would continue in untreated stands, and

additional snags may be created by underburning treated stands, thus producing more snag habitat. In addition, the 114 acre ecosystem burn is likely to create black-backed woodpecker habitat. As discussed above, there is a surplus of beetle-infested habitat on the District to meet recommendations for a minimum viable population across the entire Ecological Province (USDA 2007b). The potential loss of 2% of black-backed woodpecker habitat on the District would not threaten the viability of a species that has nearly double the recommended amount of habitat for minimum viable populations in the Province concentrated in a relatively small area (Ranger District).

Years of active fire suppression have resulted in significant reduction of black-backed woodpecker habitat, causing populations of this species to remain at relatively low levels. While tree cutting would remove many small snags, and subsequent stand conditions would result in lower levels of small snag recruitment, much of the project area would remain unaffected by past and proposed cutting. Areas outside of proposed treatment areas would continue to be susceptible to insect and disease, thereby perpetuating small to medium sized snag habitat for black-backed woodpeckers. Forest Inventory and Analysis (FIA) data demonstrate that forested USFS lands on the Bonners Ferry/Kootenai Geographic Area contain an estimated 9.9 snags/acre (90% confidence interval) between 10" and 19.9" dbh (Bush and Lundberg 2006). In addition, annual aerial surveys of new insect-induced tree mortality across the Bonners Ferry Ranger District conducted by USFS Forest Health Protection personnel have shown that bark beetles infested an average of almost 4,000 acres per year from 1990-1998 across the District, and the level of new infestation increased to over 20,000 acres from 1999-2000 (S. Kegley, pers. com.). This higher rate of infestation and mortality is expected to continue for the next few years mainly due to increasing mountain pine beetle, western balsam bark beetle and fir engraver populations, especially if drier than normal weather conditions continue. Furthermore, mortality due to root diseases is not included in aerial survey data and has been steadily increasing. These data indicate that snag and down woody debris recruitment from insects and disease activity from 1990 through 1998 had been occurring at a steady rate of about two to five percent of the District per year and increased to around six to 22 percent of the District from 1999 to present. Based on the existing and predicted increase in snag levels over the project area, there should continue to be a quantity of snags less than 20" dbh that can be considered excess to meet the Northern Region Snag guideline recommended levels.

Alternative 3

Direct and Indirect Effects

This alternative would treat the same number of acres as Alternative 2, but most of the acres (1,140 acres) would be free selection prescriptions. Since the harvested portions of these units would target areas that are more likely to provide black-backed woodpecker habitat, the analysis assumes that these areas would no longer be effective habitat. However, it is likely that some habitat will remain in untreated portions of the units. Otherwise, the effects of this alternative would be similar to those of Alternative 2.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for black-backed woodpecker:

Past Activities and Events – Timber harvest on USFS lands in the project area would have reduced snag densities in logged stands in nearly every instance, particularly prior to implementation of the Forest Plan in 1987 when standards for snag retention were adopted. The long-term impact of these activities is the reduction of snags of all sizes. In subsequent years, snag retention and snag recruitment (leaving higher densities of green trees for future snags) in harvested areas has improved through implementation of Forest Plan standards and, more recently, adoption of the Northern Region Snag Protocol (USDA 2000). Recently, as discussed above, tree mortality in untreated stands has increased Forest-wide, increasing available black-backed woodpecker habitat as a consequence. As a result, the ultimate legacy of historic logging in the project area is limited to a decrease in *large*-diameter (>20" dbh) snags. Production of smaller snags in untreated areas, as well as in harvest units >30 years old, due to natural mortality of immature trees from insect and disease infestations has compensated for the loss of small-diameter snags due to timber harvest.

Current Management Activities – Firewood cutting is anticipated to continue along seasonal and yearlong open roads, and has the potential to reduce snags within 50 meters of open roads. This activity could impact as much as 850 acres (11% of forested habitat) in the IPNF portion of the analysis area. However, not all snags near drivable roads will be taken by woodcutters, particularly smaller-diameter snags often utilized by black-backed woodpeckers. Also, as discussed above, insect infestations are expected to continue to produce small-diameter snags at a far greater rate than they can be removed. There would be an insignificant reduction in miles of open roads as a result of the action alternatives that would not measurably reduce snag vulnerability to firewood gathering. Black-backed woodpeckers have been described primarily as a post-fire obligate species – a species dependent upon habitat that results from a mixed lethal or stand-replacement fire that produces an abundance of snags. Interrupting the periodic disturbances created by lethal wildfires through continued fire suppression retards the emergence of post-fire habitat, but this same activity has contributed to the current conditions that make these stands vulnerable to insect infestation (high densities of small-diameter, suppressed trees). Conversely, if a wildfire occurs in the project area that could not be suppressed, habitat may be enhanced. Various recreation activities and routine road maintenance are unlikely to have any impacts on black-backed woodpeckers, since these activities would not measurably affect habitat.

Other Restoration Projects – It is unlikely that noxious weed treatments would have any impacts on black-backed woodpeckers because this would not affect snag levels or other important habitat components. Thinning young, small diameter trees and future underburning would be designed to increase the overall health and vigor of the stands. Since these activities are designed to produce stands with lower densities of larger stems and to reduce tree mortality, they would by definition negatively impact black-backed woodpeckers, which prefer high densities of smaller diameter snags. However, these activities would occur almost exclusively on dry forest types, and are designed to produce stands more representative of historical conditions. Black-backed woodpecker habitat would continue to be produced on many moist forest habitats, as well as some untreated dry forests, in and adjacent to the project area.

Currently active USFS timber sales – Timber sales authorized under the Mission-Brush EIS are outside the analysis area for black-backed woodpeckers (Round Prairie watershed), and therefore would have no cumulative effects on this proposal.

Activities on other ownerships – The USFS is currently unaware of any planned activities on private (mainly FCP) lands within the analysis area. However, timber harvest and road building activities may take place on these and other private ownerships, as well as adjacent properties in Canada. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion

Although the action alternatives would reduce the quantity of available snag habitat, tree mortality would continue to persist in the analysis area, allowing black-backed woodpeckers to maintain populations at low endemic levels. As a result, black-backed woodpecker populations would remain at reduced densities and their current distribution would be sustained. Samson (2006) calculated that while the IPNF could potentially only support 18-31 pairs of nesting black-backed woodpeckers in recent post-fire habitats, the Forest could support nearly 1,000 pairs in insect infested habitats. Thus, even if the entire 1,218 acres reduced by the proposed action were insect-infested (they are not), they would only represent <1% of this habitat component Forest-wide. Since no recent post-fire habitat will be affected, medium-sized (10-20") snags are abundant on the District, and considerably less than 1% of the potential nesting habitat on the IPNF would be impacted, the proposed action is unlikely to result in a loss of viability of this species or trend it toward Federal listing.

Samson (2006) concluded that short-term viability of the black-backed woodpecker in the Northern Region and on the IPNF is not an issue because:

- No scientific evidence exists that the black-backed woodpecker is decreasing in numbers.
- Increases in the extent and connectivity of forested habitat have occurred since European settlement.
- Increases in amounts of small and mid-size trees have increased since European settlement.
- Well-distributed and abundant black-backed woodpecker habitat exists on today's landscape.

Level of timber harvest is insignificant in the Northern Region (in 2006, 6,876 ha of 9,045,255 ha or 0.08% of the forested landscape) and IPNF (1,397 ha of 999,733 forested ha or 0.14%). In addition, salvage harvest made up a very small portion of this in 2006, both regionally (1,106 ha of 9,045,255 ha or 0.01%) and on the IPNF (92 ha of 999,733 forested ha or <0.01%) (http://www.fs.fed.us/r1/forest_range/timber_reports/timbersales.shtml).

Consequently, the proposed action ***may impact* black-backed woodpeckers *or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species***.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction to manage the habitat of species listed in the Regional Sensitive Species List to prevent further declines in populations, which could lead to federal listing under the Endangered Species Act (USDA Forest Service 1987 p. II-28).

(b) Flammulated Owl

Methodology

As discussed in the "Affected Environment" section, old, open-grown, dry-site forests are considered the most critical and limiting habitat feature for flammulated owls. Flammulated owl habitat was evaluated by a habitat suitability index model (HSI) using data from the Forest timber stand database (TSMRS), and updated to reflect changes in condition identified by field exams or aerial photo interpretation. The model counts stands as capable habitat in habitat groups 1 through 3 (dry grand fir, all ponderosa pine and Douglas-fir); or habitat group 4 (moist grand fir) on south, southwest or west aspects where elevation is 3,000' or less. Suitable habitat includes those capable stands with a forest (cover) type of ponderosa pine or Douglas-fir; mature sawtimber or old-growth in size with at least one tree per acre 14" dbh or larger; canopy closure between 35% and 65% based on direct measurement or estimated from basal area; and less than ½ of the stand has had a regeneration harvest since the stand exam.

This query may overestimate flammulated owl habitat because the TSMRS database does not consistently contain data on snag distribution. This is an obligate snag-dependent species, which nests in snag cavities at least 15" dbh. While low elevation grand fir habitat types on dry aspects have the potential to grow flammulated owl habitat, through fire suppression they typically have too dense an understory to be suitable for this species. However, with active management, they could become suitable for flammulated owls. As a result, the model may also underestimate suitable habitat somewhat by eliminating stands from suitable habitat that have previously been harvested using group selection prescriptions. On two separate occasions, flammulated owls have been documented using stands harvested with this prescription (USDA 2006). Consequently, District personnel field verified a subset of flammulated owl capable habitat in the project area for model validation purposes.

The 3,326 acres identified by the habitat model as capable flammulated owl habitat in the Northern Prairie project area were contained within 92 stands. District personnel conducted site visits to determine suitability of 27 capable stands enclosing approximately 1,121 acres. An additional 11 stands (240 acres) were determined to be unsuitable through aerial photograph examination, and seven stands (481 acres) had stand exams conducted within the last five years, so the resulting data was considered reliable. Altogether, model results were verified in 1,842 of 3,326 (55%) capable habitat acres (45 of 92 discrete stands). Model verification resulted in 529 acres of suitable flammulated owl habitat: two stands identified by the model as "suitable" were determined to be unsuitable, while two (much larger) stands not identified as suitable were found to contain suitable habitat. The potential effects on the flammulated owl and its habitat were determined by predicting the change in habitat suitability that would result from each alternative.

Alternative 1

While Alternative 1 would not alter existing vegetation patterns through mechanical means, mortality caused by agents such as root disease and insect "outbreaks" would continue to exert change on habitat conditions. There would be a continued shift toward more shade-tolerant species in the majority of the stands. Forest encroachment that historically would have been held in check by low-intensity fire would continue to proliferate and crowd out remaining open stands of ponderosa pine and Douglas-fir. Douglas-fir trees would continue to be recycled through disease-prone stands, creating a scenario that would discourage the development of more open, older forests of ponderosa pine and Douglas-fir. Old-growth dry-site forest stands would become increasingly crowded in the understory by shade-tolerant species, causing these stands to move further from suitable habitat conditions. Consequently, habitat suitability for flammulated owls would decline.

As discussed in the "Affected Environment" section, most of the capable flammulated owl habitat within proposed units is currently not suitable due to dense canopy cover. Without management intervention, this habitat would trend toward denser cover of young trees and away from achieving suitable habitat conditions for flammulated owls. Dry habitats in the project area would continue to degenerate. High fuel accumulations resulting from fallen trees would lead to a higher risk of stand-replacing fires. If a stand-replacing fire were to occur, it would take at least 100 years for successional processes to restore habitat which would be similar to today's condition due to continued fire suppression and subsequent dominance of shorter-lived, shade-tolerant species.

Alternative 2

Direct and Indirect Effects

The proposed action would treat approximately 890 acres of capable habitat. Approximately 860 of these acres would be shelterwood harvested under Alternative 2, including 182 acres which are modeled suitable habitat. Shelterwood harvest is expected to reduce overstory canopy to about 35-45%. Given that flammulated owl habitat is generally restricted to areas with canopy cover between 35 and 65 percent, existing suitable habitat would be maintained, but canopy cover would be reduced to the lower level of suitability for 10-15 years following harvest. In addition, large snags and small pockets of regenerating conifers that provide nesting and roosting habitat are more likely to be lost through shelterwood prescriptions. As a result, this alternative could temporarily reduce suitable flammulated owl habitat in the project area by nearly 35%.

Some of proposed treatment areas are currently unsuitable due to excessive density of small-diameter stems in the understory, but contain a structure of large-diameter ponderosa pine, western larch and occasionally Douglas-fir that could, over time, be converted to suitable habitat through mechanical thinning. If left untreated, it is questionable if any of these acres would revert to suitable habitat absent a stand-replacing disturbance event. Additional unsuitable acres would also be trended toward suitable condition through timber harvest, but these stands lack existing structure of large-diameter stems that would allow relatively short-term conversion to suitable habitat through treatment. These stands currently contain predominantly small diameter lodgepole pine, and would likely remain in this cover type without management intervention. Converting the stands through regeneration cutting methods would alter species composition and favor the longer lived, more disease resistant species like ponderosa pine. This activity would promote the restoration of more

open grown, older forests of ponderosa pine/Douglas-fir on these sites and lead to long-term habitat stability for flammulated owls.

With the current arrangement of vegetation, it is unlikely that the Harvey Mountain area supplies ideal flammulated owl habitat. The dry, rocky areas may provide small areas of suitable habitat, but these are likely of inadequate size to support flammulated owl populations. Wright (1996) found that suitable microhabitats may not be occupied by flammulated owls unless these conditions occurred across larger suitable landscapes. In the project area, contiguous suitable habitat is limited to the lower slopes of Hogue Mountain. Treatment would eventually result in more contiguous suitable habitat across the steep, south-facing slopes of the project area.

Alternative 3

Direct and Indirect Effects

Alternative 3 would treat the same 890 acres, but only nine acres would be a shelterwood harvest. All of the 182 suitable acres in treatment areas would be a free selection prescription, which would result in 35 to 60 percent canopy cover so existing habitat suitability would be maintained that more closely approximates the habitat requirements of flammulated owls suggested in the scientific literature. Free selection treatment would concentrate on portions of the stands with congested understories, while leaving the parts with an existing structure of large, widely spaced stems untouched. This activity would result in a temporary disturbance to resident animals if they were present during implementation, and subsequent underburning may leave shrub and forb understory too depauperate to provide preferred foraging habitat for a few years. However, the ground cover shortly will have recovered sufficiently to provide habitat for the arthropod species flammulated owls rely upon for foraging.

As discussed above, timber harvest poses two primary risks to flammulated owl habitat (assuming harvest does not consist of overstory removal): the loss of large snags during harvest or post-harvest fuels treatments, and the elimination of small areas of dense small-diameter stems utilized as roosting sites. Timber harvest that strives for uniform spacing and elimination of all juvenile trees results in stands that do not contain adequate structural complexity for this owl to occupy. By contrast, free selection harvest results in a clumpy distribution of remaining trees with varying overstory canopy cover. Leaving small areas unharvested or partially harvested should retain potential roosting patches as well as creating a buffer around existing snags for protection during post-harvest underburning.

Treatments in dry-site forest stands (including old growth stands) are designed to mimic or trend these stands toward structural conditions this species prefers. While there are no guarantees that flammulated owls will occupy these areas after treatment, it is apparent that many of these acres currently are not meeting habitat conditions preferred by flammulated owls, and will continue to move away from suitable condition over time. Therefore, it seems intuitive that manipulating stands that do not currently meet species habitat requirements presents far less risk to continued viability of the species than lack of action would. Both the Idaho Partners in Flight (IPF 2000) and Montana Partners in Flight (MPF 2000b), in their conservation plans, recommend dry-site restoration treatments that include removal of small diameter trees and subsequent burning (as is proposed here)

to enhance and/or restore habitat for this species. In addition, van Woudenberg (1999) recommends using "partial cutting and selection silvicultural systems" for long-term regeneration of landscapes. Flammulated owls have been documented nesting in previously logged stands in British Columbia (Howie and Ritcey 1987, van Woudenberg 1999) and western Montana (Wright 1996), and possibly on the Bonners Ferry Ranger District as well.

In 2006 District surveys documented flammulated owl presence in a previously harvested stand on Dawson Ridge (USDA 2006). The area in which the owl responded was harvested in 2000 and underburned in 2002. The prescription for this unit was commercial thin with group selection. The objective of this prescription included restoring the role of fire in ponderosa pine stands in the Dawson Ridge ecosystem and regenerating groups of ponderosa pine and larch, while improving the growth and vigor of the residual trees (similar to prescription objectives here). Flammulated owl presence had also been documented in nearby stands in 1999 and 2000. Whether this silvicultural treatment *improved* (i.e., changed habitat from an unsuitable to suitable condition) flammulated owl habitat or merely *maintained* it, it is encouraging given the management history of Dawson Ridge that owls continue to use the area.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for flammulated owl:

Past Activities and Events – USFS timber harvest of flammulated owl habitat within the project area has historically been restrained by limited road access on this steep, rocky area. Recent and historic regeneration harvest, as well as historic overstory removal ("high-grading") timber harvest would have reduced available flammulated owl habitat in the project area. In addition, much suitable habitat in low elevation dry-site old growth stands was removed to make way for residences and other development. These activities, in combination with active fire suppression in unlogged stands, have contributed to the lack of habitat for this species currently throughout much of its range. The proposed action would help restore natural processes by favoring tree species composition and structures that are consistent with historic vegetative patterns of dry site ecosystems. While some stands have lost or are losing sufficient forest structure to achieve habitat suitability, this action would lead to long-term stability of habitat for flammulated owls by promoting more open grown stands of ponderosa pine and Douglas-fir and creating opportunities for managing stands with fire in the future. Past activities and events would not have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Firewood cutting is anticipated to continue along seasonally and yearlong open roads. This activity has the potential to reduce large snags within 50 meters of open roads. With only a tiny reduction in miles of drivable roads as a result of the action alternatives, this would not significantly reduce snag vulnerability to firewood gathering. Interrupting the periodic disturbances created by lethal wildfires through continued fire suppression probably has mixed impacts on flammulated owls. High-intensity wildfire often revert stands back to an earlier successional stage. In some cases this would interrupt immature stands from reaching habitat suitability, and in other cases would regenerate stands with high densities of small stems that may never reach suitability lacking disturbance. Regardless, fire suppression through the years has

heavily contributed to reduction of open grown ponderosa pine stands by preventing periodic underburns in these stands. Since this activity is expected to continue, the results would be partially compensated for by activities described in this proposal. Various recreation activities and routine road maintenance are unlikely to have any impacts on flammulated owls, since they would not result in habitat modifications, and flammulated owls are not readily disturbed by sporadic human activity.

Other Restoration Projects – It is unlikely that noxious weed treatments would have any impacts because the habitat modifications from this activity would be inconsequential for flammulated owls. However, thinning young, small diameter trees and future underburning would be designed to increase the overall health and vigor of the stands. Additionally, thinning and underburning would improve species composition and structure, resulting in stands that are more ecologically stable in the face of potential disturbances. Consequently, thinning and underburning actions would promote long-term stability of habitat conditions for flammulated owls.

Currently active USFS timber sales – Timber sales authorized under the Mission-Brush EIS are outside the analysis area for flammulated owls (Round Prairie watershed), and therefore would have no cumulative effects.

Activities on other ownerships – The USFS is currently unaware of any planned activities on private (mainly FCP) lands within the analysis area. However, timber harvest and road building activities may take place on these and other private ownerships, as well as adjacent properties in Canada. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion

The proposed treatments would reverse the general trend affected stands toward unsuitable habitat conditions, and lead to long-term (>50 years) stability of habitat conditions for flammulated owls. However, Alternative 2 may cause an transitory reduction of 108 acres (23%) of suitable habitat in the project area. Alternative 3 would result in an inconsequential decrease in suitable habitat acres, although implementation may result in disturbance to flammulated owls during project implementation and a short-term (1-2 years) reduction of foraging habitat in treated areas. Under both action alternatives, short-term habitat losses would be offset by longer-term habitat stability. Although there may be some risk associated with timber harvest of currently suitable habitat (snag loss and reduction of roosting habitat) several studies have documented flammulated owl use of selectively logged sites (Howie and Ritcey 1987, van Woudenberg 1999, Wright 1996). Additionally, there would seem to be little risk in treating stands that are currently unsuitable due to excessive overstory and understory canopy.

Samson (2006) estimates that the IPNF contains sufficient habitat for about 426 flammulated owl pairs. Reduction of 108 acres represents a loss of less about 1.4% of the available habitat on the Forest. Effects of actions would not indicate a local or regional change in habitat quality or population status, allowing flammulated owls to maintain their current distribution. Samson (2006)

concluded that short-term viability of the flammulated owl in the Northern Region and IPNF is not an issue because:

- No scientific evidence exists that the flammulated owl is decreasing in numbers.
- Increases in the extent and connectivity of forested habitat have occurred since European settlement.
- Well-distributed and abundant flammulated owl habitat exists on today's landscape.
- Level of timber harvest is insignificant in the Northern Region (in 2006, 6,876 ha of 9,045,255 ha or 0.08% of the forested landscape) and IPNF (1,397 ha of 999,733 forested ha or 0.14%) (http://www.fs.fed.us/r1/forest_range/timber_reports/timbersales.shtml).

Based on this analysis, this project ***may impact* flammulated owls *or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species***.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction to manage the habitat of species listed in the Regional Sensitive Species List to prevent further declines in populations, which could lead to federal listing under the Endangered Species Act (USDA Forest Service 1987 p. II-28).

(c) Fisher

Methodology

Fisher denning habitat was evaluated using a habitat suitability model derived from data in the Forest timber stand database (TSMRS), and updated based on field exam or site visit results. The model counts as capable habitat stands in habitat groups 3 through 8 (moderately dry Douglas-fir or grand fir, moist grand fir, western red cedar, western hemlock, and cool and wet Engelmann spruce / subalpine fir). Suitable habitat includes those capable stands with a forest (cover) type of grand fir, western redcedar, cottonwood/aspen, Engelmann spruce, subalpine fir, western hemlock, Douglas-fir or lodgepole pine; mature sawtimber or old-growth in size with at least 20 trees per acre 14" dbh or larger; canopy closure at least 50% based on direct measurement or estimated from basal area; and no regeneration harvest (clearcut, shelterwood or seedtree), improvement or liberation cut on more than ¼ of the stand acres since the stand exam. The potential effects on fisher denning habitat were determined by predicting the change in habitat suitability that would result from each alternative.

Fisher and marten denning habitat is difficult to model because the timber stand database does not consistently characterize the amount of large woody debris these species require for denning and cover. It is possible that the model overestimates fisher denning habitat because there is incomplete data on snags or down logs. However, it is unlikely that the model overestimates suitable denning habitat, and probably underestimates it, for the following reasons: 1) any confirmed old growth within capable fisher/marten habitat is considered currently suitable, as these mature stands provide large amounts of standing and down material that these species prefer; 2) most unlogged moist-site stands in the project area are probably providing sufficient dead and down material, but may be eliminated by the model based on size class information (immature sawtimber) or lack of data, and

3) several previously logged (improvement and liberation cut) stands in the project area clearly contained enough coarse woody debris and residual overstory canopy to provide fisher denning habitat. Allocated moist-site old growth in capable fisher habitat comprised almost 1,650 acres, and there are approximately 4,570 acres of mature forest in the analysis area that have never been logged. As a result, the final suitable habitat estimate of 3,402 acres is probably conservative. The analysis also assumes that treated acres would no longer be suitable denning habitat, but a fisher's generalist diet implies that they will forage in nearly any type of forested habitat provided there is sufficient ground cover to attract prey.

Because of their preference for older stands with dense canopy cover and large snags (used for maternal dens), suitable fisher habitat closely mimics that required for other old-growth indicator species such as goshawk and pileated woodpecker. However, unlike goshawks, fishers prefer stands with congested understories for the cover these stands offer for hunting and avoiding predators. Consequently, high percentages of tree mortality in stands affected by insect infestations are unlikely to substantially reduce denning habitat. The potential effects on the fisher and its habitat were determined by predicting the change in habitat suitability that would result from each alternative.

The analysis of general fisher habitat (resting, denning and foraging) is based on management guidelines from *Fisher Biology and Management in the Western United States* (Heinemeyer and Jones 1994) and *DRAFT, Forest Carnivores in Idaho* (IDF&G 1995). Although the guidelines make a distinction between "preferred" and "suitable" habitat, they are grouped together to assess habitat quality; and so were not separated for this portion of the analysis. IDF&G (1995) also makes minor distinctions between fisher and marten habitat, but *Martes* species were treated as a guild in this assessment. The percent of the area in mature/old forest structure is displayed and compared to the guidelines, and changes in for forest structure from the existing condition as a result of project activities are discussed.

The existing forest structure and projected distribution under the proposed action on NFS lands in the Northern Prairie fisher analysis area, along with guidelines for forest structure by subdrainage, are displayed in Table 4-4.

Table 4-4. Existing condition and projected effects of alternatives on forest structure of fisher/marten habitat in the Northern Prairie fisher analysis area.

							Subdrainage Guidelines		
Forest Structure	Existing Condition[1]		Alternative 2		Alternative 3		High Quality	Moderate Quality	Low Quality
	acres	%	acres	%	acres	%			
Mature/sawt.	6,290	57.8	6,188	56.9	6,260	57.6	65-75%	≥40%	30-40%
Immature sawt.[2]	1,802	16.6	1,750	16.1	1,777	16.3	10-25%	na[3]	na
Pole/sapling	1,373	12.6	1,373	12.6	1,373	12.6	10-25%	na	na
Open/seed	1,407	12.9	1,561	14.4	1,462	13.4	na	na	na

[1]per cent of NFS capable habitat in the fisher analysis area
[2]includes multistory stands
[3]not applicable – no guidelines identified

The analysis uses the total capable acres on NFS lands north of Highway 95 as a "subdrainage", as this amount (10,872 acres) is within the Heinemeyer and Jones (1994) recommendation for subdrainage size (6,178-61,780 acres). Based on the amount of mature/sawtimber forest structure

and old growth, the existing condition of the Northern Prairie fisher analysis area meets criteria for a "moderate quality" subdrainage.

Alternative 1

The no action alternative would preserve potential foraging habitat for fisher, and would bring some stands into suitable denning condition more rapidly than treatment would. However, with this comes the increased risk of stand-replacing wildfire, which would effectively remove most burned-over areas from suitable fisher denning habitat for many years. Because the canopy cover of the drier types is higher than it would be under a natural fire regime, fisher may tend to use these dry site stands more now than they would have historically. Not coincidentally, these stands are at higher risk of stand-replacing wildfire than historic, open grown dry-site stands would have been. In summary, while the no action alternative would provide better fisher habitat than the action alternatives in the near future, some of these acres may subsequently be converted to unsuitable condition through fire.

Alternative 2

Direct and Indirect Effects

Alternative 2 would treat approximately 271 acres of capable fisher denning habitat, only about 120 acres of which are currently suitable. Only 67 acres of the suitable habitat proposed for treatment will be regenerated, so while the other 53 acres may no longer supply suitable denning habitat, they would continue to provide adequate overstory cover for travel and foraging areas. The loss of a relatively small amount of suitable habitat in the analysis area (3.5%) will be partially offset by reductions in fuel accumulations that may help protect adjacent riparian areas and suitable habitat from future wildfire. Alternative 2 would reduce mature forest content in the analysis area by about 0.9%.

In addition, standards outlined in the Northern Rockies Lynx Management Direction should benefit fisher as well as lynx by limiting forest conversion within lynx habitat and protecting important snowshoe hare habitat. Also, INFS guidelines help maintain intact riparian habitats important to fishers. This proposal represents impacts on about 2.5% of the capable fisher habitat in the analysis area, and only 1.4% of currently suitable habitat. Following implementation of this alternative, the analysis area would continue to meet criteria for a "moderate quality" subdrainage.

Alternative 3

Direct and Indirect Effects

Alternative 3 would only treat the same number of acres of capable fisher habitat as Alternative 2, but would regenerate only about 55 acres, approximately 29 acres of which are currently suitable denning habitat (0.9% of suitable habitat in the analysis area). This alternative would only reduce mature forest content in the analysis area by less than 0.2%. Similar to Alternative 2, implementation of this alternative would leave the analysis area as a "moderate quality" subdrainage for fisher.

Cumulative Effects

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for fisher:

Past Activities and Events – Past logging activities, including salvaging of occasional stems, typically deteriorates fisher habitat by removing forest canopy, snags, and current and future dead and down material. While fisher may use previously harvested stands for foraging and occasionally denning, previously unharvested stands are preferred for the latter. Any of the past timber sales had the potential to cause declines in fisher habitat, particularly the regeneration logging done in the late 1980's – early 1990's. However, these "patch" cuts (usually less than 40 acres) collectively did not alter large, contiguous blocks of fisher habitat. In combination with past natural and human-caused events, the proposed action would reduce the quantity of suitable fisher denning habitat. However, given the low density of fisher populations and high percentages of mature/old forest in the analysis area, it is unlikely that fishers are limited by denning habitat. None of these activities would have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline (previously logged areas are removed from consideration as denning habitat).

Current Management Activities – Firewood cutting is anticipated to continue along seasonally and yearlong open roads. This activity has the potential to reduce snags within 50 meters of open roads. Although it is unlikely to disrupt normal fisher use patterns, this activity could result in fisher habitat deterioration adjacent to open roads by removing large snags that represent future dead and down wood denning opportunities. As discussed above, it is unlikely that denning habitat limits fisher presence in the analysis area. Fire suppression activities are generally good for fisher habitat, as they protect denning habitat from stand-replacing fire and contribute to understory congestion in dry-site stands that provide cover for small mammals that fishers prey upon. As a result, continued fire suppression would partially offset the effects of this proposal. Various recreation activities and routine road maintenance are unlikely to impact fishers, although motorized oversnow travel can provide access for trappers who may inadvertently catch fishers.

Other Restoration Projects – It is unlikely that noxious weed treatments would have any impacts on fisher. Thinning young, small diameter trees and future underburning would be designed to increase the overall health and vigor of the stands. This is expected to produce lower densities of large diameter trees, potentially creating fisher denning habitat. However, this activity would generally be confined to drier forest types that fisher are less likely to utilize.

Currently active USFS timber sales – Timber sales authorized by the Mission Brush EIS would reduce mature/sawtimber stands by an additional 164 acres, immature sawtimber/multistoried stands by 27 acres, and would add 191 acres to the "open/seedling" size class. When these numbers are factored into either of the Northern Prairie action alternatives, the fisher analysis area would continue to meet criteria for a "moderate quality" subdrainage.

Activities on other ownerships – The USFS is currently unaware of any planned activity on private (FCP) lands within the analysis area. However, additional timber harvest and road building

activities may take place on these and other private ownerships within the project area. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion

On the Bonners Ferry Ranger District, the amount of fisher denning habitat is comparable to the quantity available historically, as evidenced by comparison of the sum of mature/large and old growth forest size classes now versus historically (see "Forest Vegetation", Chapter 3). Despite a general direction on the IPNF to restore long-lived early seral species, there has also been an effort to preserve mature and old-growth stands, allow natural succession in riparian areas, and preserve and recruit large woody debris forest wide. While this management strategy may temporarily reduce fisher habitat at the local scale, habitat should improve for this species with time and should be maintained on a landscape scale. There will be no permanent increases in access with any of the alternatives, so there will be no decrease in security for fisher.

District vegetation data clearly show that the total of forested acres in mature and old-growth condition in the project area are within the historic range of variation for these structural types (Chapter 3, Figure 3-5), and that the shade tolerant tree species (presumably providing better habitat for fishers than open-canopied stands dominated by shade-intolerant species) composition has increased significantly from the time period prior to fire suppression efforts (Chapter 3, Figure 3-3). In addition, understory congestion in many dry-site stands is potentially providing suitable fisher habitat in areas that did not prior to effective fire suppression. Riparian areas (potentially suitable habitat and important travel corridors) will remain intact through application of INFISH buffers. In addition, the level of timber harvest is insignificant in the Northern Region (in 2006, 6,876 ha of 9,045,255 ha or 0.08% of the forested landscape) and IPNF (1,397 ha of 999,733 forested ha or 0.14%) in recent years (http://www.fs.fed.us/r1/forest_range/timber_reports/timbersales.shtml). Since fishers are already at extremely low densities in north Idaho, it is unlikely that suitable habitat is limiting in the region. Given this information, it is doubtful that reduction of up to 3.5% of suitable habitat (1.1% of capable habitat) in the project area will result in a loss of viability of this species.

In addition, standards outlined in the NRLMD will benefit fisher as well as lynx. These standards assure that there will be limits to the amount of forest conversion over a given decade, and that snowshoe hare habitat will be protected to supply high densities of this important prey species. INFISH guidelines and BMPs will assure that riparian habitats important to fishers will be preserved. Consequently, the proposed action ***may impact* fisher *or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species***.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction to manage the habitat of species listed in the Regional Sensitive Species List to prevent further declines in populations, which could lead to federal listing under the Endangered Species Act (USDA Forest Service 1987 p. II-28). In addition, the Northern Prairie project is consistent with Forest Plan direction for old-growth habitat management (see "Old Growth", Ch. 4).

(d) Western Toad

Methodology

The potential effects on boreal toads were determined by predicting potential impacts to breeding habitat (wetlands) and terrestrial habitat resulting from the proposed actions.

Alternative 1

The No Action alternative would not impact Western toads. There would be no alteration of upland habitats or breeding habitat with this alternative.

Alternative 2

Direct and Indirect Effects

Implementation of Alternative 2 may result in the temporary disturbance of Western toads and Western toad upland habitat within the treatment areas. Indirect effects to breeding habitat have the potential to occur if there is increased sediment delivery to wetlands and waterways as a result of tree skidding and hauling. However, with Best Management Practices (BMPs) in place to protect water quality and fish habitat (see Hydrology section and Appendix C) and Inland Native Fish Strategy (INFS) protection measures implemented to protect waterways and wetlands, impacts to Western toad breeding areas should be minimal. No proposed harvest is within 1/3 mile of Robinson Lake, although there are several proposed treatment areas near wetlands in the Round Prairie drainage (units 96, 98, 99, and 100). However, harvest timing restrictions in place to protect grizzly bear (no harvest from 4/1 – 6/15) would also protect toads moving to or from breeding areas. Western toad breeding has been documented at the end of June at higher elevations (Nussbaum et al. 1983), but is unlikely to take place so late in the low elevation Round Prairie drainage (<3,000'). Harvest activities may result in mortality to dispersing juveniles later in the season, although this species has apparently adapted to very high natural mortality in larvae and young toads (Nussbaum et al. 1983).

Alternative 2 would result in several large (>40 acres) openings, although retention trees in shelterwood units would somewhat moderate climatic effects, Western toads may avoid these openings in the decade or so following harvest, since toads have an affinity for forested cover in upland areas.

Elsewhere in the project area, significant impacts to boreal toads are unlikely. Most of the drainages north of Highway 95 contain small, high gradient, fast moving streams that likely provide little breeding habitat. The lack of breeding pools, in combination with activity buffers around water bodies, reduces the possibility of impacts to toads in the Harvey and Hogue mountains area. There

is the possibility that individual toads could be temporarily displaced or killed due to vehicles, tree removal, skid trails, road maintenance, or underburning. This disturbance would be short term and toad activity would resume in the area after project completion. Western toads use a variety of upland areas, so the change in vegetation structure should have no long-term effect. All of the proposed timber harvest units are within 4 km of potential breeding habitat, so logging operations may pose a mortality risk to adults and dispersing juveniles. This possibility is greatly reduced for adult toads during the dry summer months, as they are mainly nocturnal, as opposed to diurnal timber harvest operations. However, fuels treatments in any of the units, particularly broadcast burning during spring, may also present a risk of toad mortality.

Alternative 3

Direct and Indirect Effects

The effects of Alternative 3 are expected to be very similar to those of Alternative 2, since both alternatives propose the same treatment areas and road maintenance activities. Since there would be fewer trees removed from proposed units, less time would be spent harvesting individual areas – slightly decreasing the risk of direct mortality. Toads may also be less vulnerable to predation in the first few years post-harvest in partially harvested units compared to regenerated units due to greater retention of hiding cover. As a result, they would be much more likely to utilize these areas (compared to shelterwood units) following harvest.

Cumulative Effects Common to Alternatives 2 and 3

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for Western toads:

Past Activities and Events – Since toads utilize a variety of forested habitats, historical timber harvest had the potential to have impacts on toads in the form of occasional direct mortality from vehicles. Similar to this project, the effects of many of these events were likely short-term (during the logging and fuels treatment phases), and toads would have resumed normal activities afterward. Logging activity that resulted in large openings may have reduced the habitat toads would utilize, since they have an affinity for forested cover in upland areas. There are three areas where logging created large (>40 acres) openings in the project area, but the two nearest Robinson Lake have by now regenerated to the point where adequate cover and shade are provided.

Current Management Activities – Personal use firewood gathering, various recreation activities (excluding off-road motorized use, addressed in alternative discussions), standard road maintenance, and continued fire suppression would not significantly impact Western toad populations. These activities are unlikely to impact breeding habitat, and potential modifications to upland forested habitat would be inconsequential. While there is a risk of direct mortality associated with these activities as a result of increased vehicular use of roads, these instances would be infrequent and isolated.

Other Restoration Projects – TSI activities, including thinning young, small diameter trees, are unlikely to have impacts on Western toads. No breeding habitat would be altered or breeding

disrupted, and there would be no off-road vehicular use associated with this activity. There is the possibility of an occasional adult mortality due to increased vehicular use on roads to access thinning areas, but this use would be of short duration in a given area, and direct mortality rare and inconsequential. Similarly, effects of noxious weed treatments would likely be limited to possible mortality caused by vehicles used for spraying, since areas of surface water are buffered from chemical application (USDA 1995). Future underburning may also cause occasional mortality, but would generally be limited to steep, dry areas infrequently used by adult toads.

Currently active USFS timber sales – Timber sales authorized under the Mission-Brush EIS are outside the analysis area for Western toads (Round Prairie watershed), and therefore would have no cumulative effects on this proposal.

Activities on other ownerships – The USFS is currently unaware of any planned activities on private (mainly FCP) lands within the analysis area. However, timber harvest and road building activities may take place on these and other private ownerships, as well as adjacent properties in Canada. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion

The action alternatives may cause adverse impacts to toads during project implementation. However, this risk is considerably reduced by project design features including timing restrictions, INFS buffers and BMPs. Although the action alternatives may slightly elevate the risk of direct toad mortality, no breeding habitat will be affected by this proposal. Consequently, Alternatives 2 and 3 ***may impact Western toads or their habitat, but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species***.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction to manage the habitat of species listed in the Regional Sensitive Species List to prevent further declines in populations, which could lead to federal listing under the Endangered Species Act (USDA 1987 p. II-28).

4.2-B.3 Management Indicator Species

(a) Northern Goshawk

Methodology

Goshawk nesting habitat was evaluated using a habitat suitability model derived from data in the Forest timber stand database (TSMRS). This model considered capable nesting habitat to be any stands in habitat type groups 2 through 6 (moderately dry Douglas-fir or grand fir; moist grand fir; western red cedar and western hemlock) on slopes of 40% or less. Since slope data in the TSMRS

database is an average of plots across the stand, using this data to determine suitability can cause the model to exclude stands that have relatively flat microsites, or include portions of stands that may be too steep for goshawks to select as nest sites. To rectify this, the model was only used to identify vegetative factors that are predictors of goshawk nest sites, while topographic limitations were determined from digital elevation model (DEM) data. As a result, modeled goshawk nesting areas did not necessarily conform to delineated stand boundaries, but were identified by combining the stand layer with two meter resolution DEM data. Suitable northern goshawk nesting habitat was initially determined using the Forest-wide habitat suitability model to be capable stands (or parts of stands) that had a forest (cover) type of Douglas-fir, ponderosa pine, lodgepole pine, western redcedar, aspen, grand fir, western hemlock, western larch or western white pine; were mature sawtimber or old growth size classes with at least 20 trees per acre over 14" dbh; had not had a regeneration harvest (clearcut, shelterwood or seed tree), improvement or liberation cut on more than ¼ of the stand acres since the stand exam; and had a Canopy closure of 50% or greater based on direct measurement or estimated from basal area.

Habitat suitability was then validated for a large portion of capable stands in the project area through site visits or by comparing TSMRS data with ancillary data such as cruise plot data, aerial photographs, and silviculturist's photographs and field notes. After USFS personnel validated 2,119 acres of capable nesting habitat, approximately 640 of the 2,958 capable nesting acres were determined to be currently suitable. The analysis area currently contains seven contiguous stands larger than 40 acres in size. In general, capable but unsuitable stands are dominated by small-diameter trees or contain adequate numbers of large stems, but are heavily congested in the understory by high densities of small stems. The model may underestimate both capable and suitable nesting habitat within the analysis area by eliminating areas of greater than 40% slope from consideration, since the goshawk pair(s) occupying nests in the Gillon Creek territory seem to have an affinity for steeper (~55%) slopes. Hayward and Escano (1989) reported only 2 of 17 nest trees (12%) in western Montana and northern Idaho were on slopes >40%, and none exceeded 50%. The 40% slope threshold is generally a good indicator of nest sites on the District, as this is the only of more than 30 known territories with nest trees on slopes steeper than 40%.

Existing nest stand, Post-fledging Family Area (PFA), and home range suitability were then compared to recommendations initially described by Reynolds et al. (1992) and modified according to the Northern Region goshawk overview (USDA 2007c).

Alternative 1

As discussed above, a number of capable stands are unsuitable either because they lack a mature overstory component, or they have a mature overstory component but have grown out of suitability because the understory is congested by a high density of smaller stems. As time passes, more stands will move away from suitability due to increasing understory congestion. Deteriorating stand health will result in large, uniformly-spaced stems being replaced by more numerous, densely-packed smaller stems. The high amount of ladder fuels in stands will prevent natural fire from clearing out this understory. Large snags will eventually disappear, trending these stands even further away from suitable goshawk nesting and foraging habitat. A large stand-replacing fire would remove the dense forests this species prefers, but small fire-produced openings may be beneficial for foraging.

Regardless of whether these stands suffer from stand-replacing fire or not, suitable goshawk nesting habitat will likely be lost over time.

Reynolds et al. (1992) advise maintaining Vegetation Structural Stage (VSS) proportions within goshawk home ranges of 10% each in VSS 1 and 2, and 20% each in VSS 3-6. Existing condition and projected changes of VSSs within capable goshawk habitat in the project area gives the results displayed in Table 4-5 (note these numbers are based on 7,701 capable *habitat* acres, rather than capable *nesting* acres discussed above). These results show that forest structure is skewed toward the larger size classes in the analysis area, particularly in the mature/large category (VSS 5). Old growth in the analysis area falls several hundred acres short of the recommendation, but the pole-sized category (VSS 3) is underrepresented by nearly 1,400 acres. While it would be desirable for some of the mature forest acres to develop into old growth, it would be even more desirable - from a goshawk habitat standpoint - to revert a number of mature forest acres to an earlier seral stage (through timber harvest, wildfire or other disturbance) so that pole-sized timber would be less deficit over time.

The analysis assumes that any unit with proposed regeneration harvest reverts to VSS 1. Suggestions for VSS distribution are conservative in nature, and are only recommendations rather than requirements. Other resource concerns and/or past disturbances may make it impossible to reach recommended VSS distribution in a given area.

Table 4-5. VSS percentages within the Northern Prairie Analysis Area.

VSS	Size Class	Alternative 1		Alternative 2*		Alternative 3*	
		Acres	%	Acres	%	Acres	%
1	Open	363	4.7	1,392	18.1	442	5.7
2	Seed/Sapling	980	12.7	980	12.7	980	12.7
3	Imm/Pole	170	2.2	110	1.4	170	2.2
4	Imm/Medium	1,584	20.6	1,279	16.6	1,559	20.2
5	Mat/Large	3,356	43.6	3,019	39.2	3,302	42.8
6	Old Growth	1,247	16.2	896	11.6	1,247	16.2

*Numbers reflect post-treatment condition for action alternatives.

A similar analysis was conducted for the putative PFA around the nest stand(s). An approximately 490-acre area was delineated on stand boundaries, consisting of a 420-acre PFA (Reynolds et al. 1992) surrounding a 60-acre nest area (the nest area is assumed to be larger than 40 acres based on the nearly 500 m distance between the original nest and the most recent nest). The PFA composition by size class for the Gillon Creek territory is shown in Table 4-6.

Table 4-6. VSS percentages of the Gillon Creek PFA.

VSS	Size Class	Acres	%
1	Open	14	3.4
2	Seed/Sapling	23	5.5
3	Imm/Pole	51	12.3
4	Imm/Medium	0	0
5	Mat/Large	342	79.5
6	Old Growth	0	0

Most of the PFA is currently in the mature/large size class, with no immature/medium-sized or old growth stands included. However, there are several hundred acres of old-growth stands across Gillon Creek, starting about 600 m to the east. The analysis also excludes a 60-acre parcel of private land that currently contains a mix of small openings and immature sawtimber. While other ownerships cannot be relied upon for long-term habitat contributions (see "Cumulative Effects" discussion, below), due to its proximity to these nests, it is likely that this parcel is utilized by resident goshawks to some unknown extent.

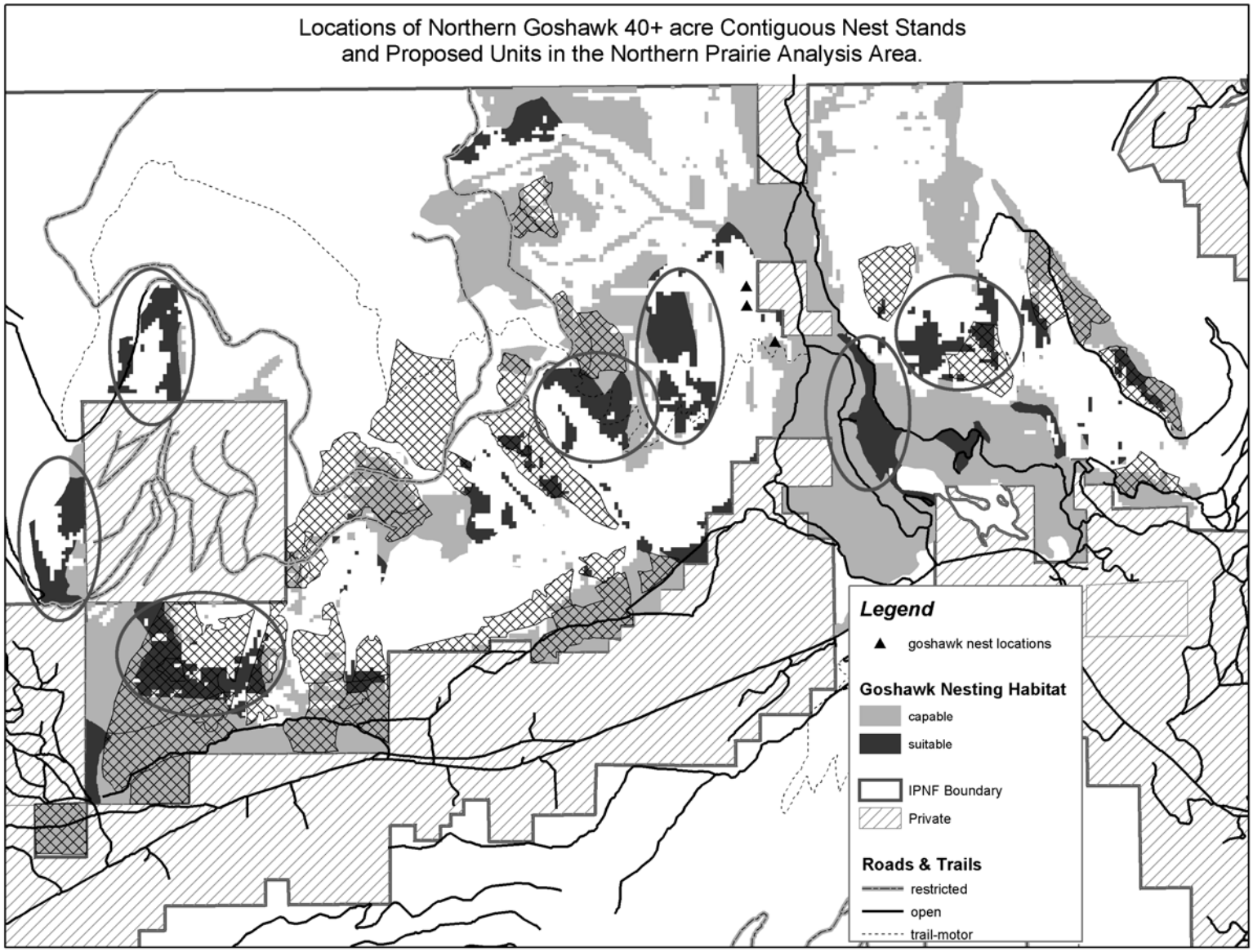
Alternative 2

Direct and Indirect Effects

Approximately 558 acres of capable nesting habitat would be impacted by this proposal, including about 105 acres that are currently suitable. All of the suitable acres proposed for treatment are in shelterwood harvest units, and the resulting post-harvest stands would become unsuitable nesting habitat. However, timber harvest would make also measurable reductions in fuel loading, thus reducing the possibility of stand-replacing fire in the future that may destroy adjacent suitable nesting habitat.

Reduction of 105 acres of suitable goshawk habitat would leave five contiguous suitable nesting stands greater than 40 acres in size within the analysis area (Figure 4-9). Specifically, Unit 94 and Unit 123 (both helicopter units) would reduce existing nesting habitat in these areas to less than 40 contiguous acres. The post-treatment condition would still meet the Reynolds et al. (1992) recommendation of at least three suitable nest areas per home range, but a commitment would be needed from the District to manage for an additional 40-acre future goshawk nest area in order to meet the recommendation for three replacement nest stands. Several such opportunities exist in the project area, including: 1) the area immediately west of proposed units 93 and 94 (currently a 19-acre suitable patch adjacent to a much larger stand of immature sawtimber to the north), 2) the area east of Unit 73 (a 15-acre suitable patch with an additional 31 acres mature sawtimber), and 3) the area northeast of Robinson Lake (16 acres of contiguous nesting habitat adjacent to >50 acres of mature and multi-storied stands).

Figure 4-9


Locations of Northern Goshawk 40+ acre Contiguous Nest Stands
and Proposed Units in the Northern Prairie Analysis Area.
Legend
goshawk nest locations
Goshawk Nesting Habitat
capable
suitable
IPNF Boundary
Private
Roads & Trails
restricted
open
trail-motor

Alternative 2 would also reduce immature and old-growth stands within the analysis area to below levels recommended by Reynolds et al. (1992). Although the sum of VSSs 4-6 would still exceed the recommended 60%, the amount of young forest and openings would, in the short-term, be inconsistent with these recommendations. There would be no change to structural components of the PFA, since this area would be unaffected by timber harvest. Similarly, there would be no need to place timing restrictions on project activities to protect breeding goshawks, since none of the proposed units is within ½ mile of any known nests. However, mechanized activities will still be restricted within ½ mile of any newly discovered nests during the nesting period (March 15 – August 15).

Alternative 3

Direct and Indirect Effects

Alternative 3 proposes harvest of the same capable and currently suitable goshawk nesting acres as Alternative 2, except that only about 17 acres of capable nesting habitat – none currently suitable – would be shelterwood harvested. While free selection harvesting would leave portions of suitable nest stands intact, the overall effect would be to reduce overstory canopy cover in treated stands to ≤60%. As a result, the loss of suitable nesting acres would be the same as in Alternative 2, although units harvested by free selection prescription would still contain adequate trees to remain in the same VSS category. Consequently, the post-harvest VSS percentages in the analysis area would more closely resemble those of Alternative 1.

Several proposed units (units 96, 99 and 100 in particular) contain species composition and structure that would likely become suitable goshawk nesting habitat in 20-30 years if left unmanaged. These stands currently lack large diameter stems (average dbh is 12-13") and are a bit too open in the overstory canopy (<70%). Assuming that shade-tolerant species did not fill up the understory, the larger stems and closed canopy resulting over time would be expected to meet nest stand criteria. However, under Alternative 3 goshawk habitat would be reduced in this area in order to enhance habitat for flammulated owls. Northern goshawks are more of a habitat generalist than flammulated owls, and new goshawk territories are being discovered on the District nearly every year. In the last five years, at least seven new territories have been documented, four of which are known to have produced young in 2006 (project file – WL003). Conversely, flammulated owls are uncommon in the local area, with relatively small amounts of suitable habitat remaining (as discussed in "Affected Environment", above). This species is locally less abundant and has more specialized habitat needs. Therefore, it seems prudent to tilt the management of stands capable of providing habitat for either species in favor of flammulated owls – particularly in light of the evidence that these stands historically were maintained in an open-grown condition that more closely approximated flammulated owl habitat (see "Forest Vegetation", Chapter 3).

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for northern goshawk:

Past Activities and Events – In combination with past natural and human-caused events, the total effect of action alternatives would help restore natural processes by favoring tree species composition and structures that are consistent with historic vegetative patterns of dry site ecosystems. While some stands have lost or are losing sufficient forest structure to achieve habitat suitability, proposed actions would lead to long-term stability of habitat for northern goshawks by promoting and maintaining a more open forest structure. In general, sales that involved regeneration logging or overstory removal damaged goshawk habitat, while sales that involved salvage or thinning from below preserved or improved habitat. None of these activities would have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Firewood cutting is anticipated to continue along seasonally and yearlong open roads. This activity may be disruptive to northern goshawks that may be nesting in the area, as they are particularly sensitive to disturbance during the courtship and fledging periods. However, since it would emanate from open roads, firewood gathering would only incrementally elevate disturbance above what motorized traffic would normally provide. It is unlikely that personal use firewood cutting would make habitat modifications that would substantially impact goshawks since snags are a relatively minor component of goshawk habitat. Continued fire suppression has mixed effects on northern goshawks. While suppression efforts may protect currently suitable nest stands from stand-replacing fire, this activity has also contributed to the understory congestion of dry-site stands that has reduced suitable goshawk habitat in recent years. Various recreation activities and routine road maintenance are unlikely to impact northern goshawks for reasons discussed above, although off-road recreational use during the spring and early summer may disturb nesting goshawks to some degree.

Other Restoration Projects – It is unlikely that noxious weed treatments would have any impacts on northern goshawks since they would emanate from roads and not modify goshawk habitat. Thinning young, small diameter trees and future underburning would be designed to increase the overall health and vigor of the stands. Additionally, this thinning would improve species composition, resulting in stands that are more ecologically stable in the face of potential disturbances. Consequently, thinning actions would promote long-term stability of habitat conditions for northern goshawks. Future road decommissioning may have short-term impacts on goshawks through disturbance, but would have long-term benefits by reducing human access/disturbance (decommissioning of currently drivable roads) and increasing potential habitat acres (revegetation of previously cleared roadbeds).

Currently active USFS timber sales – Timber sales authorized under the Mission-Brush EIS are outside the analysis area for northern goshawks (Round Prairie watershed), and therefore would have no cumulative effects on this proposal.

Activities on other ownerships – The USFS is currently unaware of any planned activities on private (mainly FCP) lands within the analysis area. However, timber harvest and road building activities may take place on these and other private ownerships, as well as adjacent properties in Canada. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of

management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion

There is a known northern goshawk territory within the analysis area that is more than ½ mile from any proposed project activities. Despite the potential reduction of suitable nesting habitat under the action alternatives, the area would continue to provide the adequate number of nesting stands recommended by Reynolds et al. (1992), although the District should identify one additional 40-acre replacement nest stand if either of the action alternatives are adopted as described. The PFA of the Gillon Creek territory will be unaffected by project activities. VSS distribution in the analysis area will remain skewed toward the larger size classes of trees under all alternatives. If any additional goshawk territories are discovered in the analysis area during sale preparation or implementation, harvest operations would not take place within a minimum 40-acre buffer surrounding known or discovered nests, and a limited operating season (no harvest March 15 – August 15) would be applied to harvest units within ½ mile of stands in which evidence of territorial nesting goshawks is found.

Greenwald et al. (2005), in a review of goshawk studies published since 1992, questioned the Reynolds et al. (1992) recommendations concerning goshawk habitat structure. Among other points, they stated that 9 of 12 studies demonstrated selection for stands with higher canopy closure, larger tree size, and greater numbers of large trees than found in random stands. Greenwald et al. (2005) also state that across the western US, "mature and old-forests have declined to much less than 40% of the landscape" and recommend protecting existing mature and old-forest characteristics and prohibiting large reductions in canopy closure. However, more than 50% of the Northern Prairie analysis area would consist of mature or old forest stands under all alternatives. In addition, Dr. Richard Reynolds responded to Greenwald et al. (2005) in a paper titled *Habitat Conservation of the Northern Goshawk in the Southwestern United States: Response to Greenwald et al. 2005* (Reynolds et al. 2005). Dr. Reynolds discusses the contents of his response in the first paragraph of the paper as follows:

> "In their review of the literature on northern goshawk….Greenwald et al. (2005) suggested that current management for the northern goshawk, as described in the *Management Recommendations for the Northern Goshawk in the Southwestern United States* (MRNG; Reynolds et al. 1992…)...are inadequate….Here we show that Greenwald's et al. (2005) conclusion derives from misunderstandings of the desired goshawk habitat conditions described in the MRNG; a poor understanding of the ecological factors limiting goshawk populations, a failure to understand goshawk forest habitat as dynamic ecosystems, incomplete reviews of the literature, and inclusion of studies with limited samples of goshawks."

Due to legitimate concerns over the incomplete and non-exhaustive review of literature by Greenwald et al. (2005), as well as their apparent misunderstandings of *Management Recommendations for the Northern Goshawk in the Southwestern United States* (MRNG; Reynolds et al. 1992), we will continue to base goshawk habitat management upon the recommendations contained in Reynolds et al. (1992).

Samson (2006) concluded that short-term viability of the goshawk in the Northern Region and IPNF is not an issue because:

- No scientific evidence exists that the northern goshawk is decreasing in numbers.
- Increases in the extent and connectivity of forested habitat have occurred since European settlement.
- Well-distributed and abundant northern goshawk habitat exists on today's landscape.
- Level of timber harvest is insignificant in the Northern Region (in 2006, 6,876 ha of 9,045,255 ha or 0.08% of the forested landscape) and IPNF (1,397 ha of 999,733 forested ha or 0.14%)

(http://www.fs.fed.us/r1/forest_range/timber_reports/timbersales.shtml).

As a result, the action alternatives may cause minor impacts to **northern goshawks** at a local level, but would not likely indicate a local or regional change in habitat quality or population status.

Consistency with Forest Plan and Other Regulations

All proposed alternatives are intended to meet or exceed Forest Plan goals and objectives for managing snag habitat (USDA 1987, Appendix X). While some tree cutting would occur within designated old growth in the Northern Prairie analysis area, this would be limited to improvement of dry-site old growth; other designated old growth would continue to be managed for old-growth characteristics. The Northern Prairie project is consistent with Forest Plan direction for old-growth habitat management (see "Old Growth", Ch. 4).

(b) Pileated Woodpecker

Methodology

Habitat management for pileated woodpeckers is based on direction in *Old-Growth Habitat and Associated Wildlife Species in the Northern Rocky Mountains* (Warren 1990) and is based on an analysis done for size class and old growth. The analysis methodology for determining potential effects on pileated woodpeckers involved mapping old growth and mature forest stands (i.e. suitable nesting habitat) in the wildlife analysis area and delineating hypothetical 1,000-acre home ranges around suitable nesting stands/groups of stands.

Based on relative habitat values and the acres of suitable nesting habitat a home range should have (Warren 1990), areas with at least 100 acres of contiguous mature/old forest habitat and an additional contiguous 100 acres of immature/sawtimber sized tree habitat were identified as having sufficient suitable nesting habitat. Once home ranges with suitable nest stands were identified, the suitability of surrounding stands in the home range to provide adequate feeding habitat was evaluated. Within each home range at least 500 acres of sawtimber/mature sawtimber forest and/or immature sawtimber habitat is needed to provide adequate feeding habitat (Warren 1990). Project impacts on suitable habitat were then determined for each home range

Analysis identified a total of seven hypothetical home ranges that were associated with potential nesting stands of >100 acres. Each hypothetical home range currently contains at least 500 acres of

sawtimber/mature sawtimber forest and/or immature sawtimber habitat to provide adequate feeding habitat. Project impacts were analyzed by assuming that free selection harvest would leave high enough average canopy cover across the stand to retain the previous size class, while shelterwood harvest would convert a stand to the "open/seedling" stage. The existing condition of the seven hypothetical home ranges, along with the projected effects of each action alternative, is shown in Table 4-7.

Table 4-7. Existing condition and projected effects of alternatives on hypothetical pileated woodpecker home ranges in the Northern Prairie Project Area.

Homerange	Alternative	Size Class (Acres)			
		Mature/Sawt.	Imm. Sawt.	Pole/Sapling	Open/Seed.
HR 1 (1,024 ac.)	Alt. 1	789	91	109	34
	Alt. 2	789	91	109	34
	Alt. 3	789	91	109	34
HR 2 (1,100 ac.)	Alt. 1	514	488	17	81
	Alt. 2	211	175	17	697
	Alt. 3	490	472	17	121
HR 3 (1,042 ac.)	Alt. 1	796	149	0	97
	Alt. 2	560	149	0	333
	Alt. 3	783	149	0	110
HR 4 (1,040 ac.)	Alt. 1	744	188	0	108
	Alt. 2	687	170	0	183
	Alt. 3	738	188	0	114
HR 5 (1,019 ac.)	Alt. 1	723	168	0	128
	Alt. 2	712	168	0	139
	Alt. 3	712	168	0	139
HR 6 (1,0567 ac.)	Alt. 1	637	107	203	108
	Alt. 2	596	97	188	173
	Alt. 3	637	107	203	108
HR 7 (1,080 ac.)	Alt. 1	371	373	108	227
	Alt. 2	265	368	63	383
	Alt. 3	371	373	108	227

This analysis also addresses potential reduction of large snags, and trends toward mature forest structure. Direct and indirect effects reflect changes in habitat conditions that would result from implementation of the alternatives. As discussed in the Affected Environment section, snag habitat for nesting is considered more limiting than foraging habitat. Nesting habitat is dependent on the age and size of trees, which makes pileated woodpeckers a good indicator species for older, larger-diameter trees and late-successional forests. Specific parameters analyzed for this assessment include the changes in distribution and quantity/quality of large snag habitat.

Alternative 1

There would be a continued shift in species composition toward more shade tolerant species in the majority of the stands. This change would trend stands toward a smaller size class and younger age class of trees. Consequently, snag production would shift away from the larger, longer-lived species, affecting the long-term stability and persistence of large snag habitat in the Northern Prairie project area. Habitat for species associated with large snags, such as the pileated woodpecker, would continue to decline. Although timber harvests over the last 20 years have begun to change the

species composition toward long-lived seral tree species, the presence of large snags would continue to be relatively uncommon due to the overabundance of Douglas-fir and grand fir.

High fuel accumulations resulting from dead and dying trees would lead to a higher risk of stand-replacing fires. If a stand-replacing fire were to occur in the project area, there may be a short-term (0-50 years) flush of large snags as a result of crown fire in mature stands, followed by a period of 50 or more years where many of these snags have fallen and the regenerating stands have not yet produced trees of sufficient diameter for pileated woodpeckers to nest in.

Alternative 2

Direct and Indirect Effects

Alternative 2 would harvest timber on approximately 697 acres of potential pileated woodpecker nesting habitat, 606 acres of which would be shelterwood units and would lose suitable nesting structure. This represents possible temporary (up to 100 years) loss of about 19% of the potential nesting habitat in the project area. Alternative 2 would also reduce the sum of sawtimber/mature sawtimber and immature sawtimber to less than 500 acres in HR 2, potentially eliminating it as a viable homerange.

Foraging habitat would remain, to some extent, in nearly all treated areas. Timber harvest would generally focus on smaller diameter stems of shade tolerant species, while large diameter snags and snag recruitment trees, particularly ponderosa pine and larch, would be protected. Outside of proposed units, tree mortality in lower risk stands would continue to advance, producing higher quantities of smaller snags, but not quality large snags required by pileated woodpeckers.

While a reduction in snag densities over the short-term may impact nesting habitat, design features for snag retention (discussed in Chapter 2) would reduce these impacts. Some of the existing areas proposed for treatment currently may provide nesting (snags) and/or foraging habitat for pileated woodpeckers, but the harvest prescriptions as designed would generally provide for long-term maintenance of seral species such as white pine, ponderosa pine, and western larch. Western larch and ponderosa pine stands with large-diameter snags are considered high-quality habitat for this species. Project implementation would improve pileated woodpecker nesting habitat within the project area in the long term by increasing high quality, large-diameter snags.

Treatment of dry sites to remove competing understory trees so that the stands obtain a more open condition may decrease the value of the stands to pileated woodpeckers. Pileated woodpeckers prefer dense stands with large snags. Currently, this is often the scenario in today's dry sites because the density has resulted from fewer understory burns, and the existing large snags resulted from earlier open stands with less competition. Thus, the existing condition of good habitat in dense dry sites is a temporary situation that would decline through stand-replacing wildfires, or death and falldown of the large snags. Removing competing understory would increase the number of large snags in the long term, but may reduce the density of the stand below that preferred by pileated woodpeckers.

Alternative 3

Direct and Indirect Effects

Alternative 3 would treat the same areas as Alternative 2 except that only 24 acres of suitable nesting habitat would be in shelterwood units that would lose suitable nesting structure. As a result, <1% of the potential nesting habitat in the project area would be lost. Under Alternative 2, all of the home range areas would continue to provide adequate forest structure to support pileated nesting and feeding.

Design features of the project were devised to ensure the retention and selection of snags at a level and distribution to support viable populations of species which use snags. Snags and snag replacements would be retained where possible at levels recommended by the Region 1 Snag Management Protocol. The Snag Protocol recognizes that not all stands are able to meet snag guidelines, but that the overall goal is to provide adequate snag habitat over the landscape. Absent treatment, stands in the project area would continue to decline in health and vigor and would become increasingly crowded with immature trees, ultimately resulting in increased risk of severe wildfire that could remove mature forest stands utilized by pileated woodpeckers.

Cumulative Effects

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for pileated woodpecker:

Past Activities and Events – Timber harvest on USFS lands in the project area would have reduced snag densities in logged stands in nearly every instance, particularly prior to implementation of the Forest Plan in 1987 when standards for snag retention were adopted. The long-term impact of these activities was the reduction of snags of all sizes. In subsequent years, snag retention and snag recruitment (leaving higher densities of green trees for future snags) in harvested areas has improved through implementation of Forest Plan standards and, more recently, adoption of the Northern Region Snag Protocol (USDA 2000). In general, sales that involved regeneration logging or overstory removal reduced pileated woodpecker nesting habitat, while sales that involved thinning from below preserved, or possibly improved, habitat. While tree mortality in untreated stands has increased Forest-wide (USDA 2005), the majority of affected trees are in smaller size classes. As a result, the ultimate legacy of historic logging in the project area is a decrease in *large*-diameter (>20" dbh) snags. However, each of the hypothetical pileated woodpecker homeranges would contain in excess of 100 acres each of mature/old and immature/sawtimber once all logged areas (past and proposed) are eliminated, although the 200 mature unlogged acres in HR 2 would not be contiguous.

Current Management Activities – Firewood cutting is anticipated to continue along seasonal and yearlong open roads. Large snags within suitable nesting habitat, including potential nest trees, could be removed by personal use firewood cutters within 50 m of open roads. Because of this, it is generally assumed that these roadside areas do not provide sufficient habitat for snag dependent species. While personal use firewood cutting may locally reduce snag densities, on a landscape scale this amounts to a relatively small amount of habitat (within the Northern Prairie analysis area, no more than 172 acres of potential nesting habitat not included in proposed units – or about 5.5% of

available mature/old forest nesting habitat). Personal use firewood cutting along open roads is unlikely to cause conspicuous changes in structure (overstory canopy or stem density) of affected stands. Various recreation activities and routine road maintenance are unlikely to have any impacts on pileated woodpeckers since they would not impact nesting or foraging habitat structure.

Other Restoration Projects – Thinning young, small diameter trees would be designed to increase the overall health and vigor of the stands. Additionally, thinning and underburning would improve species composition and structure, resulting in stands that are more ecologically stable in the face of potential disturbances. Consequently, thinning and underburning actions would help promote long-term stability of habitat conditions for pileated woodpeckers by increasing sizes and proportions of long-lived seral species that, ultimately, would result in greater availability of large-diameter snags of desired tree species. It is unlikely that noxious weed treatments would have any impacts on this species, since it would not impact nesting or foraging habitat in any measurable way. Future road decommissioning may have short-term impacts on pileated woodpecker through disturbance, but would have long-term benefits by reducing human access/disturbance (decommissioning of currently drivable roads) and increasing potential habitat acres (revegetation of previously cleared roadbeds).

Currently active USFS timber sales – Timber sales authorized under the Mission-Brush EIS are outside the analysis area for pileated woodpecker (Round Prairie watershed), and therefore would have no cumulative effects on this proposal.

Activities on other ownerships – The USFS is currently unaware of planned activity on private (FCP) lands within the analysis area, although these properties have been, and will likely continue to be, managed for intensive timber production. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion

Alternative 3 would cause inconsequential changes to pileated woodpecker nesting habitat, and would retain viability of all seven hypothetical homeranges. Alternative 2 could reduce nesting habitat by as much as 19% in the project area in the short term, and would negatively affect the utility of one hypothetical homerange as a result of proposed structural changes. However, the proposed project incorporates design features that maintain minimum numbers of snags within the harvest units. In addition to this, there are numerous snags being created outside of the proposed units that would not be treated. Treatment would trend stands toward a larger size classes and older age classes of trees. No treatments are proposed that would reduce old growth structure or integrity.

Samson (2006) found that both nest site habitat and winter foraging habitat are abundant and well distributed across the Northern Region by Ecological Province and Forest. In fact, the IPNF contains the most nesting and winter foraging habitat of any of the Northern Region forests, with winter habitat adequate to support 7,291 pileated woodpecker pairs. The regeneration of even 606 acres of potential nesting represents less than 1% of the available nesting habitat on the IPNF.

Samson (2006) concluded that short-term viability of the pileated woodpecker in the Northern Region and on the IPNF is not an issue because:

- No scientific evidence exists that the pileated woodpecker is decreasing in numbers.
- Increases in the extent and connectivity of forested habitat have occurred since European settlement.
- Well-distributed and abundant pileated woodpecker habitat exists on today's landscape.
- Level of timber harvest is insignificant in the Northern Region (in 2006, 6,876 ha of 9,045,255 ha or 0.08% of the forested landscape) and IPNF (1,397 ha of 999,733 forested ha or 0.14%) (http://www.fs.fed.us/r1/forest_range/timber_reports/timbersales.shtml).

Given the abundance of pileated woodpecker habitat on the IPNF, the inconsequential amount of habitat that would be lost through treatment, and the fact that treatments are designed to foster larger stem diameters of seral species pileateds prefer for nesting, the proposed action would not affect the viability of this species. Consequently, the action alternatives may cause temporary minor reductions in **pileated woodpecker** nesting habitat at a local level, but would not likely indicate a local or regional change in habitat quality or population status.

Consistency with Forest Plan and Other Regulations

All proposed alternatives are intended to meet or exceed Forest Plan goals and objectives for managing snag habitat (USDA 1987, Appendix X). While some tree cutting would occur within designated old growth in the Northern Prairie analysis area, this would be limited to improvement of dry-site old growth; other designated old growth would continue to be managed for old-growth characteristics. The Northern Prairie project is consistent with Forest Plan direction for old-growth habitat management (see "Old Growth", Ch. 4).

(c) Forest Land Birds

Methodology

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

Alternative 1

The Northern Prairie project area contains two of four priority habitat types for forest land birds, riparian and dry ponderosa pine/Douglas-fir/grand fir forests. Currently the long-term viability of the dry ponderosa pine/Douglas-fir habitats is at risk. According to Idaho Partners in Flight (2000), 31 species of Idaho's breeding species use this habitat for nesting.

Riparian habitats would remain unaffected by Alternative 1, as riparian habitat conditions in the

project area are not expected to substantially change in the absence of active management. However, due to fire suppression, the dry, upland forests in the project area are expected to continue to depart from historical, relatively open-canopied conditions dominated by large, shade-intolerant trees. As mentioned previously, these areas are expected to continue to become increasingly dominated by young, dense, shade-tolerant species. Consequently, the forests would become less able to support forest land birds associated with dry forest types. The perpetuation of a homogeneous landscape dominated by Douglas-fir would decrease habitat richness and habitat diversity, thereby providing limited niches to support the diversity of land birds that occur on a forested landscape. In addition, the threat of potential stand-replacing fires would become more likely as stand density and disease increased and could eliminate forest land bird habitat for several decades.

Alternative 2 and 3

Priority habitats would not be adversely impacted by the proposed actions. Applying Best Management practices and the Inland Native Fish Strategy (INFS) would protect and maintain riparian habitat that occurs along stream corridors (see Chapter 2 "Design Criteria"). Also, a purpose of this project is to promote the restoration or enhance the structure of dry ponderosa pine/Douglas-fir forests. These alternatives would encourage the long-term stability of dry habitats by altering species composition, treating overcrowded conditions of shade tolerant trees, and include fire to provide the benefits similar to natural disturbances.

Opening the forest canopy on an otherwise monotonous landscape and managing for snags in these areas would increase landscape diversity and provide for those species that rely on more open habitat conditions (e.g. chipping sparrows, Williamson's sapsucker, hairy woodpecker, pine siskin). Addressing current stand conditions resulting from a homogeneous landscape dominated by Douglas-fir would increase habitat richness and habitat diversity, thereby providing more niches to support land birds.

Cumulative Effects

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for forest land birds:

Past Activities and Events - Past activities (such as timber harvest) and natural processes (such as wildfire) have generally benefited species that require openings and younger forest stands, and been detrimental to species that require dense forest canopy. In general, historic logging has decreased the amount or quality of dry site and riparian habitat (through clearcutting, overstory removal and riparian harvest), while more recent timber harvest have tended to maintain or improve these habitats (riparian buffers and commercial thinning in dry-site stands).

Current Management Activities – Personal use firewood gathering, various recreation activities and standard road maintenance would not significantly impact forest land birds. Continued fire suppression can have both positive and negative impacts on migratory birds. Fire suppression has contributed to high tree densities and fuel accumulations that present a risk to the survival of ponderosa pine on the drier habitats and western larch on the moister habitats. Conversely, fire

suppression has also protected riparian habitats and mature dry-site forests from lethal wildfire. Where active management does not occur, continued fire suppression will retain the current homogeneous nature of the vegetation. This would result in less diversity of habitat that might benefit a greater variety of species.

Other Restoration Projects – Thinning young, small diameter trees would be designed to increase the overall health and vigor of the stands. Additionally, thinning and underburning would improve species composition, resulting in stands that are more ecologically stable in the face of potential disturbances. For those acres treated, thinning would complement alternatives by promoting long-term stability of habitat conditions for land birds. Noxious weed treatments may have localized effects on some species, but would not alter species composition or structure in dry forest habitats, and riparian areas would not be treated. Future road decommissioning may have short-term impacts on some forest birds through disturbance, but would have long-term benefits by reducing human access/disturbance (decommissioning of currently drivable roads) and increasing potential habitat acres (revegetation of previously cleared roadbeds).

Currently active USFS timber sales – Timber sales authorized under the Mission-Brush EIS are outside the analysis area for forest land birds (Round Prairie watershed), and therefore would have no cumulative effects on this proposal.

Activities on other ownerships – The USFS is currently unaware of planned activity on private (FCP) lands within the analysis area, although these properties have been, and will likely continue to be, managed for intensive timber production. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion

The action alternatives would not affect riparian habitats and would result in short-term impacts and long-term improvements to the dry forest habitat type. Consequently, although some birds associated with dry forests may temporarily be displaced under the action alternatives, over time, the area would be able to support a higher abundance of dry-forest associated birds than under current conditions.

Consistency with Forest Plan and Other Regulations

While the Forest Plan does not address specific Standards or Guidelines for managing forest landbirds, it does provide guidance for managing snag habitat and old growth. All proposed alternatives are intended to meet or exceed Forest Plan goals and objectives for managing snag habitat (USDA 1987, Appendix X). While some tree cutting would occur within designated old growth in the Northern Prairie analysis area, this would be limited to improvement of dry-site old growth; other designated old growth would continue to be managed for old-growth characteristics.

The Northern Prairie project is consistent with Forest Plan direction for old-growth habitat management (see “Old Growth”, Chapter 4).

4.3 Watershed and Fisheries

This effects analysis evaluates each project alternative's potential impacts to aquatic resources, including water quality, natural channel processes and fisheries.

4.3-A Hydrology Environmental Consequences

Direct, indirect, and cumulative effects of the proposed action are discussed with respect to watershed condition, water quality, beneficial uses, water yield, and stream channel conditions. Direct effects are those effects that are directly caused by the action to a resource. For example direct delivery of sediment to a stream would be a direct effect. Indirect effects are those effects that are separated in terms of time and space. An example of an indirect effect may be an increase in water yield causing instability downstream. Cumulative effects are a summation of past, present and reasonable foreseeable actions along with the proposed actions. For there to be cumulative effects, there must be a direct and/or indirect effect.

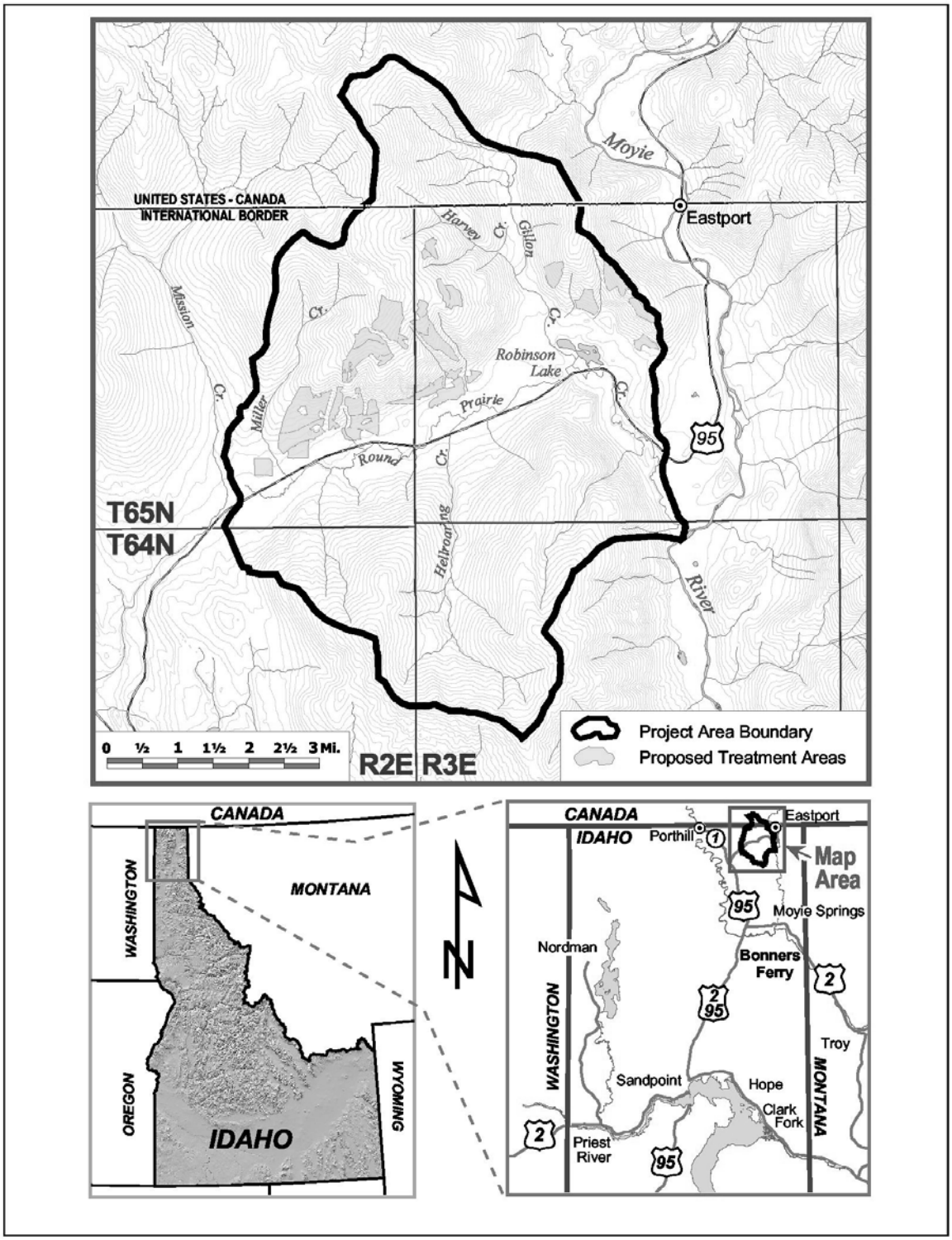
Three alternatives have been analyzed for the Northern Prairie project. Alternative 1 is the No Action alternative that would not include any timber harvest, prescribed burning in the project area units or road improvement work. Both Alternatives 2 and 3 share the exact same unit delineations, but the silvicultural treatments differ. Alternative 2 focuses primarily on dry site restoration through implementation shelterwood prescriptions and prescribed burning. Alternative 3 would focus on dry site restoration through the use of free selection prescriptions. Alternative 3 was developed to address wildlife habitat. Both action alternatives include the same road improvement work.

Hydrologic response to land use is highly variable and dependent on numerous site factors such as elevation, aspect, slope, soils, landforms, flow regimes, channel type, etc. It is important to examine hydrologic changes within the context of those factors and then translate them into potential changes to water yield, erosion, water quality, and ultimately aquatic habitat and beneficial uses. Issue indicators were developed to evaluate the effects of the alternatives upon aquatic resources. In Chapter 2 of this document, aquatic resources are identified as an "analysis issue" and not a "driving issue".

For the purpose of analyzing potential watershed cumulative effects in the project area, the Northern Prairie cumulative effects area (CEA) has been determined to include the entire Round Prairie Creek watershed (see Figure 4-10), down to the confluence with the Moyie River. The CEA includes 23,983 acres (37.5 mi^2) of land under mixed ownership. The CEA terminates at the confluence with the Moyie River for several reasons. As discussed in the existing conditions section, the mainstem of Round Prairie Creek flows through a series of meadows. These meadows would attenuate any increased flows and cause any extra sediment to drop out behind existing obstructions and along meanders (Rosgen 1996, p.2-2) The proposed units are located within the Round Prairie Creek and the units are concentrated on the north side of the creek. The units furthest downstream are about 2.5 miles upstream from the confluence of the Moyie River. In this amount of distance, it is believed that any potential impacts to Round Prairie Creek would be dissipated prior to joining the Moyie River because of the distance (2.5 miles) and the channel form and function (large meadow complex) which would allow sediment to settle out and would dissipate potential increases in water yield. The Northern Prairie project area is bracketed by Miller Creek on the western edge over to

Hogue Mountain on the eastern edge, Round Prairie Creek to the south and the drainage divide to the north. The cumulative effects analysis area for Northern Prairie is logically based on the projected effects of the proposed activities and the reasonable terminus of all possible effects.

Figure 4-10. Northern Prairie Watershed Cumulative Effects Area (CEA)



4.3-B Critical Management Issues

Critical management issues for protecting water resources include hydrologic function, riparian function, soil erosion and mass wasting, stream crossings, water yield, stream temperatures, cumulative watershed effects, and fisheries.

4.3-B.1 Hydrologic Function

Issue indicators: Ability of channel to balance water and sediment yields

Hydrologic function addresses the ability of the drainage to balance water and sediment yields. More specifically, it defines how the landscape performs in the hydrologic cycle of water as precipitation passes through the forest canopy, over and through the soil, and through streams, rivers, and lakes on its way to the ocean. A generalized relationship indicating the "stable channel balance" is described in Rosgen (1996) as a proportionality between sediment discharge, stream discharge, particle size and slope. A change in any one of these variables initiates adjustments in the other variables, thus resulting in a change to the channel.

4.3-B.2 Riparian Function

Issue indicators: Equivalent clearcut area (ECA) within RHCAs, domestic water sources, riparian road density in miles per square mile.

Many aquatic and terrestrial wildlife species are dependent on riparian, streamside habitat. Forested riparian areas provide the fallen trees to streams that in turn creates scour pools, dissipates erosive energy, controls bedload movement, stabilizes stream channels, and provides cover and food supplies for fish and other aquatic life. Vegetation in riparian areas filters sediment from overland flow before it reaches stream channels. Riparian vegetation also provides shade to moderate stream temperatures and protects cold-water fisheries. Timber harvest, road construction, or stand-replacing fires can adversely affect these critical riparian functions.

People also depend heavily upon properly functioning riparian systems. For those individuals who rely upon the forests for supplying their domestic water, a healthy riparian ecosystem is paramount. With the proposed Northern Prairie Project, all water rights recorded with the Idaho Department of Water Resources will be protected. All water rights within the proposed project area were identified on a map and each right would be protected with a 1,320 foot upstream buffer that would be 75 feet wide on either side of the channel. These protective buffers follow the State of Idaho's Forest Practices Rules.

Generally, the amount of road erosion in a watershed is a function of road density and the conditions of cutslopes, road surfaces, fillslopes, and road drainage structures. Where road erosion occurs close to streams, sediment is more likely to be delivered to channels and impact water quality and fish habitat. Studies have shown that for non-channelized flow, sediment rarely travels more than 300 ft (Belt et al. 1992). Non-channelized sediment transport distances increase with slope and decrease with the amount of obstructions (e.g., vegetation, rocks, logs, etc.) between the road and stream. Ditch relief culverts or other road drainage systems that convey runoff to hill-slopes away from

stream channels usually do not deliver sediment to streams. The risk of sedimentation from road washouts or other road-related mass slope failures impacting aquatic habitat is also far greater where these incidents occur near streams (Belt et al. 1992).

4.3-B.3 Soil Erosion and Mass Wasting

Issue indicators: WEPP model erosion and sediment delivery estimates in tons per acre, road density on sensitive land types in miles per square mile.

The geologic parent materials of the IPNF, with overlying surface volcanic ash, commonly produce sediment from a variety of sources (Niehoff 1998). The most common processes that accelerate sediment production are (1) road cut and fill slope failures; (2) surface erosion from road cuts, road fills, and driving surfaces; (3) mass wasting; and (4) hot burning. Forests generally have very low erosion rates unless they are disturbed (Elliot et al. 2000). Common disturbances include timber-harvesting operations, road construction, prescribed burning, and wildfires. The impact of these activities on soil erosion rates generally only lasts for a few years before the rapid regrowth of vegetation covers the surface with protective plant litter. When the year following disturbance has above-average precipitation, substantial soil erosion can occur.

Erosion impacts from soil-disturbing activities are not all short-lived. Forest roads are the source of long-term increases in surface soil erosion because road construction, use, and maintenance compact soils, reduce infiltration of rainfall and snowmelt, intercept and concentrate surface runoff and subsurface water, and limit vegetation regrowth.

The Watershed Erosion Prediction Project (WEPP) model is a physically based soil erosion model that provides estimates of soil erosion and sediment yield considering site-specific information about soil texture, climate, ground cover, and topographic settings (Elliot et al. 2000). WEPP differs from some other erosion and sedimentation models by accounting for sediment transport distance and gradient in predicting the amount of eroded soil that will be delivered to stream channels. Research has demonstrated that the distance from an erosion source to the stream and the steepness of the intervening slope largely determine the amount of sediment delivered to stream channels (Ketcheson and Megahan 1996). WEPP was used to estimate average annual erosion and sediment yield from each land management unit and the entire project area under different vegetation treatment scenarios (Watershed Report, Appendix B - project file). How these scenarios relate to timber harvest and fuels management prescriptions are described below under the analysis of soil erosion for each of the Northern Prairie project alternatives. WEPP was also used to estimate erosion and sediment yield from FS Road 2481 for 0.65 miles. Road 2481 is located in the Harvey Creek headwaters area and is currently delivering sediment to stream channels (Watershed Report - Appendix C). Actual erosion rates are highly variable due to local variations in climate and other factors, so values predicted by any model are only a single estimate of a highly variable process. Thirty-year averages from WEPP model runs are useful for comparing the relative effects between different management alternatives at the Northern Prairie project site, but should not be considered predictions of absolute sediment quantities. The accuracy of the predicted values from X-DRAIN and WEPP:Road models are, at best, within plus or minus fifty percent (Elliot 1999). True erosion rates are highly variable due to large variations in local topography, climate, soil properties, and vegetative properties, so predicted values are only a single estimate of a highly variable process. (Elliot, 1999). The strengths and weakness of the WEPP model were presented in aquatics existing condition narrative.

In addition to accelerating the rate of surface erosion and the efficiency of sediment delivery to streams, the soil disturbance and drainage alterations caused by road construction may increase the frequency and magnitude of mass wasting (Gucinski 2001). Mass wasting (e.g., landslides), a category of natural landscape processes, occurs when large masses of soil are rapidly displaced down slope. Naturally occurring landslides function to deliver important aquatic habitat components to streams, such as spawning gravel and LWD.

Land disturbances that change the hydrologic regime (e.g., reduced transpiration following timber harvest or fire) may increase the occurrence of mass wasting and harm aquatic habitats. In addition to the land clearing and soil compaction associated with roads, construction of improper road alignments may undercut the base of unstable slopes. Where roads intercept and concentrate surface runoff and subsurface flow, water may be diverted to hillsides causing soil saturation and slope failures. Finally, if culverts or other drainage structures become plugged with sediment and debris, road fill can be washed out and cause mass wasting. The probability of mass wasting increases beyond normal frequencies where roads are located on sensitive land types.

4.3-B.4 Stream Crossings

Issue indicators: Risk of stream crossing failure.

The amount of sediment delivered to stream channels from road erosion is affected by the road drainage system design, including road prism shape, proximity of the road to the stream system, and the length of road draining directly into streams at crossings (WFPB 1994). Ditches along in-sloped roads deliver nearly 100 percent of the sediment eroded from road sections near stream crossings. Thus, the number of roads crossing streambeds can be used as an indicator of potential sedimentation from roads.

In addition to sediment delivered from surface erosion, undersized and/or poorly maintained culverts are vulnerable to catastrophic failures when they cannot accommodate stream flows, bedload movement, and debris transported during flood events. Water backed up above a culvert can overtop the road causing the rapid erosion and delivery of fill material into the stream. The pulse of water, sediment, and debris released from a road washout often causes extensive flood damage downstream. The risk of culvert failures is an important qualitative consideration in evaluating the potential impact of management alternatives on streams.

4.3-B.5 Water Yield

Issue indicators: ECA in acres, Increased risk for rain-on-snow events and road density in miles per square mile.

Simply stated, water yield is a function of total precipitation, forest canopy and infiltration capacity. Most of the annual precipitation in the project area occurs as snowfall that is gradually released to streams through infiltration and shallow groundwater discharge. Given that total precipitation is not heavily influenced by site specific land uses, then the focus for water yield alteration in a forested drainage focuses upon changes in forest canopy and changes in soil infiltration capacity. Forest canopy cover functions in the hydrologic cycle to moderate precipitation runoff by intercepting and

transpiring water. Generally, removal of the forest canopy can result in increased water yield and hydrograph modification (e.g., increased peak flows, particularly in areas subject to rain-on-snow events). Increased peak flows may result in more extensive stream bank erosion, channel scouring, and bedload deposition. The streams within the Northern Prairie project area evolved with much more open stands than currently exist (see Forest Vegetation description). Therefore, prior to development, the streams within the treatment area likely had flashier runoffs with higher peaks than what is currently occurring on the site.

In addition to reducing canopy coverage, a second major cause of increased water yield is decreased infiltration. In the case of the project area, roads are the primary source of decreased infiltration. Roads disrupt both the water and sediment movement in a basin. Roads often cause increased sediment delivery to streams, and indirectly affect streams from activities that accompany road access (e.g., timber harvest and livestock grazing) (ICBEMP 1996). Roads contribute to increases in peak stream flows by increasing drainage efficiency as roads intercept and concentrate runoff from hill-slopes. Changes that may result from increased peak flows include alteration of stream geomorphology and ecology, more rapid turnover of riparian zone vegetation, and increased transport of woody debris and sediment (Jones and Grant 1996).

An indicator of the overall relative risk of impacts to the hydrologic functions of a forested watershed may be calculated as the Equivalent Clearcut Acres (ECA) (Belt 1980) and road densities. The ECA is calculated from the total amount of tree crown removal in forest stands that has resulted from timber harvesting, road construction, fire, and other activities. An ECA of over 30 percent may be used as an indicator that more intensive field surveys are warranted to determine if a watershed is at a threshold for hydrologic impacts (Belt 1980). Current ECA values for the Round Prairie Creek watershed is 9.8 percent. A discussion regarding the strengths and weaknesses of the ECA approach is provided in the water yield section of the existing conditions narrative.

Another potential influence on water yield is any increase in peaks associated with rain-on-snow events. Throughout the inland northwest, rain-on-snow events commonly occur between November and February. Many peak flows in northern Idaho are associated with mid-winter rain-on-snow events and rain-on-spring-snow events with peaks that are usually higher and of shorter duration than normal spring high flows (MacDonald and Hoffman, 1995). Models cannot predict peak flows resulting from these events because their frequencies are random. They do not occur on an annual basis; and they are dependent on certain climatic conditions such as air temperature, intensity and duration of precipitation, rain-on-snow elevations and snowpack characteristics (Berris and Harr, 1987). Although the bankfull flow tends to be the main channel-forming flow, these higher stream peaks can induce significant channel changes, particularly if they are accompanied by mass failures.

About 45% of the Round Prairie Creek drainage falls within a zone that tends to be prone to rain on snow events. This “zone” is identified as land forms that are located between 3,000 and 4,500 feet elevation. Though this information is valuable, it is critical to look at specific basin characteristics that may lend themselves to either amplifying or minimizing the risk for rain on snow. The Round Prairie Creek drainage is less prone to damaging rain on snow events for a several reasons. The first reason is that the drainage is located at a higher latitude and thus the warm maritime air masses moving up from the south (near Coeur d’Alene) tend to dissipate as they moves northward (NZGA Draft unpublished) Additionally, the Round Prairie Creek basin is dominated by a large meadow

complex through which the mainstem of Round Prairie Creek flows. This meadow complex can easily store excess runoff and attenuate peak flows (Rosgen 1996). A third reason is that over 30% of the streams within the larger drainage are less than a 2% gradient. This amount of low gradient stream is as high, or higher than any other sixth code basin flowing into the Moyie or Kootenai Rivers. With the lower stream gradient, there is less probability of damage associated with high stream flows (Rosgen 1996). In summary, though the Round Prairie Creek may experience an occasional rain-on-snow event, the event would most likely not be damaging because of the previously mentioned inherent characteristics of the basin.

The fourth value for the water yield issue indicator is road densities. It has been established that higher road densities tend to increase water yields off of forested slopes. Of particular importance are the road density values on highly sensitive landtypes as well as the number of road crossings per stream mile. Within the Round Prairie Creek drainage the road density is 3.5 $mi/mi^{2.}$ Within just the riparian zones, the road density is 3.7 $mi/mi^{2.}$ This suggests that many of the existing roads closely parallel stream courses and meadows.

4.3-B.6 Stream Temperatures

Issue indicators: Riparian disturbance: riparian ECAs and riparian road densities.

The single most important variable which controls direct solar radiation and thus heat influx in small forest streams is shade (Cobb 1988). Variables other than vegetation, which influence the amount of solar radiation reaching the stream, include stream width, orientation, solar angles and surrounding topography. With the proposed activities, the only variable that could possibly increase the amount of solar radiation to reach the stream would be timber harvesting. Timber harvesting in the riparian zone can increase solar radiation to the stream and thereby increase stream temperatures (Moore et al. 2005). Leaving intact riparian buffers may decrease the magnitude of stream temperature increases, whereas modifying riparian buffers increases solar heating to the streams. A range of studies has demonstrated that streams may or may not cool after flowing from clearings into shaded environments.

4.3-B.7 Cumulative Watershed Effects

Issue indicator: WATSED results and interpretation, Properly Functioning Condition (PFC) analysis and trend.

The cumulative effects of all activities in a watershed will likely have a greater effect on hydrologic conditions than the analysis of an individual project would alone. Current watershed conditions may be measured and analyzed based on past activities in the watershed. A review of watershed conditions in light of past activities can help us understand current watershed conditions and channel conditions trends. In order to provide the most comprehensive cumulative effects analysis for this project, a field review was supplemented by an Aerial Photo Analysis, GIS Modeling and WATSED modeling.

Field Review: The Northern Prairie Project area was field reviewed in the summer of 2003 by Parametrix Hydrologist, Jim Good. The 2003 review included the area roads, proposed units and stream conditions. Streams surveyed by Parametrix included: Round Prairie Creek, Gillon Creek

and Harvey Creek. All the notes from the 2003 survey are located in the project file. The entire Northern Prairie Project area was reviewed on several occasions in the spring and summer of 2006 by both the Forest Service Project Hydrologist and Bonners Ferry Hydrologic Technician. All field notes and photos from the 2006 field review are available in the project file.

Aerial Photo Analysis: Using photos dating back to 1935, stream and landscape changes were analyzed and recorded. Years of review included: 1935, 1949, 1958, 1965, 1975, 1983, 1991 and 1996. The report documenting this aerial photo review is located in the project file.

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

WATSED Model: The anticipated sediment and water yield runoff for the Round Prairie Creek drainage and subdrainages were estimated from the methods documented in the R1/R4 Sediment Guides (USDA 1981), WATBAL Technical User Guide (Patten 1989) and WADA (USDA WADA (WATSED Automated Data Assembler), undated). The version calibrated for the Idaho Panhandle National Forests, known as WATSED, is an analysis tool that spatially and temporally organizes typical watershed response relationships as a result of forest practices. The estimated responses are combined with other sources of information and analyses to help determine the findings of probable effects.

WATSED estimates a series of anticipated annual values over a period of years. The model predicts an estimate of most likely mean annual sediment loads (reported as tons per square mile per year), and the expected sediment load modifications over time. The estimate of additional loading is expressed as a percent of the "natural" (i.e., historic mean load prior to significant development activities) sediment load, which is based on the history of disturbances and average climate patterns in the watershed. In this analysis, the existing condition represents the year 2007 and any anticipated disturbances related to the proposed activities occur in 2008.

The estimates of sediment and peak flow reflect how watersheds with similar conditions and landtypes have responded over time to a similar history of disturbance. WATSED is not intended or designed to model event-based processes and functions, or specific in-channel responses. It does, however, incorporate the results of those processes in the calibration of its driving coefficients. WATSED does not evaluate increases in sediment and peak flows specifically resulting from "rain-on-snow" or other stochastic events, nor does it attempt to estimate in-channel and stream-bank erosion. Additionally, the model assesses roadwork as new construction, and, therefore, the sediment and water yield values are artificially inflated. (There is no ability in the model to differentiate between a new road and road reconstruction.) Finally, the WATSED model does not allow for water yield recovery from roads as it does from vegetation treatments. In the model, vegetative treatments are assumed to recover vegetatively, but it is assumed that roads would not revegetate. (Patten, retired IPNF Forest Hydrologist, personal comm.).

The Idaho Panhandle National Forests (IPNF) frequently validates the WATSED coefficients and estimates using long-term water quality monitoring networks on the IPNF (USDA 2003, 2000, 1999

and 1998). The model is a predictive tool and the values should not be used as absolute values, but rather as a comparison of possible alternatives. The forest management activities used to calibrate the model include standard BMPs and Soil and Water Conservation Practices; therefore, standard BMPs and Soil and Water Conservation Practices are necessary requirements for maintaining an effective confidence level in the model's use. Non-standard BMPs, management or natural disturbances not related to forest practices, and site-specific non-standard BMPs must be integrated into the final analysis to fully determine watershed response.

WATSED was designed to address and integrate a vast and complex array of landtypes and disturbances within the context of a watershed and to organize the evaluation according to rule sets established by the author and cooperators. In the case of WATSED, the rule sets reflect watershed processes and functions based on research, data and analyses collected locally and regionally. Forest Plan monitoring reports (USDA 2003, 2000, 1999 and 1998) describe how the calibration and validation of WATSED have been an annual process on the forest and where changes have been made.

The model, however, also includes simplifying assumptions, and does not include all possible controlling factors. Therefore, the use of models is to provide one set of information to the technical user who, along with knowledge of the model and its limitations, other models, data, analysis, experience and judgment, must integrate all those sources to make the appropriate findings and conclusions. Recent validation of WATSED runs indicated that the WATSED measured responses were accurate for flow, but appeared to overestimate sediment loads (USDA 2000). To date, the WATSED model is the most appropriate tool for hydrologists to use when assessing cumulative effects in snowmelt dominated, mountainous watersheds (R. Patten, personal communication).

The IPNF is preparing a watershed assessment of the Kootenai River basin and Moyie River sub-basin in Idaho (USFS 2000). A primary issue being addressed is that water quality and associated hydrologic conditions may have been modified or compromised by natural or developmental processes to the extent that the beneficial uses of the water are at risk of being or are no longer fully supported. Data on the physical condition and biological variables of each watershed and subwatershed has been compiled and analyzed in assessing the perceived water quality and watershed integrity relative to undisturbed conditions. This properly functioning condition (PFC) analysis is a measure of cumulative hydrologic effects from past watershed activities.

The PFC analysis provides three status ratings (USFS 2000). Watersheds considered to be "not properly functioning" are not capable of fully supporting beneficial uses without significant intervention and/or extremely long recovery periods, and often include aquatic resources that are seriously degraded or no longer viable. Watersheds that are "functioning at risk" have high watershed integrity, but present or ongoing adverse disturbances are likely to compromise that integrity if they are not modified or corrected; or they have at least moderate watershed integrity that has been significantly compromised by adverse disturbances. Watersheds in "properly functioning condition" have streams in dynamic equilibrium with their watersheds and fully support their integral biological system. The watersheds that are functioning at risk are the highest priority within the basin for watershed and aquatic restoration efforts.

4.3-B.8 Fisheries

Issue indicators: Mean width-to-depth ratio, LWD frequency, percent bank stability, percent undercut banks, pool frequency

Fish populations are primarily affected by adverse impacts on habitat conditions, and by interactions with other species either through competition or hybridization. Impacts on habitat include the alteration of hydrologic and riparian functions and increased sediment yields as discussed in this section. Timber harvesting can lead to increased peak flows that alter stream geomorphology and ecology and increase the transport of woody debris and sediment. Alteration of the timing and magnitude of flows can lead to substrate, habitat, or flow conditions that are unsuitable for some fish life stages. Such alterations may not only be detrimental to all fish species, but habitat changes may favor one or more species and cause a change in fish species assemblages. In addition, forested riparian areas are the source of LWD recruitment and stream shading that provide habitat for fish (pool formation, cover, food supplies) and moderate stream temperatures.

INFISH in-stream habitat criteria are intended to provide guidelines for evaluation of existing in-stream habitat conditions. INFISH in-stream habitat features include mean width-to-depth ratio, LWD frequency, percent bank stability, percent undercut banks, and pool frequency. Under INFISH, RHCAs establish recommended riparian buffer widths necessary to support the proper functioning of in-stream habitat-forming processes.

4.3-C Hydrologic Function

4.3-C.1 Alternative 1

(a) Direct and Indirect Effects

Hydrologic function could be affected under the no action alternative, Alternative 1. The impact would not be attributed to timber harvesting or road building but rather attributed to the potential effects associated with not improving road conditions and not addressing fuel loading.

With the implementation of the no action alternative, no new roads would be constructed, roads would not be decommissioned, and road density in the project area would remain unchanged. There are currently 23.02 road miles (2.75 mi/mi^2) in the Gillon Creek subwatershed and 132.08 road miles (3.5 mi/mi^2) in the Northern Prairie CEA. Additionally, fuel loading would remain unchanged and the risk of wildfire would not be moderated. The No Action Alternative may perpetuate possibility of a road failure from lack of road maintenance and the possibility of a stand replacing fire.

Lack of road maintenance could lead to road surface erosion and an increasing risk of culvert failures. Of specific concern are the 8-inch culverts under road FS 2587. Sediment and debris deposits upstream from the pipes indicate that they were partly blocked or otherwise unable to pass flood flows at times in the past. Erosion of the road surface exposing the culverts to vehicle damage is further evidence of this problem. Within proposed Unit 104, an intermittent creek has washed out the fill from one road crossing and is actively downcutting through two other abandoned roads. Another concern is the final mile of road FS 2481 where, unlike the other sites, sediment delivery to fish-bearing waters is evident. This road segment was constructed in compacted till and erosion of the cutbanks, ditches, and road surface is delivering sediment to the headwaters of Harvey Creek. Road erosion was observed in a few other locations within the project area in July 2003 (e.g., deep

ruts in road FS 2274); however, it does not appear that sediment is being delivered to stream channels from these sites. Because of the dry site conditions and lack of runoff, other roads are generally in good condition and risks of cross-drain failures are considered minimal. With the exceptions mentioned above, erosion of road surfaces is currently minor and there is little evidence of sediment transport below cross-drains.

Delaying harvest in overstocked timber stands could result in an increase in tree mortality and fuel buildup in these stands. Continued fuel buildup would increase the risk of high-intensity wildfires that would kill most of the vegetation in both upland and riparian areas. The high soil temperatures produced during high-intensity fires create hydrophobic (i.e., water repellant) surface soil conditions that greatly reduce water infiltration and increase overland flow and erosion (Niehoff 1998). Increased runoff combined with a lack of vegetation cover to protect slopes and filter sediments would lead to increased peak stream flows, excessive sediment delivery, and consequent adverse impacts to water quality, channel stability, and aquatic habitat.

In the very unlikely scenario, that an intense wildfire consumed all of the same acres proposed for treatment, the WEPP model projected delivery of about 35 tons of sediment delivery to the streams. Still, if 35 tons of sediment were delivered to the streams of the Northern Prairie Project area, the result would be possible road failures along the lower most crossings above the mainstem of Round Prairie Creek. In those smaller order streams draining the actual units, the delivery of large volumes of sediment would likely exceed the ability of the channel to effectively transport and deposit the material. In limited instances, these smaller channels would likely create "new" channels around the sediment and gradually re-establish hydrologic equilibrium. This response was observed in the field surveys conducted in 2006, where a stream cut a new channel around an ancient debris torrent deposit. Given the landforms and lack of much hydrologic connectivity between the treatment slopes and the mainstem of Round Prairie Creek, there is very little chance of sediment adversely impacting hydrologic function of Round Prairie Creek.

4.3-C.2 Alternatives 2 and 3

(a) Direct and Indirect Effects

Hydrologic function would be slightly improved under either action alternative. The harvesting of the timber across the slopes would move the stands towards historic vegetative openings. The streams on these slopes evolved in these open stands and thus would be able to accommodate increases in water yields. Because of the historically open stands water yield was generally higher than the creeks are experiencing today. With the projected increases in water yield, sediment stored in the channels could be flushed through both the named and unnamed channels to Round Prairie Creek.

Effects to the Moyie River: Under both action alternatives, there is a plan to reconstruct a portion of Road 2573D. The entire existing 2573D road proposed for reconstruction is located on the Moyie side of the slope. Given the lack of water on the ridge, coupled with the existing low to moderate risk, there is no feasible way for sediment to move more than a few feet off the road prism during reconstruction. In all probability, reopening Road 2573 will allow the agency to stabilize the road and provide basic maintenance to existing drainage structures (i.e. ditch lines and culverts). Within the project file, there is a map showing the existing and proposed road system overlaying a

topographic map and risk delineation. Given that there is no feasible way for this proposed road reconstruction to cause direct sediment or water yield increases, there will be no further discussion in this document about any possible effects of this proposed road work to aquatic resources. Therefore since there is no direct or indirect effect from this proposed road work, there will be no cumulative effects analysis of the Moyie River for the proposed Northern Round Prairie project.

Effects to Round Prairie Creek: Historically, much of the Round Prairie Creek was likely an E6 channel type that cut through a series of wetlands within a glaciated valley. The glacial deposits within the meadow are deep and the channel most likely migrated across the meadow with some regularity as the wetlands filled or beaver dams failed. The projected increase in water and sediment yields would not destabilize an E6 channel type such as Round Prairie Creek. These E6 channel types are inherently able to process increases in water and sediment yield. Today some of the old E6 channel type is still present but portions of the stream have increased in the width to depth ratio and are now more of a C4 channel type. It is possible that over time the width to depth ratio of the stream increased in response to landuse pressures, ditching and grazing. Still the sinuous nature of the channel coupled with the low gradient allows the meadow of Round Prairie Creek to have the sediment settle on the floodplains and high stream flows slowed during flooding events. Any extra sediment and water yield delivered from the steeper channels would be delivered onto the floodplains during high flow events in Round Prairie Creek. Given the landforms and the sinuous nature of the channel, it is unlikely that any sediment would move beyond the confluence of the Round Prairie Creek and Monk Creek. Reducing road density within the project area will further "normalize" the water and sediment balance: Both alternatives propose decommissioning 4.7 miles of roads (Table 2-11). There are currently 23.0 road miles (2.75 mi/mi^2) in the Gillon Creek subwatershed and 132.08 road miles (3.5 miles/mi^2) in the larger Round Prairie Creek CEA. Decommissioning would reduce road density to 3.4 mi/mi^{2}in the CEA. When the project work is completed, the ability of Round Prairie Creek and its tributaries to process water and sediment should be slightly improved.

Effects to the tributaries of Round Prairie Creek: Most of the named and unnamed channels draining off the treatment area are B channel types that serve to transport water and sediment to lower reaches. In the field review it was noted that many of the streams draining off the slopes are seasonal and often there is no connectivity to the mainstem of Round Prairie Creek. The proposed harvesting in the Gillon drainage would slightly increase both water and sediment yield. According to recent stream surveys, it appears that the channels (Gillon and other unnamed tributaries) would be able to accommodate these very slight and short lived increases in sediment and water yield.

Potential Physical Changes to Affected Streams: The slight increase in water yield for Round Prairie and Gillon Creeks would cause some minor localized shifts in the physical channel dimensions (especially width to depth ratios). The changes in physical channel dimensions (e.g. deeper pools and deeper and narrower channels) could actually be a localized benefit to existing salmonid spawning and cold-water organisms. These changes would likely improve fish habitat by increasing complexity. Deeper pools would increase cover and overwintering areas and the resulting scour associated with any increase in water yield would deposit clean gravels on pool tailouts for potential spawning sites. The net decrease in sediment yield would improve survival of eggs and fry by reducing substrate embeddedness.

In summary, hydrologic function would not be adversely affected under these alternatives. No new permanent roads or temporary roads would be constructed. There are currently 23.0 road miles (2.8 mi/mi^2) in the Gillon Creek subwatershed and 132.08 road miles (3.5 mi/mi^2) in the Northern Prairie CEA. Decommissioning would reduce road density to 3.4 mi/mi^2 in the CEA and improve slope hydrology and ultimately hydrologic function. Overall, the effects to hydrologic function would be fairly minimal. As discussed in the existing condition section, most of the adverse effects to hydrologic function occurred in the 1950s when many of these roads were constructed. In the best case, removal of the excess roads would improve hydrologic connectivity across the slope and "normalize" the slope hydrology (i.e. time to peak, infiltration, etc).

4.3-D Riparian Function

4.3-D.1 Alternative 1

(a) Direct and Indirect Effects

Riparian function would not change directly under Alternative 1. There would be no change in ECAs within the RHCAs and there would be no reduction is road density with the RHCAS. Currently 6% of the RHCA is in hydrologic openings within the Round Prairie Creek watershed (NZGA, 2006, unpublished). Most of the ECAs within the watershed are found along Round Prairie Creek where the stream flows through open pasture/meadows. In the absence of proposed management activities, the risk of high-intensity wildfires in the project area may continue to increase with fuels buildup. A hot, uncontrolled wildfire could spread to RHCAs creating new riparian openings. Depending upon the severity of the fire, the riparian zone could be essentially vegetatively rejuvenated or vegetatively retarded. If the buffer were rejuvenated, then there could be both biological and physical benefits. Similarly if the fire was too intense that vegetative rejuvenation could be hampered or retarded and depending upon the location, there could be adverse physical and biological impacts. There is too much variability (e.g. weather conditions, fuel loading, soil moisture) to absolutely determine the affect of a wildfire upon the riparian zone.

Domestic water sources would remain unchanged with the no action alternative.

No new roads would be constructed and riparian road density would not change under Alternative 1. There are currently 5.7 road miles within RHCAs in the Gillon Creek subwatershed and 23.5 road miles within RHCAs in the Round Prairie Creek watershed.

Lacking direct and/or indirect effects of Alternative 1 to Riparian Function, there are no cumulative effects.

4.3-D.2 Alternatives 2 and 3

(a) Direct and Indirect Effects

Timber harvest unit boundaries have been designed to avoid Riparian Habitat Conservation Areas (RHCAs) and thus protect riparian areas. Riparian function would not change directly under these alternatives. Further, fuels reduction would reduce the risk of a stand-replacing fire spreading from Northern Prairie treatment units to adjacent riparian areas (Behrens, pers. comm.). There are

currently 4,051 acres of riparian habitat within the Round Prairie Creek watershed and within these RHCAs, about 1,440 acres are considered openings (or ECAs). The openings within the riparian zones of the Round Prairie Creek watershed are composed mostly of riparian meadows. These alternatives would not increase the openings within RHCAs.

No new permanent roads would be constructed under these alternatives; therefore, there would be no increase to the existing riparian road density. Decommissioning would reduce roads within RHCAs to by 1.94 miles in the CEA. Post Treatment, the road density in the RHCAs would drop from 3.7 mi/mi^2 to 3.4 mi/mi^2.

4.3-E Soil Erosion and Mass Wasting

4.3-E.1 Alternative 1

(a) Direct and Indirect Effects

The risk of increased soil erosion and mass wasting would not change with implementation of the No-Action alternative. Based on WEPP model estimates for a twenty-year-old forest, sediment delivery from the Northern Prairie project timber harvest units is negligible (0.0 tons per year) under Alternative 1 (see Table 4-8). The proposed treatment areas are mostly dry sites with little runoff. Except for Harvey Creek, most of the tributaries draining the project area are intermittent streams that infiltrate the ground before reaching Gillon and Round Prairie creeks. If fuels buildup led to a high-severity fire resulting in hydrophobic soil conditions in all project units, the WEPP model estimates that sediment delivery could amount to about 35 tons per year (Table 4-8). Soil erosion and mass wasting would not change under Alternative 1, unless continued fuel buildup resulted in a stand-replacing wildfire that changed the hydrologic regime and increased the occurrence of slope failures in the project area. Presently there are 5.12 miles of road in the Northern Prairie CEA constructed on medium-sensitivity land types and 24.11 miles on high-sensitivity land types, for a total road density on sensitive land types of 0.78 miles per square mile. Because no new permanent roads would be constructed, road density on sensitive land types would not change under Alternative 1. Evidence of road erosion was observed at several locations during July 2003 and 2006 field reconnaissance; however, evidence of sediment delivery to fish bearing stream channels was evident from road FS 2481 in the headwaters of Harvey Creek. WEPP model estimates for this road segment indicated that, under existing conditions, average sediment delivery from this road segment to Harvey Creek is approximately 0.4 tons per year[4]. Under Alternative 1, funding for erosion control at these sites is uncertain.

In the soils portion of the document as well as the Aquatics portion of Chapter 3, there is discussion of underlying geology and landtype sensitivity.

[4] The WEPP model was applied to 0.65 miles of Road 2481 and included thirteen road segments.

Table 4-8. Summary of Watershed Erosion Prediction Program Model Sediment Delivery Estimates

Unit	Acres	Twenty-year-old Forest[5]			Low-severity Fire[6]			Five-year-old Forest[7]			High-severity Fire[8]		
		Sediment Delivery (tons/acre)	Sediment Delivery (tons)	Probability of Sediment Delivery (%)	Sediment Delivery (tons/acre)	Sediment Delivery (tons)	Probability of Sediment Delivery (%)	Sediment Delivery (tons/acre)	Sediment Delivery (tons)	Probability of Sediment Delivery (%)	Sediment Delivery (tons/acre)	Sediment Delivery (tons)	Probability of Sediment Delivery (%)
69	114	0	0	0	0	0	3	0	0	3	N/A	N/A	N/A
71	40	0	0	0	0	0	7	0	0	3	0	0	7
72	89	0	0	0	0	0	10	0	0	3	0	0	10
73	14	0	0	0	0	0	10	0	0	7	0	0	10
74	13	0	0	0	0	0	10	0	0	7	0	0	13
75	11	0	0	0	0	0	17	0	0	3	0	0	17
76	61	0	0	0	0	0	17	0	0	3	0.01	0.5	30
78	30	0	0	0	0	0	7	0	0	3	0	0	13
79	30	0	0	0	0	0	13	0	0	7	0.02	1.3	30
80	8	0	0	0	0.01	0.1	17	0	0	7	0.02	0.2	30
81	21	0	0	0	0.01	0.3	13	0	0	7	0.02	0.5	33
82	18	0	0	0	0	0	10	0	0	7	0	0	10
83	22	0	0	0	0	0	13	0	0	7	0.02	0.5	30
89	42	0	0	0	0	0	13	0	0	7	0	0	13
90	54	0	0	0	0	0	13	0	0	7	0	0	17
91	18	0	0	0	0	0	10	0	0	7	0	0	13
92	37	0	0	0	0	0	17	0	0	7	0	0	17
93	86	0	0	0	0	0	23	0	0	7	0	0	30
94	163	0	0	0	0	0	17	0	0	7	0.01	1.6	17
96	12	0	0	3	0	0	23	0	0	7	0	0	33

[5] This vegetation treatment simulates expected conditions under the no-action alternative, in the absence of wildfire. This condition applies to any well-established forest with soils completely covered with a forest duff layer.

[6] This vegetation treatment simulates expected conditions the year of a prescribed fire or one year after a wildfire that did not result in hydrophobic soils. Low-intensity wildfires could occur in areas of some units under the no-action alternative. These same conditions would occur in understory burn areas under Alternatives 2 and 3.

[7] This vegetation treatment simulates vegetation that has become sufficiently established to generate 100 percent ground cover in a heavily logged forest. This condition could follow timber harvest and/or one to two years after understory burning under Alternatives 2 and 3.

[8] This vegetation treatment simulates where a stand-replacing fire coincided with low soil moisture causing hydrophobic soils. Increased risk of these conditions occurs with fuel buildup under Alternative 1. A high-intensity fire is not likely in Unit 69 due to extensive rock outcrops.

Unit	Acres	Twenty-year-old Forest[5]			Low-severity Fire[6]			Five-year-old Forest[7]			High-severity Fire[8]		
		Sediment Delivery (tons/acre)	Sediment Delivery (tons)	Probability of Sediment Delivery (%)	Sediment Delivery (tons/acre)	Sediment Delivery (tons)	Probability of Sediment Delivery (%)	Sediment Delivery (tons/acre)	Sediment Delivery (tons)	Probability of Sediment Delivery (%)	Sediment Delivery (tons/acre)	Sediment Delivery (tons)	Probability of Sediment Delivery (%)
98	13	0	0	0	0	0	10	0	0	7	0	0	13
99	62	0	0	3	0	0	30	0	0	7	0.01	0.6	53
100	51	0	0	0	0	0	20	0	0	7	0	0	43
103	65	0	0	0	0	0	10	0	0	7	0	0	10
104	41	0	0	0	0	0	17	0	0	7	0.03	1.2	27
105	25	0	0	0	0	0	17	0	0	7	0.03	0.8	27
121	45	0	0	0	0	0	33	0	0	7	0.61	27.5	70
123	46	0	0	0	0	0	17	0	0	7	0	0	17
136	39	0	0	17	0	0	37	0	0	23	0.02	0.8	53
137	36	0	0	0	0	0	17	0	0	7	0	0	30
138	25	0	0	0	0	0	13	0	0	7	0	0	13
	1331	**TOTAL**	**0.00**			**0.4**		**0.00**			**TOTAL**	**35.5**	

4.3-E.2 Alternatives 2 and 3

(a) Direct and Indirect Effects

Under both action alternatives, there would be a slight increase in disturbed soils and a slight improvement in reducing the risk of future soil erosion and mass wasting. Much of the risk reduction is attributed to the proposed road obliteration and road improvements.

As presented earlier in the existing conditions soils section of this report, approximately 1.3% (17.5 acres) of the project area currently has detrimentally disturbed soils. Using the same methodology, the soil scientists projected that with the implementation of either action alternative, that the area of detrimentally impacted soils within the CEA is estimated to increase by 5.8 percent (78 acres) for both action alternatives (Rone 2008).

Although detrimentally impacted soils would slightly increase under either Action Alternative, the project increase is small and well within Forest Plan Standards. In a simple effort to compare possible effects, WEPP was used to compare the projected impacts of the action alternative to that of a stand replacing fire. According to the WEPP results (Table 4-8) the stand replacing fire would be far more detrimental to the soils than would the proposed harvest treatments. Design features to protect soils from tractor logging impacts would include using existing skid trails and minimizing any new skid trails, using slash mats to minimize compaction, and grapple-piling slash in many units during the wet season to minimize the potential for soil impacts from burning. The effectiveness of the design features is presented in the Appendix C.

Based on WEPP model estimates, sediment delivery from Northern Prairie project units is expected to be non-measurable (Table 4-8). In units where the understory is broadcast burned (see fuels treatments listed for each unit in Table 4-9), the stand would be best represented by the low-intensity fire condition for the first year or two after fuels treatment. However, in each unit where the WEPP model predicts sediment yield under the low-severity fire condition, grapple pile burning is prescribed rather than broadcast burning. Grapple pile burning approximates the five-year old forest condition (i.e., complete soil cover with brush, grass, or young trees remaining after harvest; Elliot et al. 2000) and is therefore a more representative condition following treatment in these units. WEPP model estimates for a five-year-old forest indicate that sediment delivery would be negligible (0.0 tons per year). This is supported by the Soil Scientist's report for Northern Prairie that stated "No measurable negative effects on soils are anticipated from prescribed burning or post harvest underburning if soil moisture is equal to or above 25 percent when the burning occurs" (Rone 2008). WEPP model runs are useful for comparing the relative effects between different management alternatives at the Northern Prairie project site, but should not be considered predictions of absolute sediment quantities.

Funding from timber sale revenues would be available to implement some needed road erosion control measures under both action alternatives. The three undersized culverts under Road FS 2587 would be temporarily replaced and gravel surfacing would be added in some sections to upgrade the road for log hauling. After the timber sale, the road would be decommissioned by removing all drainage structures and blocking vehicle access beyond private lands. In Unit 104, reestablishing the intermittent stream channel through three closed road crossings would control the risk of further road

washouts. Reconditioning FS 2481 and reconstructing this road between Units 79 and 81 could also be implemented during the timber sale, resulting in reduced sediment delivery to Harvey Creek. The WEPP model estimates that most of the existing 1.1 tons per year of sediment delivery from this road segment could be eliminated if the distance between ditch relief culverts was reduced by adding five new culverts during road reconstruction (WEPP results - project file).

Presently there are 5.1 miles of road in the Northern Prairie CEA constructed on medium-sensitivity land types and 24.1 miles on high-sensitivity land types, for a total road density on sensitive land types of 0.78 mi/mi^2. Neither action alternative includes any new road construction. Decommissioning would reduce roads within sensitive landtypes by 2.8 miles in the CEA, thus changing the total road density on sensitive landtypes from 0.78 to 0.72 mi/mi^2. The decommissioning of the roads will require that the roads be closed to motorized vehicles, unstable slopes would be recontoured, all culverts would be removed from NFS lands, waterbars would be installed on non-recontoured sections to disperse water across the slopes and exposed soils would be revegetated within two weeks of disturbance. The proposed decommissioning of 2.8 miles of roads on moderate to highly sensitive landtypes using the hydrologist's prescription will provide the foundation for the road removal to be successful. While, there will be very short term (hours, not days) of increased turbidity in the stream, there will be a definite longterm benefit to the streams in the project area with the removal of these excess roads. Once the road decommissioning is completed, it will improve the resiliency of the watershed and reduce of risk of large pulses of sediment reaching the streams.

Table 4-9. Soil Resources Evaluation for Northern Prairie Project Forest Management Units

		Proposed Treatment					Potential Detrimental Disturbance Alternatives 2 & Alt. 3			
							Regional Soil Quality Standard		Forest Plan Standard (incl. System Roads^)	
Unit	Activity Area (acres)	Alt. 2	Alt. 3	Proposed Logging System	Proposed Slash Treatment	Existing Condition Detrimental Disturbance % **	Estimated Acres*	In Unit Total %	Estimated Acres*	In Unit Total %
69	114	Burn	Burn	NA	UB	0	1.1	1	1.1	1
71	40	ISW	ISW	T	GP	1	5.2	13	5.2	13
72	89	FS-M	FS-M	S	GP	1	7.1	8	7.1	8
73	14	FS-D	FS-D	T	GP	0	1.8	13	1.8	13
74	13	ISW	FS-D	S	UB	0	1.0	8	1.0	8
75	11	ISW	FS-D	S	UB	0	0.9	8	0.9	8
76	61	ISW	FS-D	H	UB	0	0.6	1	0.6	1
78	30	ISW	FS-M	S	GP	0	2.4	8	2.4	8
79	30	FS-M	FS-M	S	GP	3	2.4	8	2.4	8
80	8	ISW	FS-M	T	GP	2	1.0	13	1.0	13
81	21	ISW	ISW	S	UB	0	1.7	8	1.7	8
82	18	ISW	ISW	T	GP	1	2.3	13	2.3	13
83	22	FS-M	FS-M	T	GP	3	2.9	13	2.9	13
89	42	ISW	FS-D	H	UB	0	0.4	1	0.4	1
90	54	ISW	FS-D	T	GP	3	5.4	10	5.6	10
91	18	ISW	FS-D	H	UB	0	0.2	1	0.2	1
92	37	ISW	FS-D	H	UB	0	0.4	1	0.4	1
93	86	ISW	FS-D	T	UB	5	8.6	10	9.4	11
94	163	ISW	FS-D	H	UB	0	1.6	1	2.3	1
96	12	ISW	FS-D	T	GP	3	1.2	10	1.4	12
98	13	ISW	FS-D	H	UB	0	0.1	1	0.1	1
99	62	ISW	FS-D	T	GP	5	6.2	10	7.3	12
100	51	ISW	FS-D	H	UB	0	0.5	1	0.5	1
103	65	ISW	FS-D	S/T	UB	0	6.0	9	6.4	10
104	41	ISW	FS-D	H	UB	0	0.4	1	0.4	1
105	25	ISW	FS-D	T	UB	8	2.5	10	3.0	12
121	45	ISW	FS-D	S	UB	0	3.6	8	3.6	8
123	46	ISW	FS-D	H	UB	0	0.5	1	0.5	1
136	39	ISW	FS-D	T	GP	2	3.9	10	4.2	11
137	36	ISW	FS-D	T	GP	4	3.6	10	3.6	10
138	25	ISW	FS-D	T	GP	3	2.5	10	2.5	10
Total (ac)	**1,331**					**17.5**	**78.0**		**82.2**	

GB – Ground Based
S – Skyline
FS – Free Selection
ISW – Irregular Shelterwood
M – Moist
D - Dry
GP – Grapple Pile
UB - Underburn

*Coefficients used to predict potential detrimental disturbance for proposed logging and slash treatment scenarios are included in the project file (soils report). The level of disturbance increase also depends on the amount or lack of existing skid trails. Activity units that have had little prior disturbance will show a greater incremental increase in potential detrimental disturbance than those units that already contain a network of existing skid trails. Little to no increase in disturbance is expected there because equipment would re-use existing skid trails. Additionally, several ground-based units (90, 93, 96, 99, 105, 136, 137, and 137) will be winter logged for further resource protection. Rounding errors may occur.

**Existing detrimental disturbance includes impacts from old non-system roads/trails and landings present in some of the units.

^System roads that dissect through units.

4.3-F Stream Crossings

4.3-F.1 Alternative 1

(a) Direct and Indirect Effects

The risk of a failure at any one of the higher risk culverts would increase under Alternative 1 because of the current lack of maintenance. High risk culverts were identified at several locations in the Round Prairie Creek watershed, including some in the project area. Road 2587 has three undersized culverts that have become plugged with sediment and debris, causing road erosion. Although this road lies on relatively flat terrain and fill volumes are minimal, this area is at the base of an alluvial fan, and there is a high risk that the culverts will become blocked and the road will wash out. The fill for closed Road 2573UF and Road 2573UM is gradually being washed out where these closed roads cross an intermittent stream at the east end of the project area. A short distance upstream, Road 2573UD has already been washed out with cobble to fine sediment transported downstream. Diversion of the stream onto the road tread for 100 ft has also saturated the road fill and caused a slope failure that delivered more sediment and debris to the intermittent stream channel. Although there is no evidence that this intermittent stream delivers sediment to fish-bearing waters, continued erosion and mass wasting problems could pose a risk for the culvert at Road 2573 and degrade water quality in the intermittent stream. Outside of the project area, other roads need to be decommissioned to reduce the risk of drainage failures or ongoing erosion, particularly Road 2481D in the Miller Creek subwatershed. A 30-inch culvert recently failed where the road crosses the main channel of Miller Creek, and the road fill was washed into the stream at this location. A second 30-inch culvert on a branch of Miller Creek is at risk of a similar failure. Because there would be no timber sale contracts under Alternative 1, the Forest Service will need to pursue other funding sources to correct these road drainage problems and reduce the risk of culvert failures.

4.3-F.2 Alternatives 2 and 3

(a) Direct and Indirect Effects

The risk of stream crossing failures in the Northern Prairie CEA would be reduced for both action alternatives through the decommissioning of 4.7 miles of road. The three undersized and failing culverts under road FS 2587 would be replaced during management activities proposed under the action alternatives. In summary, the implementation of either action alternative would reduce the total number of stream crossings and reduce the risk of future failures at stream crossings. When the pipes are removed and/or replaced, there will be a short lived increase in turbidity downstream of the work (The turbidity increase would likely last less than 1 hour based of the experience of the project hydrologist and a recent study by Randy Foltz 2007). The turbidity will be the result of the stream reestablishing itself in the updated crossing. The majority of the potential increase in turbidity would be mitigated with the use of best management practices (i.e. diverting the stream during excavation or filtering the water just downstream).

4.3-G Water Yield

4.3-G.1 Alternative 1

(a) Direct and Indirect Effects

Because no activities are planned in the project area under Alternative 1, no increases in water yield would be expected. The WATSED model was used to determine impacts to water yield. Model results suggest that current water yield peaks are 4% above baseline for the Round Prairie Creek watershed. This value means that during peak runoffs, it is anticipated the actual hydrologic peaks may be 4% higher than the peaks would be if the watershed were not disturbed. According to the WATSED model results, water yield would gradually decrease from the 4% (in 2008) to a full recovery (0% peak increase) in the year 2050. The current ECA for the Round Prairie Creek drainage is 9.8 percent and road densities are 3.5 mi/mi^2. Currently ECAs and road densities would remain unchanged should the no action alternative be selected.

In the event of a natural disturbance in the watershed, such as insects, disease or fire, then water yield may increase in response to new vegetative openings. Of the three possible natural disturbances, wildfire would have the most impact. The risk for a stand-replacing wildfire in the project area would increase over time as fuel loading slowly increases in the untreated stands. In the event of a stand-replacing wildfire ECAs would increase immediately and this could increase peak flows high enough to cause possible adverse impacts to water quality, channel stability, and aquatic habitat.

4.3-G.2 Alternative 2 and 3

(a) Direct and Indirect Effects

Activities planned under both action alternatives are expected to increase the ECA (Figure 4-11) and reduce road densities. Even with these slight increases in ECAs and decreases in road densities, the changes in water yield are not likely to be measurable in the larger Round Prairie Creek drainage. The hydrologic impact of an increase in water yield and reduced sediment delivery was discussed in the previous issue indicator section titled, “Hydrologic Function: Ability of the channel to balance water and sediment yields”. While the increases may not be noticeable in the larger drainages, the increases in water yield may be noticeable in the smaller, relatively steep, first order tributaries draining from the proposed units. The minimal increases in water yield would be favorable for the streams as it would gradually move sediment through the system and redistribute it on floodplains just as the channels naturally function. Redistributing the sediment (even slightly) can improve fish habitat by deepening existing pools and moving fine sediments out the channels and onto the floodplains. The current ECA (Figure 4-12) for the Round Prairie CEA is 9.8% percent (2, 358 ECAs). Alternative 2 would increase the ECA by 4.0 percent (958 ECAs) and Alternative 3 would increase the existing ECA by 2.4 percent (590 ECAs). Road densities would decrease from 3.5 mi/mi^2 to 3.4 mi/mi^2.

Figure 4-11

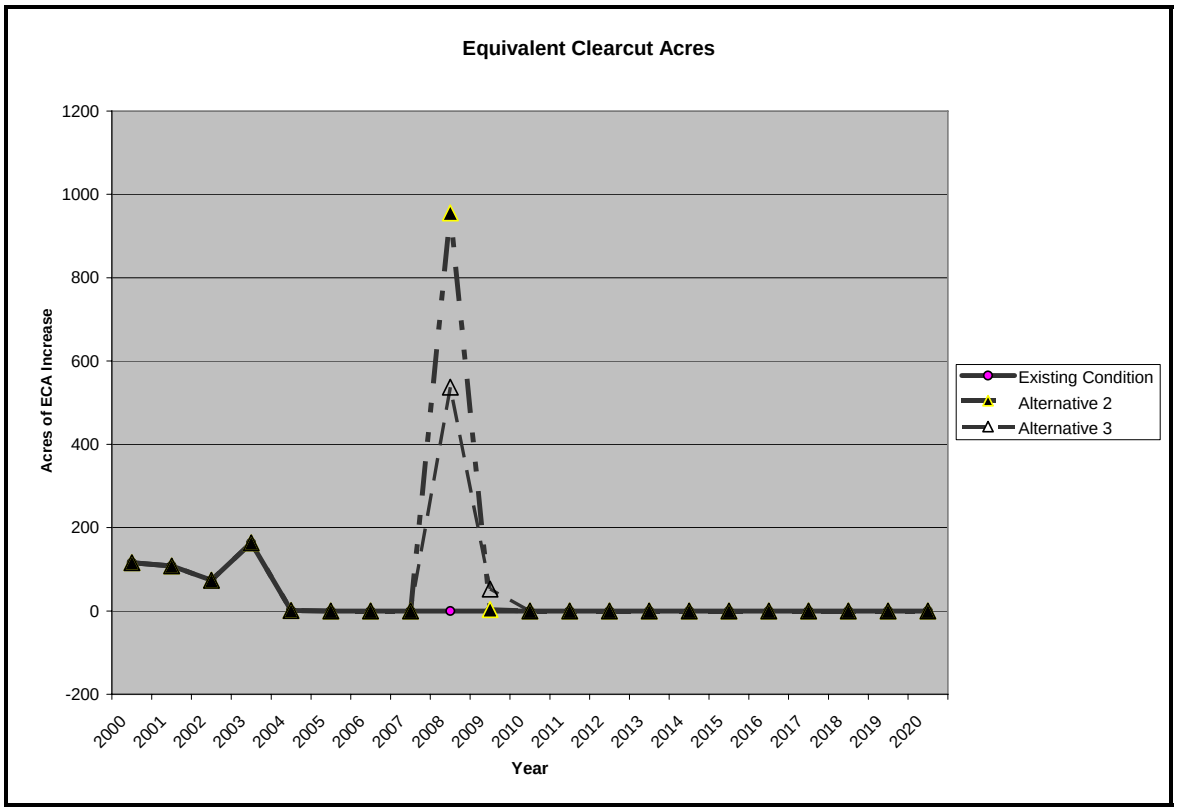
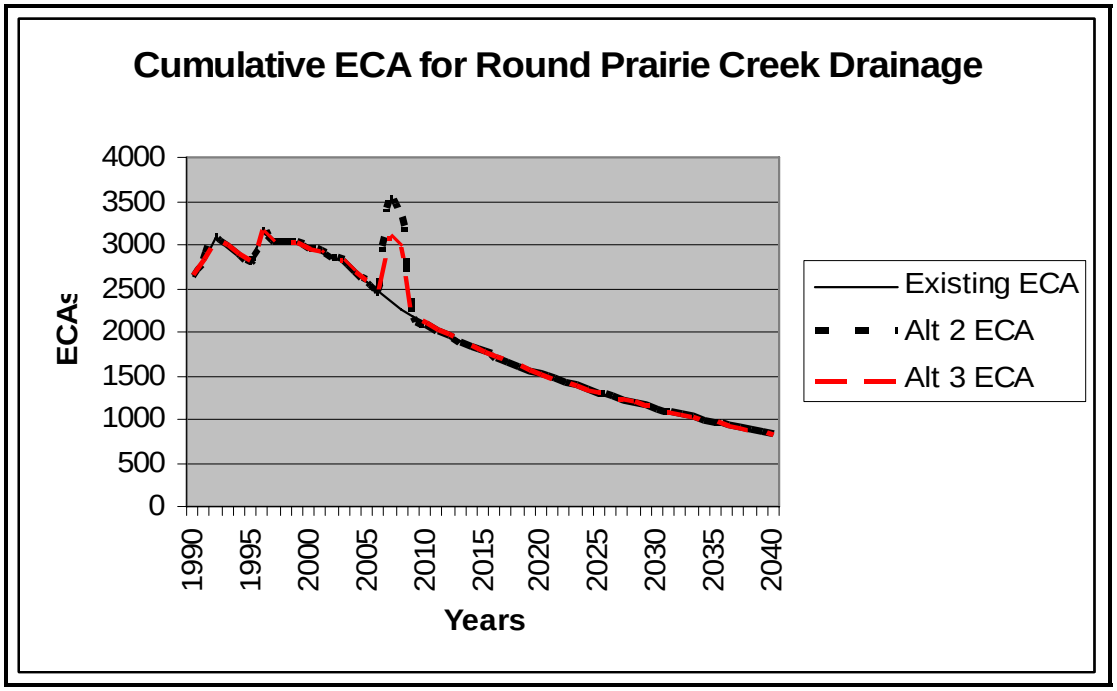


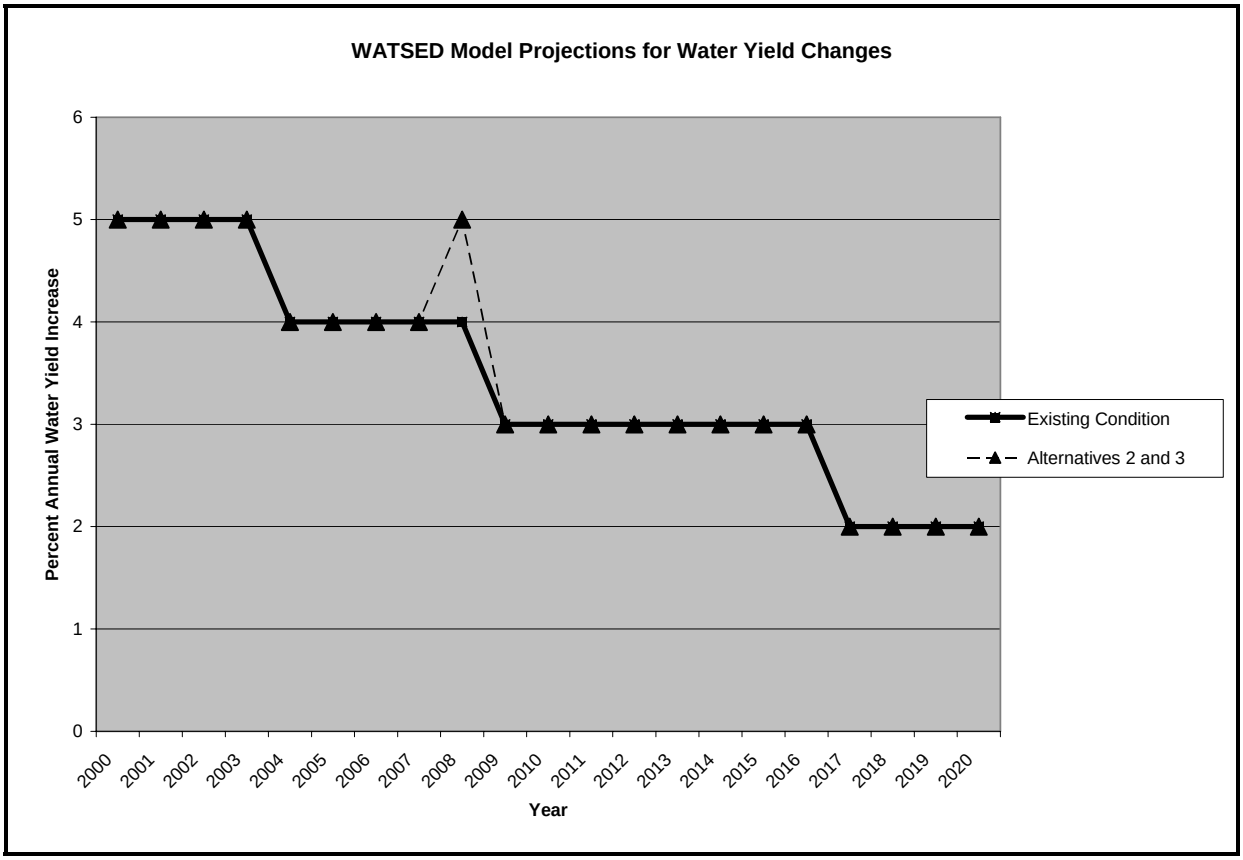
Figure 4-12



In the Northern Prairie project area, the relatively dry site conditions on predominantly south-facing slopes reduce the potential for peak flow impacts. The streams draining this south facing slope evolved with far more open vegetation then is currently found on the site. Research has shown that peak flow increases associated with overstory removal, either through timber harvesting or fire, are primarily correlated to large watersheds where (1) snowmelt runoff dominated during above-average moisture years, and (2) vegetation removal exceeded 35 percent (Marvin 1996, Campbell and Morris 1988, Harr 1986). Within this project area, most of the annual precipitation occurs as snowfall that is gradually released to streams through infiltration and shallow groundwater discharge.

The selective timber harvesting proposed under Alternative 2 will restore the more natural conditions of canopy openings that are characteristic of dry sites. The openings under Alternative 3 will be scattered ¼ to 2 acre clearcuts strategically spread out across a stand to meet the objective of reducing fuel loading. The increase in ECA for the Round Prairie Creek for Alternative 2 is 4.0% and for Alternative 3 is 2.4%. The increase in ECAs is concentrated within the proposed project area and thus increases in water yield would be localized in the smaller drainages. According to the project Silviculturist, implementation of Alternative 3 would resemble a commercial thinning. The difference in the effect to water yield between the two silvicultural approaches on this landscape are negligible. According to the WATSED model projections, implementing either action alternative would result in a peak annual water yield increase of 1% for both alternatives (Figure 4-13). The increased water yield would drop to below pre-treatment levels within two years under either action alternative.

Figure 4-13



The risk of a damaging rain-on-snow would not be elevated with the implementation of the either action alternative. Any increased water yield in the larger Round Prairie Creek drainage during a rain-on-snow event would be difficult to attribute to harvest activities because of the limited treatments and the spatial extent of the project. The proposed treatment area located within the rain-on-snow zone totals less than three percent of the total Round Prairie Creek watershed. (The total amount of acres proposed for treatment within the Northern Prairie Project that lies within the rain on snow zone is 712 acres for both action alternatives). The 30 to 50 percent canopy closure left in these treated areas would reduce the effects of rain-on-snow events. Design criteria and INFISH buffers would further attenuate the effects of runoff during a rain-on-snow event. By reducing current and future fuel loads, implementation of either action alternative would reduce the risk of a stand-replacing fire. A stand replacing fire could greatly increase the ECA and result in increased peak flows with consequent adverse impacts to water quality, channel stability, and aquatic habitat.

Although activities planned in the project area under Alternatives 2 and 3 are expected to slightly increase the ECA, changes in water yield are not expected to be measurable. The current ECA for the Northern Prairie CEA (Round Prairie Creek watershed) is 9.8 percent. Alternative 2 would result in a total of 13.8 percent ECAs and Alternative 3 in a total of 12.2 percent ECAs. In the Northern Prairie project area, 1221 out of 1331 acres of proposed treatment acres are on south facing slopes. These southerly slopes tend to be relatively dry site as evidenced by the more seral tree species and the snow load is generally shorter lived than the snow pack on northerly facing slopes. Most of the annual precipitation in the project area occurs as snowfall that is gradually released to streams through infiltration and shallow groundwater discharge. The selective timber harvesting proposed under both action alternatives will restore the more natural conditions of canopy openings that are characteristic of dry sites.

Any increased water yield during a rain-on-snow event would be difficult to attribute to harvest activities. The proposed treatment area located in the rain-on-snow zone is less than three percent of the total Round Prairie Creek watershed. The 30 to 50 percent canopy closure left in these treated areas would reduce the effects of rain-on-snow events (Berris and Harr, 1987).

By reducing current and future fuel loads, implementation of either Alternative would reduce the risk of a stand-replacing fire that could greatly increase the ECA and result in increased peak flows with consequent adverse impacts to water quality, channel stability, and aquatic habitat. The bottom line is that implementation of either action alternative would allow the watersheds to more closely mimic the water yields under which the streams evolved and the channel equilibrium would gradually be restored. There would be little to no increase in the intensity of future rain on snow events with the implementation of either action alternative.

4.3-H Stream Temperatures

4.3-H.1 Alternative 1

(a) Direct Effects

Because no riparian activities are planned in the project area under Alternative 1, no direct changes in water temperature would be expected. Implementation of the No-Action alternative would not

reduce the thermal loading pollutant of concern. There would be no changes in either issue indicator associated with stream temperatures (riparian ECAs or riparian road densities). Idaho DEQ will likely develop a temperature TMDL for the Moyie River and all of its wadable streams within the next five years (Robert Steed, IDEQ, email). Thermal buffering of runoff could improve, assuming no large, severe wildfires occur and assuming that trees and shrubs in riparian areas continue to grow and provide shade.

4.3-H.2 Alternatives 2 and 3

(a) Direct Effects

Timber harvest unit boundaries have been designed to avoid RHCAs and thus protect riparian areas that provide critical shading to streams. There is no potential for stream temperatures to increase under either action alternative. Neither action alternative would affect stream temperature. Riparian ECAs would not be affected by any timber removal under either action alternative. Riparian road densities would decrease by 1.94 miles. While this reduction in riparian road densities is an improvement, it is not enough to provide a measurable change to stream temperatures because of limited number of lineal riparian zone affected. Any improvements to stream temperature from the removal of riparian roads would take many years to actually affect the stream because the vegetation would need to mature to shade the stream to make a difference.

4.3-I Cumulative Hydrologic Effects

This cumulative effects analysis is based on an aggregate representation of past, present, ongoing, and reasonably foreseeable actions, whether they are human-caused or natural events. Past actions and events have shaped the forest vegetation and provide the baseline conditions for analyzing direct and indirect effects of proposed activities.

Past: Historically, timber harvesting, road construction, and other Forest Service management activities in the Northern Prairie CEA have occurred at several times during recent decades (See reference table and map(s) pertaining to cataloging past actions in the project file). Within the Miller Creek drainage, about 950 acres is owned by Forest Capital Management (FCM), which was formerly owned by Crown Pacific International. In the past five years, the timber company has harvested about 266 acres, though most of the 950 acres was commercially harvested in the 1990s. Though there are instances of isolated culvert failures on existing roads within the Northern Prairie Project area, there are no records of mass failures off of the existing road systems.

Current: Present and ongoing activities within the Northern Prairie CEA include fire suppression, road maintenance, motor vehicle use, grazing and home development. Fire suppression, as it alters vegetation conditions, will continue to influence water yield. U.S. Highway 95 through the CEA is a relatively high-traffic road on the Bonners Ferry District. Frequent use and maintenance of the highway and forest roads have the potential to affect water quality from road dust, accidental spills, and ditch erosion. These conditions are expected to continue and risks of water quality impacts are not expected to change. Evidence of erosion from off-road vehicle use was negligible in the CEA, based on the July 2003 site reconnaissance. Cattle grazing in the privately owned riparian areas of Round Prairie Creek are expected to continue to affect water quality in the stream. The resulting stream bank erosion and reduction in riparian shade have likely increased fine sediment deposition

and stream temperatures in Round Prairie Creek. Home development is ongoing and is expected to increase as housing pressures increase. The most probable home sites are those private lands lining Round Prairie Creek adjacent to Highway 95. Increased home development will likely increase water yields and could increase sediment delivery to the streams.

Reasonably Foreseeable: To determine any foreseeable future events on lands outside of the National Forest, the Forest Service contacted the State for all current permits on small private timberlands and contacted FCM to determine their future plans (Behrens, pers. comm.) Based on the information provided by these entities, measurable cumulative effects are not anticipated. Several private landowners have forest management permits from the State of Idaho for timberlands within the CEA. Typically, the permitted activities are commercial thinning or selective harvest of trees that produce the highest economic value. Small private timberlands are located in and near the stream valleys; thus, these activities will generally occur on low-gradient slopes at the lower elevations. Because the small-scale timber harvesting on private lands will generally not occur on steep slopes and will be located below the rain-on-snow zone, contributions to erosion and sedimentation are expected to be negligible and runoff from these sites is not expected to increase peak flows. All timber harvesting is required to conform with the requirements of the State of Idaho Forest Practices Act. In addition, firewood cutting will continue to be permitted in the CEA. Most firewood cutting occurs within 200 ft of existing roads and is not expected to cause a downward trend in hydrologic function because of the limited cutting and widespread spatial distribution of the limited firewood cutting.

There are no other foreseeable future activities planned on lands within the cumulative effects analysis area (CEA) that are outside of the National Forest.

In order to affect the aquatic issue indicators of this project, the foreseeable activity must increase stream temperature or sediment and/or water yield to a stream. Given that sideboard, the only reasonably foreseeable projects that fall into that category are timber harvesting, fire suppression, helispot maintenance, land development, grazing, road and trail maintenance and tree thinning. Within the cumulative effects analysis area on NFS lands, the effects of most of the ongoing and reasonably foreseeable activities (as listed in the project file and discussed briefly above) are limited in time and space and would not measurably contribute to water or sediment yields. All of the projects ongoing and proposed on FS managed lands were assessed either through the WATSED modeling or by taking a hard look at the activity as it could affect water quality. The exact time and place of activities on privately managed lands cannot be precisely predicted. Nevertheless, the State of Idaho is responsible for ensuring that all activities (on privately managed lands and federally managed lands) comply with the rules and regulation of the State of Idaho. Provided private landowners adhere to State rules and regulations, impacts to water quality would be minimal.

4.3-I.1 Alternative 1

Effects from past and current management are generally not anticipated to act cumulatively with the No-Action alternative to adversely affect water resources. According to the WATSED results, the affected drainages currently have slightly elevated water and sediment yields (Project File). Additionally, past forest management and fire control practices have led to fuel conditions that could, over time, result in an intense stand-replacement fire with adverse consequences for hydrology and water quality.

Because no activities are planned in the project area under the no-action alternative, no changes in the PFC of Round Prairie Creek would occur. Currently Round Prairie Creek is listed as functioning at risk due to moderate watershed disturbance (USFS 2003d).

4.3-I.2 Alternative 2 and 3

The direct and indirect effects to the critical management issues were presented earlier and included the following: hydrologic function, riparian function, soil erosion and mass wasting, stream crossings, water yield, stream temperatures. None of these issues really are independent of one another in terms of cumulative effects. Therefore, instead of addressing each one independently, the cumulative effects analysis is the summation of all of the hydrologic direct/indirect effects to each of these issues. It is the summation of all of the direct and indirect effects to these issues that is the heart of the cumulative effects for water resources.

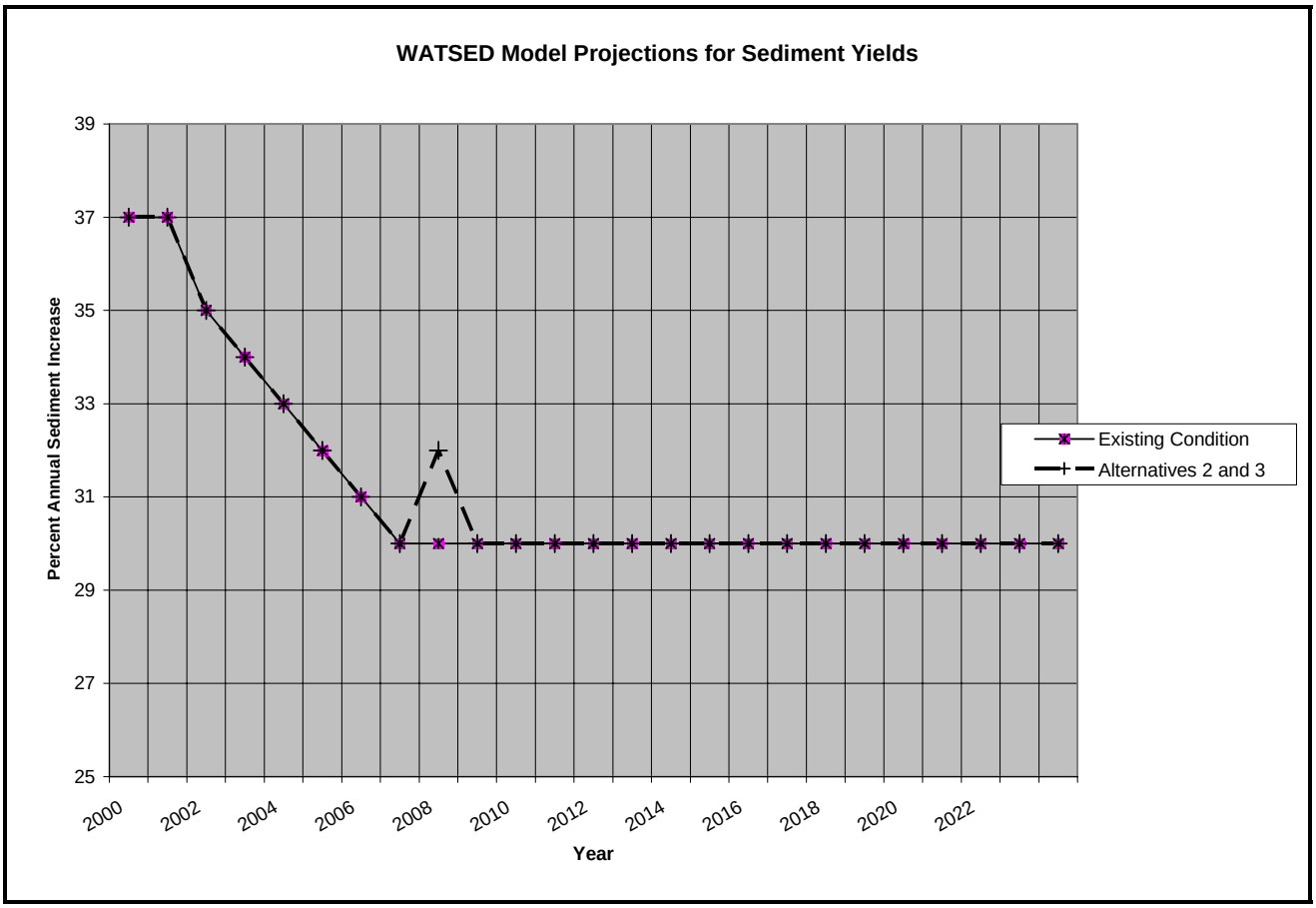
Cumulatively, it appears that while there have been historic impacts to all of these issue indicators, not all of them will be affected equally with the proposed Northern Prairie Project. The issues that are not measurably affected by the proposed action alternatives include the following: riparian function and stream temperatures. The remaining issues that had slightly more measurable impacts included hydrologic function, soil erosion and mass wasting, stream crossings and water yield. For these four issues, the WATSED model was used to quantify the cumulative effects. The outcome of the WATSED model results were reviewed in light of the existing conditions and the hydrologist made a final determination of cumulative effects based on site specific information and professional experience.

As described earlier, the cumulative effects analysis includes all of the Round Prairie Creek drainage from the headwaters down to the confluence with the Moyie River. In order to evaluate the potential cumulative effects of either action alternative along with past, present and reasonably foreseeable actions, the WATSED model was selected as the primary tool. The results from the WATSED model are interpreted by a professional hydrologist as part of the larger effects analysis. The WATSED model was applied to both the larger Round Prairie Creek drainage as well as to the Gillon Creek drainage. Figure 4-14 displays the WATSED model results for sediment yields projections for the Round Prairie Creek.

Using the WATSED model results and stream field data, it appears that Round Prairie Creek has been moving elevated volumes of sediment and water for a number of years. The underlying glacial geology serves as a relatively large aquifer that is able to absorb most increases in water yield. Effects from past and ongoing activities have resulted in a disturbed stream system that is functioning at risk. The proposed treatments are primarily focused on a south facing hillslope just north of the mainstem of Round Prairie Creek. Past forest management and fire control practices have led to fuel conditions that could, if continued, result in an intense stand-replacement fire with the consequences for hydrology and water quality described earlier. No change in the PFC of Round Prairie Creek is expected under either action alternative. Currently Round Prairie Creek is listed as functioning at risk due to moderate watershed disturbance (USFS 2003). Road decommissioning and road improvement projects proposed under the action alternatives are expected to trend toward reducing watershed disturbance and improving the condition of Round Prairie Creek by reducing the

risk of road failures that could deliver high volumes of sediment to the streams. Over the next five to ten years[9], the proposed road decommissioning and road improvement will begin an improvement trend within the Round Prairie Creek drainage.

Figure 4-14



Management activities under either action Alternative would have the potential to directly affect soil and water resources through ground disturbance and vegetation removal. The majority of the units would be harvested using shelterwood systems, free selection systems, or both. The steeper slopes, representing nearly one third of the treatment area, would be harvested using helicopter yarding. Gentle slopes would be harvested with ground skidding (tractor logging), and the remaining area would be harvested using skyline systems. Fuels reduction would be accomplished using controlled understory burning in more than half of these units and grapple pile burning in most of the other units. One large, rocky unit in the project area (Unit 69) would be broadcast burned, but no timber would be harvested there.

Similar to Alternative 2, management activities under Alternative 3 have the potential to directly affect soil and water resources through ground disturbance and vegetation removal. The most significant difference between Alternatives 2 and 3 is prescribing uneven-aged systems (Alternative

[9] Forest Plan Monitoring and Evaluation Report, 2001, page 37 addresses the recovery of obliterated roads.

3) rather than two-aged silvicultural systems (Alternative 2). Alternative 3 was designed specifically to address issues surrounding wildlife (flammulated owl and northern goshawk) while still meeting forest composition and structure objectives of restoring long-lived seral species. The logging systems to be used in each unit are generally the same in both action alternatives. Fuels treatments prescribed for Alternative 3 are also generally the same as Alternative 2. The same road work described for Alternative 2 is also part of Alternative 3.

Although both action Alternatives have the potential to directly affect soil and water resources, the proposed treatments are designed to reduce such affects. The proposed silvicultural prescriptions would return the treated areas to more natural conditions of canopy coverage, and measurable increases in peak flows are not expected. No road construction is proposed; thus, no new stream crossings would be added and no changes in hydrologic function are expected. Replacement of three undersized culverts along road FS 2587 would reduce the risks of ongoing road erosion at these locations and would reduce the risk for further road washouts there. Protection of RHCAs will prevent any loss of riparian function. Improvements to FS 2481 could be implemented during the timber sale as this road is used to access Unit 81, resulting in reduced sediment delivery to Harvey Creek. Overall, the short-term reduction of fuels and the long-term conversion of timber stands back to dominance by fire-tolerant tree species are expected to reduce the risk of severe wildfires and consequent impacts to soil and water resources.

In summary, the impacts of implementing either action alternative are very minimal to water resources and hydrologic function. As WATSED suggested, water yields would increase by only 1% and sediment yield would increase by 2%. For both sediment and water yield increases, the model suggested that the recovery to pretreatment levels would occur within one year of the activity. Given the small and very short lived increases, coupled with the past, present and reasonably foreseeable activities, it is determined that cumulatively the streams of Round Prairie Creek would not be adversely impacted under either action alternative. There would be not adverse cumulative effect to hydrologic function, soil erosion and mass wasting, stream crossings and water yield. However, with the road decommissioning and normalizing of the water yield regime, there would be some long-term benefits to hydrologic function, soil erosion and mass wasting, stream crossings and water yield.

4.3-J Fisheries

4.3-J.1 Alternative 1

(a) Direct and Indirect Effects

There are no anticipated direct effects or indirect effects of Alternative 1 on fish populations. Hydrologic and riparian conditions that influence the formation of in-stream habitat features important to fish populations are not expected to be altered under Alternative 1. However, Alternative 1 would promote the buildup of fuels over time and increase the risk of a high-intensity stand-replacing fire. Such a stand-replacing fire could directly and indirectly impact hydrologic and riparian conditions and lead to the degradation of fish habitat.

Existing channel conditions would likely stay the same under Alternative 1, since there are no activities associated with this alternative. Streams within the project area were surveyed in 2003,

and walk through surveys were conducted in 2006 to verify the data. In the reaches of Round Prairie Creek and Gillon Creek, INFISH guidelines were generally met for LWD while INFISH guidelines for mean width-to-depth ratios were not. Pool frequencies in Round Prairie Creek fell short of INFISH guidelines, but were adequate in Gillon Creek. INFISH guidelines for bank stability and undercut banks are established for non-forested streams but not forested streams. However, bank stability was greater than 94 percent for all surveyed reaches. Undercut banks were lacking in Round Prairie Creek, but made up about 20 to 35 percent of the stream-bank length in Gillon Creek.

4.3-J.2 Alternatives 2 and 3

(a) Direct and Indirect Effects

Effects on fish habitat and populations are expected to be negligible under Alternatives 2 and 3. Research studies and monitoring results conducted on the Idaho Panhandle National Forest verify that when RHCAs or buffer strips are incorporated into timber sales, sediment delivery to stream channels is not measurable or negligible (USDA 2000, 1999, 1998b, 1997b, Belt et al 1992, Reid and Hilton 1998). In general, Gillon and Round Prairie Creeks are separated from harvest units by either existing roads or forests and expansive meadows that prevent sediment delivery to the streams that might otherwise impact fish habitat. Any increase in water yield would be localized, but likely would not be measureable due to the slight increase in ECAs. Except for Harvey Creek, tributary flows from the steeper hill-slopes infiltrate the ground before reaching fish-bearing waters. Under existing conditions, large quantities of sediment periodically mobilize in Harvey Creek. Substrate effects of proposed management actions would likely be undetectable provided that reconstruction work on FS 2481 is completed as part of the harvest operations to prevent increased sediment delivery to Harvey Creek.

As with Alternative 1, existing conditions are expected to be maintained under Alternative 2 where INFISH standards were generally met for LWD while INFISH standards for mean width-to-depth ratios were not. Pool frequencies would remain inadequate in Round Prairie Creek, but adequate in Gillon Creek. Bank stability would remain high (existing bank stability is greater than 94 percent in all surveyed reaches) and undercut banks would remain either lacking in Round Prairie Creek or make up about 20 to 35 percent of the stream bank length in the surveyed reaches Gillon Creek. There would be no change in these parameters, since the minimal increase in water yield would assist with sediment routing and distribution.

4.3-K Consistency with Laws and Regulations - All Alternatives

As planned, Northern Prairie project action alternatives, including considerations for potential cumulative effects, comply with the Forest Plan, INFISH, the Clean Water Act, the ESA, and other regulatory requirements. The Northern Prairie project has been designed to minimize the need for mitigation by avoiding effects to water resources. By restoring fire-tolerant tree species' dominance, the project seeks to reduce the risk of a stand-replacing fire that could have significant effects on water yield, erosion, and water quality. Accomplishing this through a combination of selective timber harvesting and prescribed burning will minimize the reduction of vegetative cover. Using helicopters and cable systems to remove logs from the steeper slopes and limiting tractor logging to the more gentle slopes will minimize soil compaction and disturbance. No new roads will be constructed as part of the Northern Prairie project.

4.3-K.1 Endangered Species Act

No Endangered Species Act-listed fish species occur within the project area,. Therefore, the proposed management alternatives are also consistent with the Governor's Bull Trout Conservation Plan because the Northern Prairie project would have no effect on bull trout populations.

4.3-K.2 Forest Plan

All alternatives meet the requirements of the IPNF Forest Plan for water resources and fisheries. Alternative A would not change riparian habitat conditions, except for a steady increase in the risk of a stand replacement fire over time and the potential for road drainage failures from high risk culverts. The alternatives also meet the requirements for fisheries resources in Forest Plan, as amended by the Inland Native Fish Strategy.

(a) Inland Native Fish Strategy

The INFISH (see Chapter 3) amendments to the Forest Plan provide more stringent requirements to protect riparian areas (USFS 1995). To comply with INFISH, the Northern Prairie project designated RHCAs where no timber harvesting is planned. For Gillon Creek, Harvey Creek, and Round Prairie Creek, the RHCAs consist of the stream and the area on either side of the stream extending to: (1) the top of the inner gorge, (2) the outer edges of the 100-year floodplain, (3) the outer edges of riparian vegetation, (4) a distance equal to the height of two site-potential trees, or (5) 300 feet slope distance, whichever is greatest. For the Category 4, seasonally flowing streams, the minimum RHCAs must include the area from the edge of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greater. A hydrologist or fisheries biologist will assist the project forester and marking crew with on-the-ground identification of channels that need protection. This would reduce the potential for production and delivery of sediment to stream channels and assure consistency with INFISH standards. A minimum 300-feet slope distance RHCA is also designated around the perimeter of Robinson Lake.

4.3-K.3 Clean Water Act

The mainstem of the Moyie downstream of the Round Prairie Creek drainage, along with the mainstem of Round Prairie Creek and Gillon Creek are listed by the state of Idaho on the 303 (d) list for elevated stream temperatures as a pollutant of concern. According to Bob Steed of the Idaho Department of Environmental Quality (IDEQ), efforts are underway to collect data to better refine the need for a temperature TMDL in these basins. The proposed Northern Prairie Project would not increase stream temperature in any way to any water segment because there would be no modification of shade along any streamcourse.

Road reconstruction and decommissioning proposed as part of management alternatives are expected to improve watershed conditions as discussed earlier. Under Alternatives 2 and 3, timber-harvesting revenues would provide for road drainage improvements to reduce sediment delivery from FS 2481. The undersized culverts on FS 2587 would also be replaced to reduce the risk of continued road erosion at this location. To further reduce erosion, the intermittent stream channel in Unit 104 would be reestablished where it is washing out three, old road crossings. All told, the management alternatives would reconstruct 1.5 miles of roads, decommission 4.7 miles of roads by removing

drainage structures and restoring natural drainage channels, and barrier an additional 4.4 miles of roads by blocking access to truck traffic. Blocking truck traffic will reduce wear and erosion of road surfaces. Finally, Alternatives 2 and 3 include 7.5 miles of FS 2481, FS 2228, and FS 2587 that will be reconditioned. Reconditioning will include new gravel surface material, culvert clearing, and other maintenance activities that will reduce risks of erosion.

In addition to the roadwork to improve watershed conditions that would be accomplished as part of the management alternatives, other road decommissioning opportunities were identified in the Round Prairie Creek watershed, including road segments south of U.S. Highway 95. These opportunities include 2.3 miles of roads that need to be decommissioned by removing drainage structures and restoring natural drainage channels, and 1.8 miles of roads that can be decommissioned by blocking truck access. Of greatest concern is FS 2481D, which recently experienced a culvert failure and road washout at the Miller Creek crossing and is vulnerable to more failures in the future. Because this roadwork is not associated with timber harvest units under project alternatives, it will require KV (Knudson/Vandenberg) funding or other funding that cannot be guaranteed as part of this project. There are also 6.3 miles of watershed roads that can be decommissioned through revegetation without the need for any construction work. As part of the timber sale contract design, the purchasers will improve those roads used for hauling timber to market.

While none of the streams are listed as having sediment as a pollutant of concern by the State of Idaho, it is still the goal of the Forest Service to improve aquatic conditions by reducing potential sediment delivery to streams. With the implementation of either action alternative, there would be a short term and very small increase in turbidity with the proposed road removals and road improvements. In the long-term, this road work will reduce long-term delivery of sediment to the stream(s) and will enhance beneficial uses such as cold water aquatic life communities, salmonid spawning, primary contact recreation and domestic water supply.

4.3-K.4 Monitoring

Should either of the action alternatives be implemented, the following monitoring would be conducted to verify that the management activities are implemented as designed and effective in meeting the project and Forest Plan objectives, and to validate the assumptions and models used in planning. Following Appendix JJ of the Forest Plan, monitoring plans address three primary questions to demonstrate water quality protection:

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

Baseline monitoring, implementation monitoring, and effectiveness monitoring are used to answer these questions. Baseline monitoring sites throughout the Forest have been established to provide representative samples of existing water quality conditions and long-term trends of stream systems. Implementation monitoring shows whether prescribed BMPs were implemented as designed and whether they are in accordance with Forest Plan standards and guidelines and project specifications. In practice, the timber sale administrator and engineering contracting officer's representative, with technical assistance from the district hydrologist, assure that timber harvesting and roadwork

specifications are followed. Implementation monitoring would be documented in BMP inspection reports completed by the district hydrologist, reviewed by the Forest hydrologist, and submitted to the Idaho Bureau of Water Quality. BMP effectiveness monitoring would follow at least one runoff season after BMP implementation. Monitoring would be correlated with watershed exams on the sale area through the fifth year after project implementation, based on available funding. The Forest Plan also includes monitoring of fish habitat and population trends to evaluate the impacts of forest management activities. Stream surveys typically include evaluations of pool conditions, habitat complexity, substrate size, and spawning conditions.

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The following individuals participated in the formulation and analyses of the alternatives and the subsequent preparation of the Northern Prairie Environmental Assessment (EA).

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List of Agencies, Organizations, and Persons Consulted

The following agencies and organizations received copies of the EA. Additionally, 49 local landowners received the EA in electronic disk (CD) format. This list is not all inclusive due to the fact that other persons can request copies following the release of the Environmental Assessment to the public. Response to comments received on this assessment, changes to the alternatives included in this assessment will be addressed in the Decision Notice (DN) when the document is completed and released to the public.

Boundary County Commissioners
Dave Andesron, Mayor of Bonners Ferry, Idaho
Kootenai Tribe of Idaho
US Senator Larry Craig – Coeur d'Alene staff
US Senator Michael Crapo – Coeur d'Alene staff
US Representative Bill Sali – Coeur d'Alene staff
Idaho State Representative Shawn Keough - Sandpoint
Idaho Dept of Fish and Game
Idaho Dept of Lands
USDI Fish & Wildlife Service – Spokane, WA
Idaho Department of Parks and Recreation
The Lands Council
Idaho Dept of Environmental Quality – Coeur d'Alene
Idaho Dept of Health and Welfare – Boise
Idaho Conservation League
Selkirk Conservation Alliance
Forest Capital Partners, LLC
Riley Creek Lumber Co
Wild West Institute (formerly The Ecology Center)
Alliance for the Wild Rockies
Idaho Native Plant Society
Kootenai Environmental Alliance
Boundary County Library
Mike Brown KSPT/KPND News - Sandpoint

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Other Resource Concerns

Appendix A lists the resources concerns that were eliminated from detail study. These resources were eliminated 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.

Biodiversity

Biological Factors

Noxious Weeds

The impacts of noxious weed invasions on forest resources and the effectiveness and impacts of different weed treatment methods are discussed in the Bonners Ferry Noxious Weed Control Projects Environmental Impact Statement (USDA 1995), hereby incorporated by reference.

Information on current weed infestations and weed treatment in the project area is derived from a status report submitted by the district weed technician (Bergstrand 2003). A copy of the report is in the project file. Copies of treatment records for Forest roads in the project area are also included in the project file.

It was determined that weed prevention and treatment measures as proposed in Chapter 2 would reduce but not eliminate the potential for spread of meadow hawkweed, goatweed and knapweed within the project area. Cumulative effects under either action alternative with regard to existing weed infestations are expected to be low for common tansy, orange hawkweed and Canada thistle, based on their current levels of infestation.

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

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

According to the Idaho Panhandle Forest Plan (USDA 1987) direction, infestations of many noxious weed species, including knapweed, goatweed and common tansy, are so widespread that control would require major programs that are not possible within expected budget levels (Forest Plan, p. II-7). Forest Plan direction is to "provide moderate control actions to prevent new weed species from becoming established". Alternative 1 meets Forest Plan direction by not creating disturbance conducive to new noxious weed invasions or spread of existing weed populations. Alternatives 2

and 3 meet Forest Plan direction by providing moderate control actions through project design, as required by the Forest Plan, to prevent new weed species from becoming established.

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

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

A detailed noxious weeds report is included in the project file.

Threatened and Endangered Species

Wildlife

There are five threatened and endangered wildlife species and one that has been delisted on the Bonners Ferry Ranger District. They include the woodland caribou, grizzly bear, gray wolf, bald eagle, Canada lynx, and peregrine falcon (delisted).

Woodland Caribou

The woodland caribou population is generally found above 3000 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 and normally occur as altitudinal patterns, moving to traditional sites for different seasons. The population is threatened by habitat fragmentation and loss, and excessive mortality from predators and illegal human take (USDI 1994).

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 in the Selkirk Mountains of northern Idaho, northeastern Washington and southern British Columbia, Canada.

As part of the plan for recovery, caribou were augmented into the ecosystem from source populations in British Columbia between 1987 and the present. By 1990, the population was increased to approximately 55 to 70 animals. The population remained somewhat stable through the early 1990's but a decline in numbers began in 1996 that was believed to be the result of increased rates of predation. Caribou numbers vary annually, and have been regularly followed with annual censuses and monitoring of radio-collared animals.

Habitat management guidelines for woodland caribou were originally provided by the Forest Plan (USDA 1987) and the Woodland Caribou Recovery Plan (USDI 1994). More recent research has resulted in the development of a habitat capability (HCI)/suitability (HSI) model (Allen and Deiter 1993, and Allen 1998b), which was derived from habitat research on the transplanted caribou as well as earlier research and a preliminary model developed by the recovery team in 1985 (Scott and Servheen 1984, Summerfield 1985, Warren 1990, and Allen 1998a). The HCI/HSI model tracks five 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, and summer/rut (July 16 – September 15). In addition, 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.

Existing Condition: The Northern Prairie project area provides little suitable habitat for woodland caribou and is outside areas designated for its recovery. Currently, woodland caribou occupation is restricted to the Selkirk Mountains – across the open and highly developed Kootenai River Valley from the project area.

Rationale for No Further Analysis: The project is not within the Southern Selkirk Mountains Caribou Recovery Area, and there have been no recent sightings of caribou in the vicinity. Consequently, this project would not affect woodland caribou. No further analysis and discussion is warranted (refer to the Biological Assessment, project file).

Fish

Bull Trout

Bull trout (*Salvelinus confluentus*) are listed as threatened under the Federal Endangered Species Act (ESA) (Federal Register Vol. 63, No. 111) and are under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS). Identified risks to bull trout populations include harvest, habitat disruption, introduction of species (particularly brook trout), and population fragmentation (Quigley and Arbelbide 1997). Critical habitat listing has been proposed, but has not yet been designated for bull trout (Federal Register Vol. 67, No. 230). Bull trout currently inhabit about 45 percent of their overall historic range with most occurring in the Central Idaho Mountain Ecological Reporting Unit (ERU; Quigley and Arbelbide 1997).

Bull trout have two distinct life history strategies. Resident populations spend their entire lives in headwater streams, while migratory populations move into headwater streams to spawn. Juveniles of the latter rear in the headwater streams for several years before migrating downstream to larger river systems (fluvial), lakes (adfluvial), or the ocean (anadromous), though the anadromous form would not be expected to occur as far inland as North Idaho. Resident bull trout are typically much smaller in size than migratory bull trout. Adult bull trout spawn in August and September and migratory adults typically enter spawning tributaries from April to July (Johnson 2000). Fry emerge from the substrate in April and May. Emergence and survival are influenced by fine sediment and water flow through interstitial spaces (Chapman 1988). After emergence, fry typically inhabit slow, shallow stream margins or off-channel habitats and gradually occupy deeper, swifter habitats as they grow (Hillman et al. 1987). Juveniles may overwinter within interstitial spaces of substrate and

survival can be affected by fine sediment (Bjornn 1971). Bull trout exhibit somewhat more specialized life history requirements and behavior than other salmonids. In particular, strong bull trout populations are associated with high channel complexity and the coldest stream reaches within basins (IDEQ 1998). In addition, bull trout are highly piscivorous (fish eating) as adults.

The Round Prairie Creek watershed is not considered a Priority Watershed for bull trout (USFWS 2003). However, the Deer Creek watershed, located approximately 10 river miles downstream of the mouth of Round Prairie Creek, is considered a Priority Watershed within the Moyie River system. Therefore, fluvial bull trout habitat is present in the Moyie River and some use of the extreme lower reaches of Round Prairie Creek by fluvial bull trout is possible. Potential resident bull trout habitat is found in upper Round Prairie Creek and tributaries, but bull trout have not been found in the Round Prairie Creek watershed. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on bull trout or their habitat.

White Sturgeon

On September 06, 1994, the Kootenai River population of white sturgeon (*Acipenser transmontanus*) was designated as endangered (Federal Register Vol. 59, No. 171). Within the area covered by this listing, this species is known to occur in Idaho, Montana, and British Columbia (Brown 1971), and has been geographically isolated from other Columbia River stocks by Bonnington falls (Cora Linn Dam), near Nelson, British Columbia. The primary causes of its endangered status cited in the listing were lack of recruitment and threats from reduced biological productivity. Poor water quality and toxic contamination from mining were also cited as contributing factors. Critical habitat has been designated for white sturgeon (Federal Register Vol. 66, No. 173), but the Moyie River watershed is not designated as critical habitat for white sturgeon.

The white sturgeon inhabits large rivers, lakes, and marine environments from southern California to the Cook Inlet of Alaska. It is a long-lived migratory species that can grow to be very large (nearly 20 ft and weigh 1,970 lb) and live to an age of 100 years or more. It feeds on fish, crustaceans, mollusks, worms, and plant material (Brown 1971). White sturgeons typically spawn over large substrates in higher-than-average water column velocities during the spring freshet. Juvenile fish inhabit a wide range of depths and water velocities.

Kootenai River white sturgeon exhibit both riverine and adfluvial life histories and migrate freely throughout the Kootenai River (Andrusak 1980). However, they are uncommon upstream of Bonners Ferry, Idaho (Graham 1981; Apperson and Anders 1991). The majority of adult fish reside in Kootenay Lake, and make extended migrations to spawn in a 19-km reach below Bonners Ferry, Idaho. Some adult fish remain in the river and overwinter in the deep (greater than 30 meter) pools. The Kootenai River white sturgeon typically is found over sand substrates. There are very few areas within the lower Kootenai River that contain substrates greater in size than sand. Due to the dominance of these small-diameter substrates, it is not known whether white sturgeon are selecting for sand or are forced to use this substrate because gravel and cobble are lacking.

White sturgeon are not known to occur in the Moyie River or its tributaries, including the Round Prairie Creek drainage. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on white sturgeon or their habitat.

Sensitive Species

Wildlife

The Bonners Ferry Ranger District contains habitat or populations for several sensitive wildlife species listed below.

American Peregrine Falcon

Peregrine falcons are seasonal migrants, nesting in the northern temperate regions while wintering in the tropics and subtropics. They nest on sheer cliffs with overhanging ledges or potholes and a vertical surface that are typically higher than 100 feet and provide protection from predation. Foraging areas associated with nest sites can include wooded areas, riparian habitats, marshes and open water.

Reference Condition: Peregrine falcons once ranged throughout the northern Rocky Mountains but suffered serious population declines, largely due to pesticide contamination. By 1975, peregrines had been extirpated from Idaho. In 1982, the Peregrine Fund, in cooperation with other agencies and organizations, began a recovery effort to reintroduce peregrines into Idaho. From 1990 to 1995 the Forest Service and the Peregrine Fund worked together to release young peregrines into the wild. This effort was considered a success in 1997 when a pair of falcons returned to the area and established a nesting territory near its historic eyrie. This was the first evidence of breeding in North Idaho in several decades.

Existing Condition: In August 1999, the peregrine falcon was removed from the Endangered Species list. Previously, the only known eyrie (nest site) associated with the northern (Kaniksu) portion of the Idaho Panhandle National Forests was located in the Clark Fork River Valley, some 50 air miles south of the project area. Records of peregrines within Boundary County had been rare, but documented in the spring on the Kootenai National Wildlife Refuge. However, in June, 2006, the Kootenai Tribe of Idaho Fish & Wildlife Department located a peregrine falcon eyrie on the cliffs along the Kootenai River east of Bonners Ferry, Idaho. Subsequent visits documented the presence of two adults and a single fledgling at this site (S. Soults, pers. com.). The eyrie is on an isolated parcel of USFS-administered land.

Rationale for No Further Analysis: There are no suitable cliffs in close proximity to the project area, and there are no known historic or current eyries within ten miles of proposed activities. Because of the lack of suitable nesting habitat, the Northern Prairie project would have ***no impact*** on peregrine falcons or their habitat. No further analysis and discussion is necessary.

Black Swift

Townsend's big-eared bats are primarily cave dwelling species. Although they occur in a wide variety of habitats, distribution tends to be correlated with the availability of caves, especially old mine workings (Pierson et al. 1999). Their behavior appears, in most cases, to be temperature driven with bats using cooler sites before the young are born and moving to warmer sites after the young are born. In spring and summer, females form maternity colonies in warm parts of caves, mines and

buildings. In winter, they prefer relatively cool places for hibernation, often near entrances and in well-ventilated parts of caves and mines (Kunz and Martin 1982).

Reference Condition: Townsend's big-eared bats occur throughout much of the western North America, from British Columbia to Mexico, and eastward to Texas (Pierson et al. 1999). Throughout much of their range they are recognized as species at risk. They are currently listed as a R-1 Sensitive Species and considered species of special concern by most western states' wildlife management agencies. Records of Townsend's are found throughout the State of Idaho.

The most serious factor leading to population declines is loss and/or disturbance of suitable roosting habitat. Most notable threats include abandoned mine closures, recreational caving, and renewed mining at historical sites (Pierson et al. 1999). As the Forest Service closes more mines with bat-accessible gates, human disturbance will decrease and habitat will be improved for this species and other bats which roost in abandoned mines.

Existing Condition: Townsend's big-eared bats have been documented at only two sites on the Bonners Ferry Ranger District: the American Girl and Bethlehem mines. These sites between two and five miles to the south of the project area. However, natural cave habitat is limited or nonexistent on the Bonners Ferry Ranger District. The only known historic mining activity in the project area is the Miller Brothers Mine, which likely does not provide bat habitat since all that is left is a caved, dry and overgrown adit or pit flanked by two smaller pits.

Rationale for No Further Analysis: Since Townsend's big-eared bats have not been documented in the project area and the presence of roosting habitat or hibernacula is unlikely, the Northern Prairie project would have ***no impact*** on the Townsend's big-eared bat. No further analysis and discussion is necessary.

Harlequin Duck

Harlequin ducks are rare, seasonal residents of whitewater streams in the northern Rockies. They are small sea ducks that winter in coastal areas and migrate hundreds of miles inland to northern Idaho, western Wyoming and western Montana to breed and rear young. Harlequins nest along clear, clean, swiftly flowing remote mountain streams located away from concentrated human activities. Harlequins arrive in northern Idaho between March and May. After nesting begins in mid-May the males migrate back to the Pacific coast. Nesting continues through July, with the females rearing the young through late August or September, after which they return to the coast for the winter (Cassirer and Groves 1991).

The presence of harlequin ducks is considered an indicator of high water quality (USDA 1992). Management activities that impact stream quality, including those that could increase water yield beyond the stream's capability, have the potential to impact this species. Water quality standards relative to harlequins are primarily to protect their invertebrate food base and maintain hydrologic function. Harlequin ducks can also be affected by disturbance within approximately 200 feet (depending on density of streamside vegetation) of a nesting stream.

Reference Condition: The estimated breeding population of harlequin ducks in Idaho includes a total of 70 breeding pairs (Cassirer et al. 1996). Harlequin ducks were listed as a C2 candidate in 1991 by the U.S. Fish and Wildlife Service due to low numbers, limited distribution, and localized population declines.

Existing Condition: Harlequin duck staging and breeding habitats are concentrated in the Purcells and northern Selkirk zones on the Bonners Ferry RD. In northern Idaho, breeding streams are usually associated with mature to old growth western red cedar/western hemlock or spruce/fir forest stands (Cassirer and Groves 1991). Nesting habitat includes very low gradient stream sections with braided channels, intact riparian areas with dense streamside shrub growth, and rich aquatic insect populations (Cassirer and Groves 1991). Turbulent stream sections are used for security and feeding. The nearest documented harlequin ducks use has been in the Moyie River, several miles east of the project area. The Northern Prairie project area does not contain suitable stream habitat for harlequin ducks, as streams in the area are too small, steep, and/or contain inappropriate substrate to support the ducks.

Rationale for No Further Analysis: There are no suitable harlequin duck breeding streams in the project area, and project activities are not expected to alter water flows in such a way that downstream habitat in the Moyie River would be affected. Since the Northern Prairie project would have ***no impact*** on harlequin ducks or their habitat, no further analysis and discussion is necessary.

Common loon

Common loons generally nest in clear, fish-bearing lakes surrounded by forest, with rocky shorelines, bays, islands, and floating bogs (McIntyre and Barr 1997). The species constructs ground nests on islands, floating bog islets, or other protected areas. Because of their need for large expanses of water for take off and landing, loons generally occur in lakes larger than 10 acres in size (USDA Forest Service 1989). The primary threats to loons are shoreline developments and recreational activities (i.e. boating, jet skiing) that interrupt nesting. Also, on some of the larger lakes such as Priest Lake and Lake Pend Oreille, these birds are extremely sensitive to human disturbance.

Reference Condition: Anecdotal evidence suggests, at least from a historical perspective, that common loons nested in northern Idaho. In 1985 a statewide effort was conducted to document loon distribution in Idaho (Fitch and Trost 1985). Lakes investigated were chosen using guidelines on size and elevation of lakes, water depth and clarity and nest and nursery habitat requirements. During this survey, the only successful nest discovered was at Indian Lake, south the Yellowstone Park, where one chick was fledged (however, nine-tenths of this lake lies in Wyoming). While there was no direct evidence of nesting in northern Idaho, loons were observed on several lakes including Robinson and Kerr lakes in Boundary County. Since this study, shoreline development and the amount of boating traffic have increased dramatically on most North Idaho lakes with public access.

Existing Condition: Robinson Lake is the only water body within the project area where the presence of loons might be expected. This lake recieves a moderate amount of human disturbance during the ice-free season emanating from two lakeside residences, public boat access (non-motorized or electrical motors), a lakeshore trail, and a USFS campground. Loons are extremely

sensitive to disturbance during the breeding season, and boating and other human activities on potential nesting lakes are presumably the major cause for their decline (Fitch and Trost 1985). There is adequate natural nesting habitat is available at the lake (Savoy 2004), and loon pairs have been documented for 2-3 week time periods during several recent summers (d7_wlatlas). However, sightings of loon chicks have never been reported from this lake. Past nesting attempts may have failed due to human disturbance during the nesting season, or eggs/chicks may have been lost to disease or predation (there is an active bald eagle nest close to the lakeshore).

Rationale for No Further Analysis: Robinson Lake contains available nesting habitat, and recent use by loon pairs suggests it may, in the future, be used for nesting. However, the nearest proposed harvest unit is nearly ½ mile from the lake, and no-activity buffers around streams should mitigate potential adverse effects to water quality. In addition, there is already a conspicuous amount of human disturbance on the lake as a result of residences and recreational use. Therefore, the Northern Prairie project would have *no impact* on the common loon. No further analysis and discussion is necessary.

Fringed Myotis

The fringed myotis is a member of the group of bats referred to as the "long-eared" bats. Fringed myotis use a fairly broad range of habitats represented by open areas (e.g. grasslands) interspersed with mature forests (usually ponderosa pine, pinyon-juniper or oak) at middle elevations that contain suitable roosts sites and are near water sources (Keinath 2004). They are relatively slow but highly maneuverable flyers, and are most active the first two hours following sunset (O'Farrell and Studier 1980). Fringed myotis feed on insects during flight and glean insects off of vegetation, usually near the top of the forest canopy, with beetles and moths making up the majority of their diet (Keller 2000, O'Farrell and Studier 1980, Wisdom et al. 2000).

Where available, fringed myotis use caves, mines, buildings and rock crevices as day, night, maternity and hibernation roost sites (Ellison et al. 2004). They also roost underneath the bark and inside hollows of snags, particularly larger ponderosa pine and Douglas-fir snags in medium stages of decay (O'Farrell and Studier 1980, Rabe et al. 1998, Weller and Zabel 2001, Rasheed et al. 1995). Generally, snags used as roost sites are in somewhat open microsites within otherwise contiguous forest (Weller and Zabel 2001). Because of the short lifespan of snags, bats using snags to roost require a high density of snags and often move between snags while roosting (Weller and Zabel 2001, Rabe et al. 1998).

Reference Condition: The main risks to fringed myotis are the loss of suitable habitat for foraging or roosting and human disturbance of roost sites. Fringed myotis, like many bat species, are very sensitive to disturbance or habitat modification and any change in conditions altering the microclimate (e.g. airflow, thermal regime) close to roosts can have a substantial impact (Keinath 2004). Fringed myotis are perhaps more vulnerable to alterations of mature or old growth forest conditions than most bat species because of their close association with those forests that contain abundant, large snags for roosting (Keinath 2004). According to Rabe et al. (1998), the use of multiple snags by roosting bats and the short-term nature of snags in the early decompositional stages of decay suggest that bats require higher densities of snags than birds. In addition, riparian areas should be managed to retain natural stream hydrology and healthy riparian vegetation to allow

for sufficient water sources and to promote use by emergent insects. Therefore, management activities should, 1) manage for the retention and recruitment of large diameter snags at relatively high densities, particularly in late-successional forests; 2) protect known roost sites to prevent human disturbance or habitat alteration of microsite conditions, and; 3) maintain and improve riparian areas (Wisdom et al. 2000).

Existing Condition: There is a documented occurrence of fringed myotis on the Bonners Ferry RD at the Montgomery Mine, approximately 3½ miles west of the project area. There are also two abandoned mines (American Girl mine and Bethlehem mine complex) several miles south of the project area where surveys between 1998 and 2007 documented the presence of several bat species, but not fringed myotis. There are also several mature and old-growth dry-site stands in the project area that may supply roosting sites for fringed myotis.

Rationale for No Further Analysis: Because of their association with mature and old-growth dry site forests, fringed myotis can be treated as a guild with flammulated owl. The project effects to this species are represented by the effects analysis for flammulated owls.

Northern Bog Lemming

Northern bog lemmings are found in sphagnum bogs, wet meadows, moist mixed and coniferous forests, alpine sedge meadows, krummholz spruce-fir forests with dense herbaceous and mossy understory, and mossy streamsides (Streubel 2000). They feed on grasses and other herbaceous vegetation. They are active day and night throughout the year. They occupy surface runways and burrow systems up to 12 inches deep. They can be found in small colonies with population densities that may reach 36 individuals per acre. (Streubel 2000). Northern bog lemmings feed on grasses, sedges, and other herbaceous vegetation, but also snails, slugs, and other invertebrates (Foresman 2001). Nearly all of the documented occurrences of northern bog lemmings in Idaho, Montana and Washington have been found in peatlands characterized by extreme abiotic conditions that inhibit the decay of organic materials, allowing the soil to hold large quantities of water and maintain a relatively stable environment for plant and animal species.

Reference Condition: The Northern bog lemming has a widespread distribution extending from Alaska to Labrador and south to portions of the northern U.S. This species reaches the southern extension of its range in northern Washington and Idaho, and are apparently relatively uncommon in this portion of their range. They are listed by the Idaho Department of Fish and Game as a Species of Concern, and in 1999 were added to the USFS Region 1 Sensitive Species list.

Existing Condition: Alpine wet meadows and fen/bog habitat is generally limited to a few locations on the Bonners Ferry Ranger District. A single northern bog lemming was trapped in a boggy meadow in Cow Creek in the Selkirks in 1988, about 25 miles west of the project area. Surveys for this species in likely habitat at Grass Creek and Perkins Lake during summer, 2004 did not produce any individuals (Boggs and Wood 2004). The largest threats to this species are activities that would dry out or damage the vegetation (trampling, compaction etc.). These activities could include timber harvest, livestock grazing or recreation use.

Rationale for No Further Analysis: Since there is no alpine wet meadow or fen/bog habitat in the project area, it is very unlikely that bog lemmings are present. Low-elevation wetlands in Round Prairie and adjacent to Robinson Lake are more than ½ mile from any proposed activities, and streamcourses in the project area are densely forested and of too high a gradient to provide wet meadow habitat.There are no documented bog lemming sightings within 20 miles of the project area. Therefore, the Northern Prairie project would have ***no impact*** on the northern bog lemming. No further analysis and discussion is necessary.

Peregrine Falcon

Peregrine falcons are seasonal migrants, nesting in the northern temperate regions while wintering in the tropics and subtropics. They nest on sheer cliffs with overhanging ledges or potholes and a vertical surface that are typically higher than 100 feet and provide protection from predation. Foraging areas associated with nest sites can include wooded areas, riparian habitats, marshes and open water.

Reference Condition: Peregrine falcons once ranged throughout the northern Rocky Mountains but suffered serious population declines, largely due to pesticide contamination. By 1975, peregrines had been extirpated from Idaho. In 1982, the Peregrine Fund, in cooperation with other agencies and organizations, began a recovery effort to reintroduce peregrines into Idaho. From 1990 to 1995 the Forest Service and the Peregrine Fund worked together to release young peregrines into the wild. This effort was considered a success in 1997 when a pair of falcons returned to the area and established a nesting territory near its historic eyrie. This was the first evidence of breeding in North Idaho in several decades.

Existing Condition: In August 1999, the peregrine falcon was removed from the Endangered Species list. Previously, the only known eyrie (nest site) associated with the northern (Kaniksu) portion of the Idaho Panhandle National Forests was located in the Clark Fork River Valley, some 50 air miles south of the project area. Records of peregrines within Boundary County had been rare, but documented in the spring on the Kootenai National Wildlife Refuge. However, in June, 2006, the Kootenai Tribe of Idaho Fish & Wildlife Department located a peregrine falcon eyrie on the cliffs along the Kootenai River east of Bonners Ferry, Idaho. Subsequent visits documented the presence of two adults and a single fledgling at this site (S. Soults, pers. com.). The eyrie is on an isolated parcel of USFS-administered land.

Rationale for No Further Analysis: There are no suitable cliffs in close proximity to the project area, and there are no known historic or current eyries within ten miles of proposed activities. Because of the lack of suitable nesting habitat, the Northern Prairie project would have ***no impact*** on peregrine falcons or their habitat. No further analysis and discussion is necessary.

Pygmy nuthatches

The pygmy nuthatch is a sedentary, year round resident of ponderosa pine forests (Ghalambor 2003). It relies heavily on the foliage of live, larger ponderosa pines as foraging habitat and on larger ponderosa pine snags for nesting and roosting cavities (McEllin 1979). Their almost exclusive association with ponderosa pine, particularly mature stands that are fairly open (<70% canopy

closure), leads to a patchy distribution of the pygmy nuthatch as they mirror ponderosa pine's distribution (Kingery and Ghalambor 2001, Engle and Harris 2001). Pygmy nuthatch abundance is directly correlated with snag density and foliage volume (Ghalambor 2003). They generally excavate their own nest cavity, but at times are a secondary cavity nester and locate their nest cavities in dead trees or in dead sections of live trees (Ghalambor 2003). Their diet consists mainly of insects during the breeding season, and in some areas they forage almost exclusively on pine seeds in the non-breeding season (Ghalambor 2003).

The main threats to the species are the loss of ponderosa pine dominated forests and low snag densities (Ghalambor 2003). There has been a substantial decline of mature ponderosa pine forests in recent years (Wisdom et al. 2000). This decline is largely due to fire suppression, which has replaced natural regimens of frequent, low intensity fires that maintained relatively open ponderosa stands and has allowed for a marked increase in the density of shade-tolerant tree species (i.e. Douglas-fir), thereby reducing the availability of habitat for the pygmy nuthatch. The encroaching shade tolerant species are also shorter-lived and more susceptible to insect and disease, increasing the amount of ladder fuels and the probability of a stand-replacing fire, which again could lead to the loss of mature ponderosa pine habitat (Wisdom et al. 2000). In addition, studies have shown that reduction of the number of snags greatly diminishes pygmy nuthatch densities by decreasing the availability of suitable nest and roost cavities (Scott 1979).

Rationale for No Further Analysis: Because of habitat similarities between the two species, pygmy nuthatch can be treated as a guild with flammulated owl. The project effects to this species are represented by the effects analysis for flammulated owls.

Townsend's Big-eared Bat

Townsend's big-eared bats are primarily cave dwelling species. Although they occur in a wide variety of habitats, distribution tends to be correlated with the availability of caves, especially old mine workings (Pierson et al. 1999). Their behavior appears, in most cases, to be temperature driven with bats using cooler sites before the young are born and moving to warmer sites after the young are born. In spring and summer, females form maternity colonies in warm parts of caves, mines and buildings. In winter, they prefer relatively cool places for hibernation, often near entrances and in well-ventilated parts of caves and mines (Kunz and Martin 1982).

Reference Condition: Townsend's big-eared bats occur throughout much of the western North America, from British Columbia to Mexico, and eastward to Texas (Pierson et al. 1999). Throughout much of their range they are recognized as species at risk. They are currently listed as a R-1 Sensitive Species and considered species of special concern by most western states' wildlife management agencies. Records of Townsend's are found throughout the State of Idaho.

The most serious factor leading to population declines is loss and/or disturbance of suitable roosting habitat. Most notable threats include abandoned mine closures, recreational caving, and renewed mining at historical sites (Pierson et al. 1999). As the Forest Service closes more mines with bat-accessible gates, human disturbance will decrease and habitat will be improved for this species and other bats which roost in abandoned mines.

Existing Condition: Townsend's big-eared bats have been documented at only two sites on the Bonners Ferry Ranger District: the American Girl and Bethlehem mines. These sites between two and five miles to the south of the project area. However, natural cave habitat is limited or nonexistent on the Bonners Ferry Ranger District. The only known historic mining activity in the project area is the Miller Brothers Mine, which likely does not provide bat habitat since all that is left is a caved, dry and overgrown adit or pit flanked by two smaller pits.

Rationale for No Further Analysis: Since Townsend's big-eared bats have not been documented in the project area and the presence of roosting habitat or hibernacula is unlikely, the Northern Prairie project would have ***no impact*** on the Townsend's big-eared bat. No further analysis and discussion is necessary.

Wolverine

Wolverines are low density, wide-ranging species that inhabit remote forested areas, ranging over a variety of habitats. Wolverines tend to use lower elevations in the winter and higher elevations in summer, when these areas provide the greatest potential for a food supply (Hornocker and Hash 1981). Wolverines are primarily scavengers but will also hunt small mammals. Denning habitat is high elevation snowy cirque basins.

Wolverine mortality associated with human/wolverine interactions is considered one of the primary limiting factors in wolverine populations. Improved access increases the potential for these conflicts, which can lead to shooting loss or incidental take by trapping (wolverines are occasionally taken by trappers focusing on other furbearers such as bobcat and American marten). Other factors with the potential to threaten local population viability of the species include reductions of "wilderness refugia" (large areas of habitat with limited human access) or food availability (Butts 1992).

Reference Condition: Wolverines are considered scarce or rare in north Idaho, however, the actual status and range remains uncertain. The scarcity of information is largely due to the difficulty and expense in studying an animal that is solitary and secretive, and found mostly in remote areas at low densities.

Existing Condition: The project area includes lower elevation winter range, as well as potential denning habitat in the form of high elevation rock cirques on north of Mission and Harvey mountains. However, proposed harvest units are more than one mile from possible maternal den sites. As is the case with other forest carnivores, wolverines require large, remote areas to roam and feed. The proposed actions are located in the developed (roaded) portion of the project area, in an environment that makes wolverine presence ephemeral or unlikely. There are no confirmed observations of wolverines in the project area, although there are historical accounts of wolverines in Gillon Creek and other nearby areas. While wolverines may utilize proposed harvest units on south-facing, low elevation sites, they are likely to be transient due to their wide-ranging nature.

Rationale for No Further Analysis: As with lynx, wolverines require large, remote areas to roam and feed. In general, proposed units are located on a portion of National Forest lands characterized by open and restricted roads and past timber harvest. While these areas provide foraging

opportunities for wolverine, they do not represent the secure habitat that wolverine seem to prefer. Furthermore, no proposed harvest units are within one mile of potential maternal den sites. Access would remain unchanged, so the chance of human/wolverine interactions and subsequent mortality risk would remain the same. Ungulate populations are at or near all time highs in the Northern Idaho Panhandle (IDFG 2004), so foraging habitat does not appear to be limiting to wolverines. Since the proposed action would not result in disturbance of potential maternal dens during the winter denning period, would not result in measurable changes to the forage base, and would not increase human access, there would be ***no impact*** to wolverine or their habitat. No further analysis and discussion is necessary.

Fish

Redband Trout

The interior stock of redband trout (*Oncorhynchus mykiss*) is considered a USFS sensitive species on the Idaho Panhandle National Forest (USFS 2003b). Redband trout is a subspecies of rainbow trout, which is a widely distributed western North America native salmonid. Redband trout are spring spawners and resident stocks include adfluvial and fluvial forms. The potential for both forms exists in the Upper Kootenai sub-basin. The historic range of the redband trout included freshwaters west of the Rocky Mountain from northern California to northern British Columbia (Behnke 1992). Redband trout are not known to occur in Round Prairie, Gillon, or Harvey Creeks. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on redband trout or their habitat.

Torrent Sculpin

Torrent sculpin (*Cottus rhotheus)* is considered a USFS sensitive species on the IPNF (USFS 2003b). The torrent sculpin is known to inhabit the Kootenai River sub-basin, but data on distribution within and among streams is limited (Simpson and Wallace 1982; Scott and Crossman 1973). They prefer riffle habitat in medium to wide streams and rivers. Spawning usually occurs in May and June in riffles with moderate to swift flows. Torrent sculpin are not known to occur in Round Prairie, Gillon, or Harvey creeks. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on torrent sculpin or their habitat.

Burbot

Burbot (*Lota lota*) is considered a USFS sensitive species on the IPNF (USFS 2003b). On March 11, 2003, it was determined that the listing of lower Kootenai River burbot under the ESA was not warranted, because the petitioned population is not a distinct population segment (DPS) and, therefore, is not a listable entity (Federal Register, Vol. 68, No. 47).

The burbot is the only freshwater member of the cod family. Burbot are a cold-water, bottom-dwelling, piscivorous species that are typically associated with larger streams, rivers and deep, cold lakes or reservoirs. Under natural conditions, burbot in the Kootenai River sub-basin spawn under ice during the winter months in water temperatures below 4° Celsius (39° Fahrenheit) (Simpson and Wallace 1982). Historically, burbot were abundant in the Kootenai River and supported a substantial fishery. However, the burbot fisheries in the Idaho and British Columbia portion of the

basin collapsed after the construction of Libby Dam in 1972, and only 145 adult burbot have been captured in the Kootenai River in Idaho and British Columbia since 1993 (Paragamian et al. 1999). Altered spawning patterns and poor fry survival due to dam-related changes in water temperature, flow, and a reduction in food productivity in the river are believed to be the primary threats to burbot (Paragamian 1993; Paragamian and Whitman 1999; Paragamian et al. 1999).

Burbot are not known to occur in Round Prairie, Gillon, or Harvey Creeks. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on burbot or their habitat.

Westslope Cutthroat Trout

In August of 2003, the USFWS determined that listing of westslope cutthroat trout (*Oncorhyshus clarki lewisi)* as threatened or endangered is not warranted at this time (Federal Register, Vol. 68, No. 152). However, westslope cutthroat trout are considered a USFS sensitive species on the Idaho Panhandle National Forest (USFS 2003b). Identified risks to westslope cutthroat trout populations include harvest, habitat disruption, and competition and hybridization with introduced species (Quigley and Arbelbide 1997). Populations considered as "strong" (greater than or equal to 50 percent of historical potential) by Idaho Department of Fish and Game biologists remained in only 11 percent of the historical range and less than 4 percent of the historical range supported strong populations not threatened by hybridization (Rieman and Apperson 1989).

Characteristic of many salmonids, westslope cutthroat trout have distinct life history strategies that contribute to population resilience under variable environmental conditions; namely, resident and migratory populations, as described above for bull trout. Resident and fluvial populations are most common in Idaho. Waters inhabited by cutthroat trout are often cold and nutrient poor (Liknes and Graham 1988). Cutthroat trout spawn in the spring and fry emerge from the substrate in April and May. Emergence and survival are influenced by fine sediment and water flow through interstitial spaces (Chapman 1988). After emergence, fry inhabit slow shallow stream margins or off-channel habitats and gradually occupy deeper swifter habitats as they grow (Hillman et al. 1987). Juveniles overwinter within interstitial spaces of substrate and survival is affected by fine sediment (McIntyre and Rieman 1995).

Westslope cutthroat trout are known to occur in the upper reaches of the Round Prairie Creek drainage. Electrofishing surveys conducted in 2003 found the presence of westslope cutthroat trout in Gillon Creek, but no westslope cutthroat trout were found in either Round Prairie or Harvey Creeks. However, the surveys conducted in 2003 were not exhaustive and the entire length of Round Prairie and Gillon Creeks within the cumulative effects area potentially support westslope cutthroat trout. Because of limited suitable salmonid habitat and numerous natural barriers, it is likely that westslope cutthroat trout do not occur in Harvey Creek. Therefore, the action alternatives would have no direct, indirect, or cumulative effects on west slpe cutthroat trout or their habitat.

Plants

There are no Threatened or Endangered plant species suspected to occur in the project area. Rare plant surveys were conducted in 1997, 2002 and 2003. No currently designated rare plants were identified during the surveys. After the Region One Sensitive Species list and IPNF Species of

Concern list were revised in 2004, results of the field surveys were reviewed, and it was determined that no further surveys were needed.

It was determined that implementation of either action alternative may directly impact undetected individuals of rare moonworts, but that such impacts would not result in a trend toward federal listing or a loss of population or species viability. There would be no impact to other moist forest sensitive species not found in the project area.

A small amount of suitable wet forest habitat and some suitable moist forest habitat for sensitive moonworts would be impacted under both action alternatives. Such impacts would not result in a trend toward federal listing or a loss of population or species viability for any sensitive plant species. No suitable aquatic, peatland, deciduous riparian, subalpine, cold forest or dry forest habitat would be impacted under either action alternative.

No occurrences of clustered lady's slipper were found in any proposed treatment areas. However, suitable habitat for the species does occur. The proposed treatments are consistent with natural disturbance regimes in the Douglas-fir/ninebark habitats that support clustered lady's slipper in northern Idaho. Both action alternatives would, to some degree, reintroduce low-intensity fire to dry site ecosystems in the project area and would reduce the risk of large, stand-replacing fires (see Forest Vegetation section of the EA).

No occurrences of pine broomrape were discovered during the surveys. The impacts of the proposed treatments to suitable habitat for this species cannot be predicted with certainty because the species' ecology is poorly understood. However, the proposed treatments would likely enhance oceanspray, which is the preferred host species. The beneficial effects of proposed burning to oceanspray would likely also benefit pine broomrape, at least in the long term, because the host species would be maintained.

Impacts to suitable rare plant habitat under either action alternative would not be expected to lead to a long-term loss of habitat capability. Cumulative impacts to sensitive moonworts and suitable moist forest habitat for these species would be low to moderate under all action alternatives. See the project file for a list of sensitive plant species, field survey results and a detailed report.

Management Indicator Species

Wildlife

American Marten

The marten is a solitary carnivore that inhabits mature stands of coniferous forest throughout North America. In the western United States, marten are most abundant in mature to old growth true fir or spruce-fir forests and generally avoid open, drier coniferous forests (Warren 1990). They prefer forest stands greater than 40 percent tree canopy closure that protects them from predators and enhances the moist conditions favorable for prey species (Clark et al. 1989).

American marten was selected by the Idaho Panhandle Forest Plan as a management indicator species (MIS), and represents species using mature and old-growth habitats. In addition to a closed

canopy, marten require an abundance of large downed logs and snags. These provide secure resting locations, denning habitat and winter access to small mammals living beneath the snow (Patton and Escano 1990). American marten are easily trapped and are highly vulnerable to overharvest in areas accessible by fur trappers.

Rationale for No Further Analysis: Although the presence of marten has not been documented in the project area, recent surveys suggest that marten are common and widespread throughout the District (S. Cushman, pers. comm.). Because of habitat similarities with fisher, the American marten will be treated as a guild with fisher in this document.

White-tailed Deer

White-tailed deer are very adaptable and prolific, and thrive in a variety of habitat types. They are tolerant to disturbances such as agriculture and forestry practices, and prefer areas modified by these activities if an adequate arrangement of cover and forage is available.

Reference Condition: Historically, white-tailed deer flourished in the 1800s, but by the early 1900s their populations were reduced to low numbers due to exploitation by trappers, miners and settlers. White-tailed deer populations have since rebounded to being the most abundant big-game species in northern Idaho. Some of the largest white-tailed deer populations occur in the northern Idaho Panhandle. In 1985, the Idaho Department of Fish and Game estimated that 99% of the State's population was found in the Department's two northern regions.

Climatic factors affect the seasonal variation of forage quality and quantity, accessibility to foraging areas and the energetic requirements of the animal. 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. Consequently, in an effort to ameliorate conditions, deer locate themselves on lower elevations, concentrating on smaller, more confined areas known as critical winter range. Critical winter range is generally found at lower slopes and on valley floors below 3,000 feet where snow accumulations are moderate enough to sustain white-tailed deer populations.

Existing Condition: The small amount of low elevation habitat limits the availability of winter range for white-tailed deer. Browse species are widespread on the south-facing slopes of above Round Prairie. Much of the shrub component is decadent or too tall to be utilized as big game forage. Aspen, which can produce abundant winter browse, is declining due to conifer encroachment.

Critical winter range is also somewhat limiting within the project area since most low elevation forests are on dry habitat types. The habitat suitability model identifies 1,118 acres within the project area that are capable of producing critical winter range. Currently, only 60 acres are providing this habitat component. These stands are concentrated above Round Prairie and in the Gillon Creek drainage.

Rationale for No Further Analysis: White-tailed deer populations are currently prospering in north Idaho. The proposed action would not impact currently suitable critical winter range, and would slow the progress of only a small amount (174 acres) of capable habitat from reaching suitability. In addition, the reduction of forest canopy – particularly on the dry, south-facing slopes above Round

Prairie – is likely to increase forage quality/quantity on traditional big game winter range. Since there would be no increased mortality risk or measurable negative impacts to habitat, the Northern Prairie project is unlikely to result in local or regional changes in habitat quality or population status. No further discussion and analysis are necessary.

Other Species and Habitats

Rocky Mountain Elk

Habitat Requirements - As with deer, elk use a variety of habitats, with more restricted habitat use occurring during the winter. However, because of their greater foraging ability and mobility, wintering elk will use higher elevations more often than wintering deer. The primary threat to elk is road access. High, open road densities increase elk vulnerability to hunting loss and can lead to over harvesting.

Reference and Existing Conditions - Early records indicate that elk occurred throughout most of Idaho. However, large herds were apparently absent from the most northerly portion of the state (Thomas and Toweill 1982). With the discovery of gold in Pierce, Idaho in 1860 and the subsequent settlement and exploitation, elk in Idaho were reduced to a few isolated herds. A translocation program was initiated in 1915 and proceed through 1946. In 1938, the Bonner Sports Association (today Bonner County Sportsmen's Association) received a shipment of elk from Yellowstone National Park to restock areas in northern Idaho. Today, elk populations exceed their distribution and population levels of a century ago (Thomas and Toweill 1982).

Although elk in Idaho are more abundant than a century ago, high, open road densities have increased elk vulnerability to hunting loss and have led to over harvesting of some local populations. Heavy losses experienced during the winter of 1996/1997 have further stressed the importance to manage for low road densities. The Northern Prairie project area occurs within Elk Management Unit 1. Idaho Department of Fish and Game's objective for Unit 1 is to recover elk populations from the heavy losses incurred during winter 1996/1997. During the July 2002 site visit, elk scat was infrequently observed in the project area.

Currently, there are 35.6 miles of open roads within the project area, for a road density of 1.8 road miles per square mile. The proposed action would not change the number of permanent open road miles (the primary threat to elk). Temporary disturbance to elk could occur during the time of harvest activities, and a long-term increase in forage availability would occur. For these reasons, the action alternatives is not expected to impact elk, their habitat, or their viability, and consequently, no further analysis is provided for the species.

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.

Range

There are no range allotments within the Northern Prairie analysis area.

SOCIAL/ECONOMIC FACTORS

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.

Economics/Community Stability

The proposed timber harvesting is on productive forestland and could be offered with minimal investment. Estimated timber volume removed under Alternative 2 would be about 15 million board feet (MMBF) and 8 MMBF under Alternative 3. The TE appraisal system shows both alternatives would produce viable timber sales with predicted high bids of over $1.2 million for Alternative 2 and about $650 thousand for Alternative 3. The direct and cumulative effects of each alternative would be related to the costs and revenues generated by each.

Alternative 1 would generate no direct revenues or costs.

Based on the TE appraisal, neither Alternative 2 nor 3 are expected to produce a deficit timber sale. Both alternatives would generate revenues to the Federal Treasury and to USFS trust funds (KV and BD), which could be used to offset the costs of reforestation and fuels reduction. These alternatives would also provide local employment opportunities for loggers, mill workers, equipment operators (i.e., for grapple piling, fireline construction, etc.), and reforestation crews.

The indirect effects of each alternative would be related to future costs of maintaining healthy forested conditions in the Northern Prairie area. Forests that are managed within their historic range will generally be more sustainable and less costly to maintain. Under Alternative 1 the risk of severe fire would increase over time, which could lead to increased fire suppression costs, and restoration costs related to restoring ecosystem functions. Alternatives 2 and 3 would reduce the risk of severe

fire in both the short-term long-term by trending stands toward historic conditions, which would reduce the potential suppression and restoration costs.

Documentation of the analysis and considerations for community stability is contained in the Final Environmental Impact Statement for the IPNF Forest Plan. Given the potential employment opportunities projected under Alternative 2 and 3, 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 Alternative 2 would provide a greater number of employment opportunities, and greater diversity of employment opportunities, within Boundary County. Alternative 1 would provide none of the employment opportunities to help sustain community stability provided by the other two alternatives.

Visual Quality

Through the public scoping process it was determined that scenery management was not a significant issue that would drive alternative development. However, maintaining or improving the scenic integrity would be prudent for that portion of the project area that can be viewed from adjacent residences as well as by recreationists and other casual forest observers in the Round Prairie area, especially from on and around Robinson Lake.

The action alternatives include proposed harvest activities on nearly 1,300 acres. Alternative 2 includes mostly two-aged irregular shelterwood harvests and Alternative 3 is primarily uneven-aged free selection harvests. Under Alternative 2 the shelterwood harvests would create openings on nearly 1,100 acres with some individual openings larger than 300 acres. This would change the current stand characteristics from closed canopy stands to irregularly shaped open stands consisting of the largest diameter trees available, favoring ponderosa pine, western larch and Douglas-fir on the dry-sites and white pine, western larch and Douglas-fir on the moist sites. Under Alternative 3 the combined treatments would also change the current stand characteristics from closed canopy stands to irregularly shaped open stands, but the openings created would include clumps and stringers of large leave trees that will blend with the surrounding landscape characteristics. Under Alternative 3 continuous openings would vary in size from about one to three acres and would be irregulary shaped. Under both alternatives a combination of skyline and helicopter logging systems would be utilized on about 75% of the harvest units, which are located on the steepest and most visible areas as viewed from Highway 95 and Robinson Lake. The remaining 25% of harvest units that are located on the less visible (from Highway 95) valley bottom and toe of the slopes along the mountains would utilize a combination of tractor systems, helicopter logging systems, or both. Based on results of the 2002 Forest Plan Monitoring Report (C1) over the last 15 years, increased skill in the implementation of salvage and commercial thinning methods and regeneration type harvest methods has resulted in more natural appearing, sustainable landscapes, and a good record for meeting our established Visual Quality Objectives (VQOs). Both Alternatives would be designed to meet VQOs, but Alternative 3 would better meet these objectives. The 2002 Report includes monitoring of the Meadow Dawson Timber Sale, which included prescriptions similar to those proposed under Alternative 3. Based on the report, the prescriptions easily met the assigned VQOs.

Recreation

Lands within the analysis area have a long history of motorized and non-motorized recreational use. They include a wide range of natural and developed settings. They lie within an hour of Bonners Ferry, Idaho as well as Cranbrook, British Columbia. Recreation areas are easily accessed via Highway 95 in addition to well-maintained Forest roads. The Highway 95 corridor and Robinson Lake are parts of the Districts identified Watchable Wildlife loop. Highway 95 is touted in many tourism guides as a scenic, recreational travel route. The analysis area is visible from the highway.

Recreational use has significantly increased in the last 20 years. Recreational traffic along Highway 95 has expanded enormously. There is greater demand for recreational facilities than ever before. Lands in the Purcells play a very important part in the recreation opportunities provided on the Bonners Ferry Ranger District. Motorized use limitations on most other parts of the District make these lands, open to motorized recreation, unique. Areas that were at one time considered a low priority for recreation now offer opportunities for all-terrain vehicles (ATV) or motorcycle trails, as well as opportunities for car camping, driving for pleasure, and snowmobile use. More than 50 miles of open road are available for recreational access.

Lands in the analysis area accommodates a diversity of activities ranging from car camping, huckleberry picking, hunting and fishing, to horseback riding, rock climbing, and day hikes. Due to terrain and already developed access, these lands provide some of the best potential on the District for fully accessible recreation activities. Recreational day use is high along roads throughout the analysis area, and surrounding Robinson Lake. Although the highest seasons of use are summer and fall, the low elevations and easy access allow full year recreation opportunities. Recreationists enjoy ice fishing at Robinson Lake as well as cross-country skiing and snowmobiling along Forest roads.

An additional recreational use within the analysis area is permitted use by alternative educational schools. These schools commonly model Outward Bound or the National Outdoor Leadership School. Outdoors activities to gain self-reliance and hands-on nature study are paramount aspects of their educational programs. Several of these schools are located within Boundary County. Existing special use permits outline allowable activities within the analysis area. This type of use is occasional in the analysis area.

Physically, landforms vary from pastoral farmlands with rock cliff backdrops located along the highway corridor, to the wetlands throughout Round Prairie, and including forested hillsides over most of the analysis area. Peaks in the area range in elevations from just over 4,300 feet to nearly 6,000 feet. Long-range vistas are not common, yet several vantage points along the Hogue Mountain Road as well as points along all trails within the analysis area offer dramatic views. The general setting of the analysis area is natural appearing, yet evidence of human activities such as highways, timber harvest, roads, developed campsites, etc predominate.

The physical Recreation Opportunity Spectrum (ROS) settings will not change permanently in either the summer or winter season. There will be substantial change in forest composition in some areas to the north of Highway 95, but they are appropriate and not unexpected in a Roaded Natural or Roaded-Modified environment.

Proposed road decommissioning throughout the analysis area will be done primarily on roads that have been brushed in and not useable for vehicle access for many years. Therefore, there will not be an increase in the amount of land offering a non-motorized recreational experience. Conversely, there are no facilities upgrades or road improvement proposals that would change the current ROS setting to a more developed rating.

Socially, in the foreground and to some degree in the middle ground, the recreational experience north of the highway will be diminished slightly for the length of the proposed activities. In both action alternatives a majority of the units will be helicopter logged. An increase in sights and sounds of work activities may disturb the generally quiet character of the lands in the analysis area. Helicopter operation will be visible and audible from many vantage points in the analysis area. Helicopter operations, increased truck activity, and log deck locations may reduce the number of dispersed campsites that are typically available. Roadside activities such as berry picking and firewood gathering may be interrupted temporarily. These are all activities that can be expected in a Roaded Natural experience. The social setting would likely return to its present condition after activities are complete. As experienced from a distance, project activities will not affect the social recreational settings.

Should harvest activities occur during the winter season, the social setting will change more dramatically, but due to the type and amount of recreation that occurs during the winter season, very few Forest visitors would be adversely affected. The social setting, for winter, will return to its current characteristic at the end of project activities.

Inventoried Roadless Area (IRA)

There are no Inventoried Roadless Areas (IRAs) within the project area, therefore the proposed activities would have no effect on IRAs.

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.

Minerals

There are no mining claims within the assessment area.

Public Health and Safety

Air Quality (See Appendix D)

Water Resources and Aquatics

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. 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

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.

Pesticides and Herbicides

Pesticides are not used by the Forest Service within the project area. Herbicides are used sparingly and judiciously in the project area on noxious weeds in accordance with the requirements of the Bonners Ferry Noxious Weed EIS. This project proposes the same level of use, consequently, there will be no direct, indirect, or cumulative effects from pesticides and herbicides from any of the alternatives.

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.

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 the project area. 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.

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. The Northern Prairie Fisheries Report (project file) contains descriptions of existing stream channel and habitat conditions. 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.

Stream Survey Data

Stream habitat surveys were conducted in Roud Prairie Creek and Gillon Creek in 2003. 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 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.

Summary of Biological Assessments and Evaluations

The following tables provide effects summaries for Threatened, Endangered, Sensitive, and MIS wildlife species. Species that may be affected (including beneficial effects) are tracked through Chapter 4 of the EA. Species that are not present within the project area, or those that would not be affected by the proposed activities are discussed in Appendix B of the EA and in the project file (WL002). Determinations are based on the known distribution of the species, the habitat conditions required of the species, and the current habitat conditions within the evaluation area. Complete Biological Assessments and Evaluations for all of these species are included in the Northern Prairie project file.

Table B1. Threatened and Endangered Wildlife Species

Common Name	Scientific Name	Species or Habitat Present in Project Area	Species or Habitat Potentially Affected	Requires a Detailed Analysis	Determination of Effects
Northern gray wolf	*Canis lupus*	Habitat present, no recent sightings	No	No	May affect, not likely to adversely affect
Woodland caribou	*Rangifer tarandus caribou*	No	No	No	No effect
Grizzly bear	*Ursus arctos horribilis*	Yes	Yes	Yes	May affect, not likely to adversely affect
Canada lynx	*Lynx canadensis*	Yes	Yes	Yes	May affect, not likely to adversely affect

Table B2 - Sensitive Species Biological Evaluation / Summary of Conclusion of Effects

Species	No Impact	May measurably impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species	Will 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[1]	Beneficial Impact
American peregrine falcon *(Falco peregrinus anatum)*	√			
Bald eagle *(Haliaeetus leucocephalus)*	√			
Black-backed woodpecker[2] *(Picoides arcticus)*		√		

Species	No Impact	May measurably impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species	Will 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[1]	Beneficial Impact
Black swift *(Cypseloides niger)*	√			
Common loon *(Gavia immer)*	√			
Flammulated owl *(Otus flammeolus)*		√		
Harlequin duck *(Histrionicus histrionicus)*	√			
Pygmy nuthatch[3] *(Sitta pygmaea)*		√		
Fisher *(Martes pennanti)*		√		
Fringed myotis[3] *(Myotis thysanodes)*		√		
North American wolverine *(Gulo gulo)*	√			
Northern bog lemming *(Synaptomys borealis)*	√			
Townsend's big-eared bat *(Corynorhinus townsendii)*	√			
Coeur d'Alene salamander *(Plethodon vandykei idahoensis)*	√			
Western toad *(Bufo boreas)*		√		

[1]Considered a significant action under NEPA.
[2]The preferred alternative would reduce the likelihood of severe fire and disease outbreaks, and thereby would reduce the possibility of an influx of high-quality black-backed woodpecker habitat, compared to the no-action alternative.
[3]Treated as a guild with flammulated owl.

Table B3. Management Indicator Species[1]

Species	Species or Habitat Present in Project Area?	Species or Habitat Measurably Impacted?	Requires a Detailed Analysis	Determination of Effects
American marten *(Martes americana)*	Yes	Yes	No[2]	May impact species or habitat, but would not likely indicate a local or regional change in habitat quality or population status.
Northern goshawk *(Accipiter gentilis)*	Yes	Yes	Yes	May impact species or habitat, but would not likely indicate a local or regional change in habitat quality or population status.
Pileated woodpecker *(Dryocopus pileatus)*	Yes	Yes	Yes	May impact species or habitat, but would not likely indicate a local or regional change in habitat quality or population status.
White-tailed deer *(Odocoileus virginianus)*	Yes	No	No	No impact
Forest Land Birds	Yes	Yes	Yes	May impact species or habitat, but would not likely indicate a local or regional change in habitat quality or population status.

[1]Threatened and Endangered species addressed above.
[2]Treated as a guild with fisher.

Table B4. Threatened, Endangered and Sensitive Fish Species

Species		Species or Habitat Present in Project Area	Species or Habitat Potentially Affected	Species Further Analyzed	Determination of Effects
Common Name	**Scientific Name**				
Endangered					
White Sturgeon	*Acipenser transmontanus*	No	No	No	No effect
Threatened					
Bull Trout	*Salvelinus confluentus*	No	No	No	No effect
Sensitive					
Westslope Cutthroat Trout	*Oncorhyshus clarki lewisi*	No	No	No	No effect
Redband trout	*Oncorhy chus mykiss*	No	No	No	No effect
Torrent Sculpin	*Cottus rhotheus*	No	No	No	No effect
Burbot	*Lota lota*	No	No	No	No effect

Table B5. Threatened and Endangered Plant Species

Species	No Effect	May Affect - Not Likely ToAdversely Affect*	May Affect -Likely ToAdverselyAffect	Beneficial Effect
1. *Howellia aquatilis*	X			
2. *Spiranthes diluvialis*	X			
3. *Silene spaldingii*	X			

Rationale: No habitat for any threatened species occurs in the project area, which is dominated by coniferous forest vegetation. Field surveys were conducted on July 30, 2002. Field survey reports are located in the project file.

Table B6. Sensitive Plant Species**

Species	No Impact	May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Toward Federal Listing Or Loss Of Viability To The Population Or Species	Will Impact Individuals Or Habitat With A Consequence That The Action May Contribute To A Trend Toward Federal Listing Or Cause A Loss Of Viability To The Population Or Species*	Beneficial Impact
1. Aquatic species	X			
2. Deciduous Riparian species	X			
3. Moist Forest species, except #4 and #5	X			
4. *Botrychium* species		X		
5. *Buxbaumia viridis*		X		
6. Wet Forest species		X		
7. Dry Forest species	X			
8. Peatland species	X			
9. Subalpine species	X			
10. Cold Forest species	X			

Comments: Rationale is contained within the NEPA document; a detailed sensitive plants report is located in the Project File.

*Considered a trigger for a significant action in NEPA
**Note: The rationale for the conclusion of effects is contained the NEPA document

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:

1) Rules and Regulations Pertaining to the Idaho Forest Practices Act, (IFPA), as adopted by the Idaho Land Board; and
2) 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 11:09 - Management by Closure to Use
PRACTICE 15:23 - Traffic Control During Wet Periods

OBJECTIVE: To reduce the potential for road surface disturbance during wet weather and to reduce sedimentation probability by excluding activities that could result in damage to facilities or degradation of soil and water resources.

EFFECTIVENESS: Moderate

COMPLIANCE: Meets Forest Practices Act Rules

IMPLEMENTATION: Closures (seasonal, temporary, or permanent) are made when the responsible line officer determines that a particular resource or facility needs protection from use. Specific guidelines for closure of roads during the period of the contract and at the end of the Purchaser's operations would be spelled out in this EIS and the timber sale contract.

Roads that must be used during wet periods should have a stable surface and sufficient drainage to allow such use with a minimum of resource impact. Rocking, paving and armoring are measures that may be necessary to protect the road surface and reduce erosion potential. Roads not constructed for all weather use should be closed during the wet season. Where winter field operations are planned, roads may need to be upgraded and maintenance intensified to handle the traffic without creating excessive erosion and damage to the road surface.

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:

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) Round Prairie Creek - The entire mainstem length and its tributaries
2) Gillion Creek - The entire mainstem length and its tributaries

a. 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.
b. 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 <u>not</u> 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.

3) 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) 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.

5) 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.

6) 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 topsoil 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 15.04 - Timing of Construction Activities

OBJECTIVE: To minimize soil erosion, sedimentation and loss in soil productivity by insuring that the Purchaser conducts his operations, including erosion control work, road maintenance, etc., in a timely manner, within the time period specified in the timber sale contract.

EFFECTIVENESS: Moderate

COMPLIANCE: Meets Forest Practices Act Rules

IMPLEMENTATION: Limited operating periods are identified and recommended during the environmental analysis by the Interdisciplinary Team. Contract language specifies contract termination date and operating periods within that contract. Purchaser's plans must show intent to operate within these time frames prior to approval to commence work. Extensions of time (except for contract term adjustments) and waiver of specified operating periods should be granted only after interdisciplinary team review.

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 Reconstruction - The following criteria will be incorporated into the roaddesign:

    a. The reconstruction will include increasing pipe sizes or changing design on many of the existing

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.

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.

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.

Air Quality Decision Analysis

Air Quality and Smoke Emissions

Sources of smoke from wildland fire are generated from incomplete combustion of fuel. Fuel consumption and smoke production are influenced by pre-burn fuel loading categories (such as grasses, shrubs, woody fuels, litter, moss, duff, and live vegetation), condition of the fuel (live, dead, sound, rotten); fuel moisture; fuel arrangement; and fuel continuity (Ottmar 2001). Fire behavior, fire size, and consumption of these fuels would dictate the amount of emissions from a wildland fire.

The No Action Alternative (Alternative 1) would have the least impact to air quality *from project activities*. However, it is difficult to assess in a quantitative manner, the effect wildfires have on the environment because of the uncertainty in the size of the burned area and the amount of emitted pollutants (Graham et al. 2003).

Smoke emissions include carbon dioxide and water, carbon monoxide, hydrocarbons, nitrogen oxides, and particulate matter. Carbon Monoxide and $PM_{2.5}$ (particles less than 2.5 µm) are two major pollutants of concern emitted from biomass burning. $PM_{2.5}$ is inhalable and respirable and it has a long residence time in the atmosphere. It also reduces visibility and absorbs harmful gases. The Environmental Protection Agency exempts smoke from wildfire or wildland fire use because they are deemed as "natural events". In addition, extreme fire behavior (where a lot of smoke is emitted into the atmosphere) generally occurs due to heavy fuels, fuels that may smolder for a prolonged period of time, emitting more smoke over a period of days or weeks.

Direction for fire management actions are provided in the Idaho Panhandle National Forests (IPNF) Fire Management Plan (FMP) and defined in the IPNF Land and Resource Management Plan (LRMP – Forest Plan. Appendix F, Table 10; F-3) and Forest Service Manual (FSM) 5100. Wildland fire use and protection standards included in all management areas include a development of prescribed fire objectives, which comply with the requirements of the *Clean Air Act.*

The Montana/Idaho Airshed Group is composed of three members: Montana, North Idaho, and South Idaho. The Bonners Ferry Ranger District of the Idaho Panhandle National Forests is a member of the North Idaho Unit. The intent of the Airshed Group is to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction. The Montana/Idaho Airshed Group has a joint operating plan, which details policy and procedures all members agree to abide by. The monitoring unit in Missoula, Montana is the administrative unit that coordinates prescribed burning for each unit. Airshed group members abide by operating procedures of the monitoring unit in order to prevent or reduce smoke impacts to communities. The Department of Environmental Quality (DEQ), in both Montana and Idaho, interact directly and continuously with the monitoring unit. The monitoring unit is responsible to the airshed group for the daily operation of the smoke management program and provides the daily coordination to implement burning restrictions.

Alternatives 2 and 3 would be expected to have the greatest overall impact to air resources due to project implementation because these alternatives propose to treat acres using prescribed fire, including pile burning. However, after project implementation, a wildfire would be expected to create fewer emissions due to the reduction of heavy fuels that tend to smolder for prolonged periods.

Emissions by treatment for Alternatives 2 and 3

Alternative	Fuels Treatment	Acres	PM10 and PM2.5 Total Emissions (Tons)
2	Underburn	852	1085
	Pile Burn	479	614
3	Underburn	852	626
	Pile Burn	479	411

All acres are approximate.

Features Common to Alternatives 2 and 3: Underburning and pile burning is proposed for fuels treatment under both alternatives. Where feasible, underburning would be used to reintroduce fire where current fire regimes are highly removed from historic frequencies (the majority of which is on southern slopes above Round Prairie Creek dominated by ponderosa pine and other dry-site vegetation). While prescribed pile burning helps reduce the activity fuels, it does not play the same role in reintroducing fire that underburning does.

The project area lies about 18 miles north of the community of Bonners Ferry, however, there are several local residences within the Round Prairie area and the community of Eastport, ID at the International Border, is only about 1.5 miles from proposed activities. Smoke created from some burning activities would be noticeable to the local public and the general and local winds would create the potential for decreased visibility due to smoke. Prolonged combustion of heavy fuels would perpetuate the duration of smoke and emissions of potentially harmful particulates. Thus, decreasing the amount of fuels available to burn would decrease the impacts to locals from smoke. Prescribed fire behavior can be manipulated by lighting pattern and the rate at which the fuels are ignited – both of which can affect the amount of smoke introduced into the atmosphere at a given time. Following the restrictions of the DEQ and monitoring unit would mean that prescribed fire activities occur on days when smoke dispersion is greatest and conditions are favorable.

For both action alternatives, it is also important to convey that all fuel treatments do not occur at once. For one, the district does not have the personnel and other resources necessary to burn that many acres on any one day. In addition, smoke restrictions limit the location and amount of acres that can be ignited at once. Prescribed burning (both underburning and pile burning) tends to occur over a few seasons, maybe years; with pile burning generally occurring in the fall and underburning generally occurring in the spring.

By treating the approximately 1331 acres included in the proposed treatment area (Alternative 2), the amount of surface, ladder, and aerial fuels would be reduced, thus combustion time would likely decrease during a wildfire as compared to untreated. However, treating the fuels does not protect the

area from a wildfire ignition; it alters the fuels to reduce the intensity and severity in the case of a wildfire. Smoke would still be produced; however the flaming and smoldering phases of combustion would be lessened, due to a decrease in the amount of fuel.

Air Quality and Smoke Emissions Cumulative Effects

Cumulative effects are changes to the environment that are caused by an action in combination with other past, present, and reasonably foreseeable future human actions.

Past actions that effect fuels and fire behavior in the project area include fire suppression, previous timber harvest across all ownerships, and road building. Fire suppression has led to fuel build-up where fire regimes were frequent, such as on south slopes above Round Prairie Creek. Past timber harvest activities would have altered fuel arrangements, fuel loadings, species compositions and stand structures in the areas in which they occurred. Construction of forest roads has provided access for forest visitors, which as previously described, could have an impact on the amount of human caused fires in the project area. These past activities together have all contributed to the current conditions in the project area as described in Chapter 3.

Present and reasonably foreseeable actions include fire suppression and timber harvest (especially on private land). Both of these factors would affect large scale fire behavior as fire moves from dense stands that have not been treated to more open-canopy stands that have been. Depending on how activity fuels are treated in harvested stands would affect expected surface fire behavior.
Alternative 1 (No Action)

This alternative would have no *immediate* effect on overall fuel conditions in the project area. However, in the short to long term, both live and dead fuel loadings would continue to increase in the proposed treatment areas and overall project area. Long-lived seral species most adapted with fire would continue to drop out of the system as shade tolerant species move in. With continued fire suppression and no fuels treatment, areas in Condition Class 2 would move toward Condition Class 3. For dry site stands with a historically frequent fire regime, this could result in an overall higher risk of extreme wildfire behavior and negative effects to water quality, soil resources, and other key ecosystem components (such as long-lived seral species), depending on fire severity.

Conclusions:

- Long-term effects from inaction include fuel build-up in all fuel layers that could compromise the goal of firefighter and public safety during wildfire suppression activities.
- Alternative 1 does not focus on reducing fuels in the municipal watershed to ensure high-quality drinking water into the future.
- Alternative 1 does not trend toward the desired condition as described in Chapter 3. Alternative 1 proposes no treatment, and therefore no effort to move fire adapted forest systems to an improved condition class.

Alternatives 2 and 3

These alternatives would provide mechanical and prescribed fire fuel reduction treatments. In particular, on portions of the project area nearing Condition Class 3, "appropriate" mechanical treatments coupled with prescribed fire can control excessive amounts of saplings and reduce surface fuels, recycle nutrients back to the ground in a "semblance" of natural processes, and also reduce the hazard of extreme and severe wildfire (Arno and Fiedler 2005). As related to fire, cumulative effects are mostly due to previous harvest and fire suppression. Restoration (fuels treatment) would trend portions of this watershed towards the desired condition – one that is "…sustainable – that is vigorous, self-perpetuating, and at low risk to…catastrophic fire" (Arno and Fiedler 2005 (Fiedler 2000a)).

Cumulative effects would be similar as described for the Alternative 2; however, the 114- acre wildlife habitat prescribed burn would not be included in Alternative 3. Under both alternatives prescribed fire would be utilized after harvest to treat fuels on 959 acres, which are dominated by dry-site vegetation – reintroducing fire on these sites is a necessary step in condition class improvement, due to the fact that fire return intervals have been missed. Underburning alone would improve the condition class rating of these stands. Modification of succession classes through commercial harvest and other project activities would also move acres between succession class stages, lending to an improvement trend in condition class as well.

Prescribed fire would be conducted in the spring when soil moistures are adequate (see Chapter 2 soils recommendations). It is possible that fire from these activities could back into Riparian Habitat Conservation Areas (RHCAs) adjacent to treatment units due to the absence of constructed fuel breaks. Generally, fuel moistures and relative humidity's are greater in these areas than in areas outside the RHCA under the same weather conditions – due to the presence of water. The alternative, to prevent any prescribed fire from entering these areas, would be to construct mechanical or hand fireline. Detrimental effects to the water resource from these activities may be greater than would occur from prescribed fire.

Conclusion:

- Fuel reduction treatments (1331 acres) would trend portions of the watershed toward the desired condition.
- Prescribed fire would be utilized on approximately 959 acres of dry-site vegetation, resulting in an improving trend in Condition Class.
- Past, present, and future activities on both public and private lands that include surface, ladder, and crown fuels reduction would contribute to the reduced risk of unwanted, extreme fire behavior at the landscape level.

The cumulative air resource analysis is unique compared to the analysis for resources such as fuels or vegetation, because past impacts to air quality are not usually evident. However, present and reasonably foreseeable effects could include impacts from other forest and agricultural burning, dust, residential wood combustion, traffic exhaust, or point source pollution.
Relative comparison and quantification of prescribed fire and wildfire smoke emissions are shown in the following table (2001 Smoke Management Guide).

Table D1. General Comparison of Forest Emissions

Pounds of emission per ton of fuel consumed (burned)

Fuel Configuration	Combustion Phase	PM10	PM2.5
Broadcast Burn Mixed Conifer	Flaming	11.7	9.6
	Smoldering	25.3	23.6
	Average	20.5	28.8
Pile and Burn Slash Mixed Conifer	Flaming	7.4	6.6
	Smoldering	15.9	14.0
	Average	12.4	10.8
Wildfire (Forests)	Fire Average	30.0	27.0

PM_{10} and $PM_{2.5}$ refer to particulate matter that is, respectively, less than 10 micrometers, or 2.5 micrometers in size. Fine particles from fuel combustion are often called respirable particles because they are efficient at penetrating the lungs (Smoke Management Guide, 2001).

Forest Plan Consistency

Under both action alternatives, Forest Plan compliance occurs through efficient fire protection and fire use to help accomplish land management objectives (Forest Plan, Chapter II, pages 10 and 38). Forest Plan Standards for fire management are listed below:

1. Fire protection and use standards are specified by management area. Cost effective fire protection programs would be developed to implement management direction based on on-site characteristics that effect fire occurrence, fire effects, fire management costs and fire caused changes in values.
2. The Fire Management Action Plan would be guided by the following Forest-wide standards:
    a. Management area standards.
    b. Human life and property would be protected
    c. Fire would be used to achieve management goals according to direction in management areas.
    d. Management area standards would be used in Escaped Fire Situation Analysis as a basis for establishing resource priorities and values.
    e. The appropriate suppression response for designated old-growth stands in all management areas, except in wilderness, would result in preventing the loss of old growth.
    f. Activity fuels would be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.
    g. Forest Fuel Management Fund expenditure priorities are:
        i. Natural fuels that pose a threat to human life and property

ii. Unfounded activity fuel projects
iii. Areas where fuels/fire behavior is a threat to management area objectives

Following is a description of how each alternative meets Forest Plan standards. Forest Plan standard 2d relates to wildfire suppression policy and requirements which are not affected by this project, and therefore compliance with these standards is not described. In addition, this project does not determine Forest Fuel Management expenditure priorities, so compliance with standard 2g would not be addressed.

Alternative 1 (No Action)

Alternative 1 is ***inconsistent*** with the Forest Plan standard to use fire to achieve management goals according to the direction in Management Areas 1, 4, 9, and 17. With Alternative 1 there is no effort to develop cost-effective fire programs because no-action allows the fire exclusion trends to further remove all affected stands from Condition Class 1 and continue increasing the risk of intense and severe fire behavior. Given intense and severe fire behavior it is reasonable to expect expensive wildfire suppression costs, which generally "…outweigh the costs of fuels treatments…" (Pollet and Omi 2002), and damages / changes to wildlife habitat, water quality, soil productivity, recreation, aesthetics, etc. Effects to these resources could be lessened with activities that treat forest fuels.

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

Alternative 1 does not take any action to prevent the loss of old growth characteristics in the resource area. Given that the No Action Alternative analysis shows modeled flame lengths greater than four feet, the appropriate fire suppression tactics would include indirect tactics. These tactics do not contribute to any goals that prevent the loss of old growth, thus inconsistent with the Forest Plan standard 2e. The modeled flame lengths would also contribute to an increased risk of crown fire, where severe fire effects, including tree mortality, are expected.

Alternatives 2 and 3

These alternatives are ***consistent*** with the Forest plan standards, as it proposes to use fuels treatment such as thinning, lopping, slashing, piling, pile burning and prescribed fire (underburning) to help meet the goals of Management Areas 1, 2, 7, and 9 across all of the proposed treatment area. These alternatives include prescribed underburn following harvest treatments on approximately 865 acres. Fuels reduction is one of the objectives in the project area and all activities would be accomplished in accordance with that objective. Implementation of these alternatives would facilitate suppression in the event of a wildfire by reduced flame lengths, rates of spread, and crown fire potential.

These alternatives take action to prevent the loss of old growth stands, as the proposed treatments are tailored to retain the large diameter individuals while removing the small diameter trees that are not

only contributing to overcrowding, but increasing crown fire risk to the old growth because they act as ladder fuels.

Monitoring

Monitoring for reduction in fuels – including surface fuels (coarse-woody debris in tons/acre), ladder fuels (increase in canopy base heights), and crown fuels (reduction in crown bulk density, canopy closure, and spacing) would occur across the proposed treatment area.

Summary of Analysis

From a fire and fuels management perspective, Alternative 1 would simply not accomplish the objectives of the project.

Alternatives 2 and 3 would treat nearly the same amount of fuels. Although both alternatives considerably reduce the fuel hazard, the shelterwood prescriptions in Alternative 2 would reduce the hazard to a greater extent than free selection prescriptions in Alternative 3. In the event of a fire start, that would result in reduced flame lengths, reduced rates of spread, and reduced risk of unwanted crown fire on twice the acres, as well as an improvement trend in condition class and an increase in safety for direct attack suppression crews on twice the acres.

In terms of air quality, Alternative 2 would generate an estimated 1700 tons (Table D2) of emissions and Alternative 3 would generate and estimated 1037 tons (Table D3), or about 64% more emissions.

From the perspective of fire and fuels management, Alternative 2 best meets the Northern Prairie project objectives of reduced fuel hazard, but Alternative 3 is a considerably better option than no action in terms of reducing fuel hazard.

Table D2. Alternative 2 Estimated Emissions

Unit	Rx	Fuels	Acres	Total PM_{10} (tons)	Total $PM_{2.5}$ (tons)	Total Emissions (tons)
69	WLF/BU	UB	114	24.1	24.5	48.5
71	ISW	GP	40	33.1	28.1	61.2
72	FS-M	GP	89	36.8	31.2	68.1
73	FS-D	GP	14	5.8	4.9	10.7
74	ISW	UB	13	9.9	8.4	18.3
75	ISW	UB	11	8.4	7.1	15.5
76	ISW	UB	61	46.4	39.3	85.7
78	ISW	GP	30	24.8	21.0	45.9
79	FS-M	GP	30	12.4	10.5	22.9
80	ISW	GP	8	6.6	5.6	12.2
81	ISW	UB	21	16.0	13.5	29.5
82	ISW	GP	18	14.9	12.6	27.5
83	FS-M	GP	22	9.1	7.7	16.8
89	ISW	UB	42	31.9	27.1	59.0
90	ISW	GP	54	44.7	37.9	82.6
91	ISW	UB	18	13.7	11.6	25.3
92	ISW	UB	37	28.1	23.8	52.0
93	ISW	UB	86	65.4	55.4	120.8
94	ISW	UB	163	124.0	105.1	229.0
96	ISW	GP	12	9.9	8.4	18.4
98	ISW	UB	13	9.9	8.4	18.3
99	ISW	GP	62	51.3	43.5	94.8
100	ISW	UB	51	38.8	32.9	71.7
103	ISW	UB	65	49.4	41.9	91.3
104	ISW	UB	41	31.2	26.4	57.6
105	ISW	UB	25	19.0	16.1	35.1
121	ISW	UB	45	34.2	29.0	63.2
123	ISW	UB	46	35.0	29.6	64.6
136	ISW	GP	39	32.3	27.4	59.7
137	ISW	GP	36	29.8	25.3	55.1
138	ISW	GP	25	20.7	17.5	38.2
						1699.5

Table D3. Alternative 3 Estimated Emissions

Unit	Rx	Fuels	Acres	Total PM_{10} (tons)	Total $PM_{2.5}$ (tons)	Total Emissions (tons)
69	WLF/BU	UB	114	24.1	24.5	48.5
71	ISW	GP	114	33.1	28.1	61.2
72	FS-M	GP	40	36.8	31.2	68.1
73	FS-D	GP	89	5.8	4.9	10.7
74	FS-D	UB	14	5.4	4.6	9.9
75	FS-D	UB	13	4.6	3.9	8.4
76	FS-D	UB	11	25.3	21.4	46.6
78	FS-M	GP	61	12.4	10.5	22.9
79	FS-M	GP	30	12.4	10.5	22.9
80	FS-M	GP	30	3.3	2.8	6.1
81	ISW	UB	8	16.0	13.5	29.5
82	ISW	GP	21	14.9	12.6	27.5
83	FS-M	GP	18	9.1	7.7	16.8
89	FS-D	UB	22	17.4	14.7	32.1
90	FS-D	GP	42	22.4	18.9	41.3
91	FS-D	UB	54	7.5	6.3	13.8
92	FS-D	UB	18	15.3	13.0	28.3
93	FS-D	UB	37	35.6	30.2	65.8
94	FS-D	UB	86	67.5	57.2	124.7
96	FS-D	GP	163	5.0	4.2	9.2
98	FS-D	UB	12	5.4	4.6	9.9
99	FS-D	GP	13	25.7	21.7	47.4
100	FS-D	UB	62	21.1	17.9	39.0
103	FS-D	UB	51	26.9	22.8	49.7
104	FS-D	UB	65	17.0	14.4	31.4
105	FS-D	UB	41	10.4	8.8	19.1
121	FS-D	UB	25	18.6	15.8	34.4
123	FS-D	UB	45	19.0	16.1	35.2
136	FS-D	GP	46	16.1	13.7	29.8
137	FS-D	GP	39	14.9	12.6	27.5
138	FS-D	GP	36	10.4	8.8	19.1
						1036.8

Appendix E - Cumulative Effects Maps

Figure E15– Past Actions

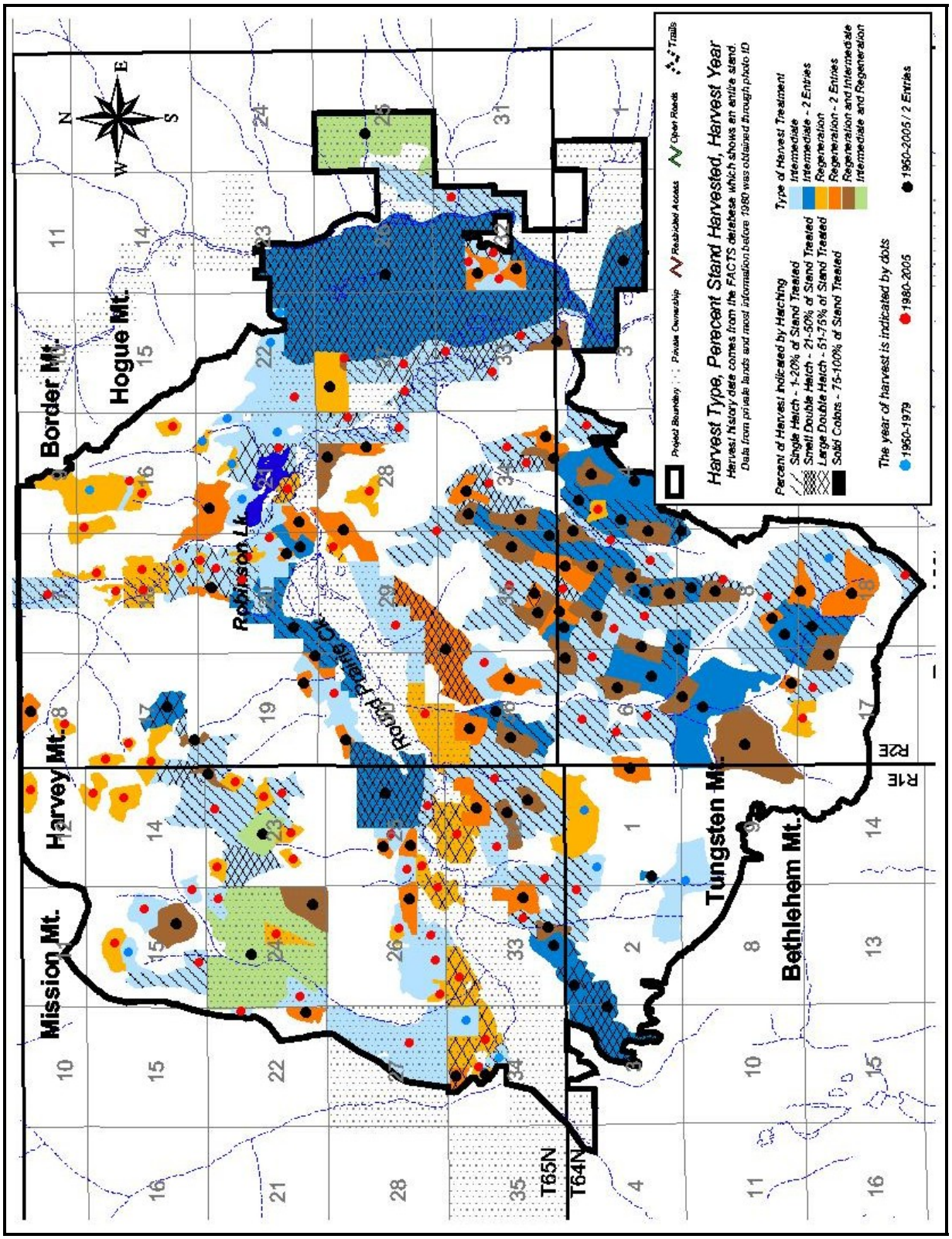

Figure E16 - Current Actions

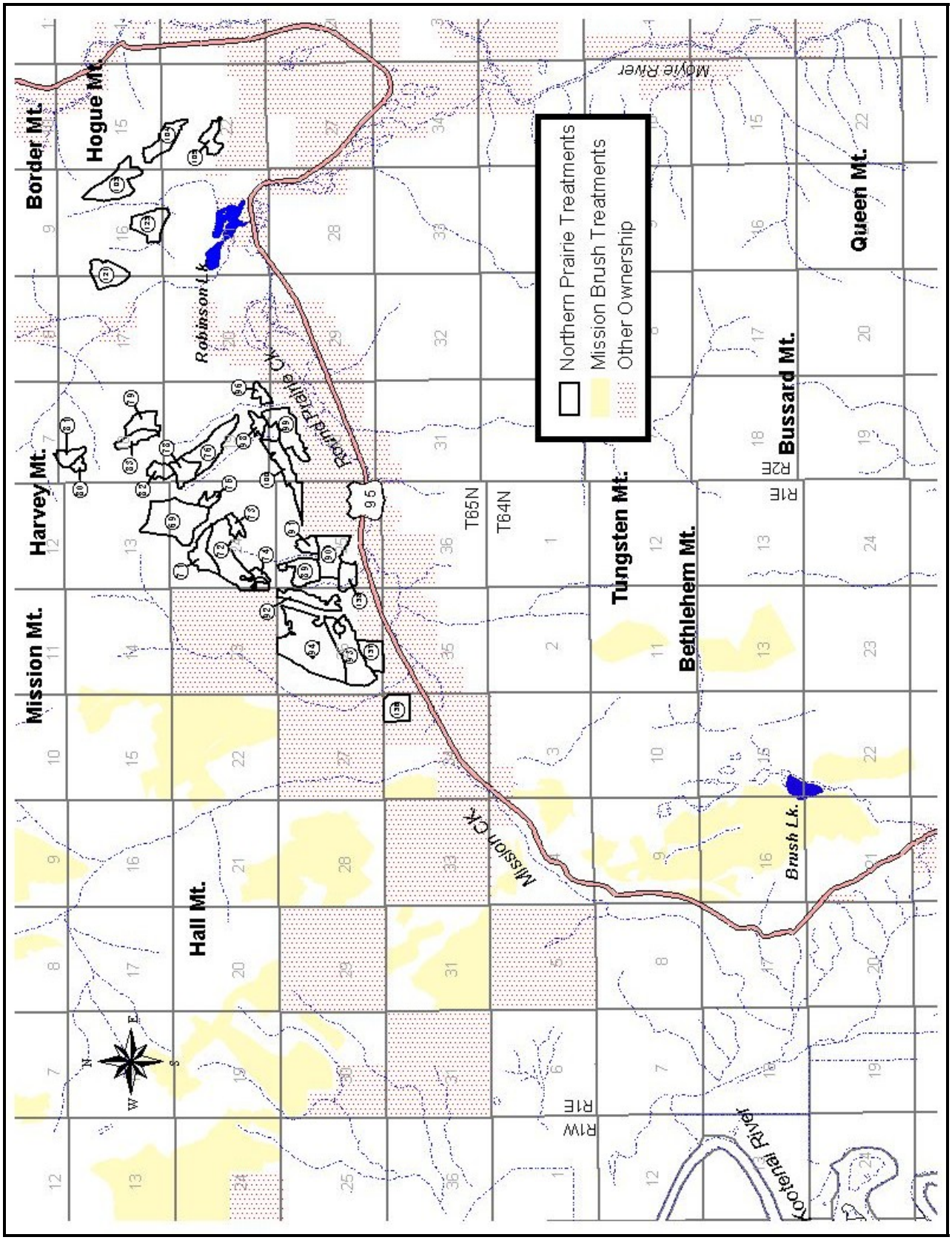
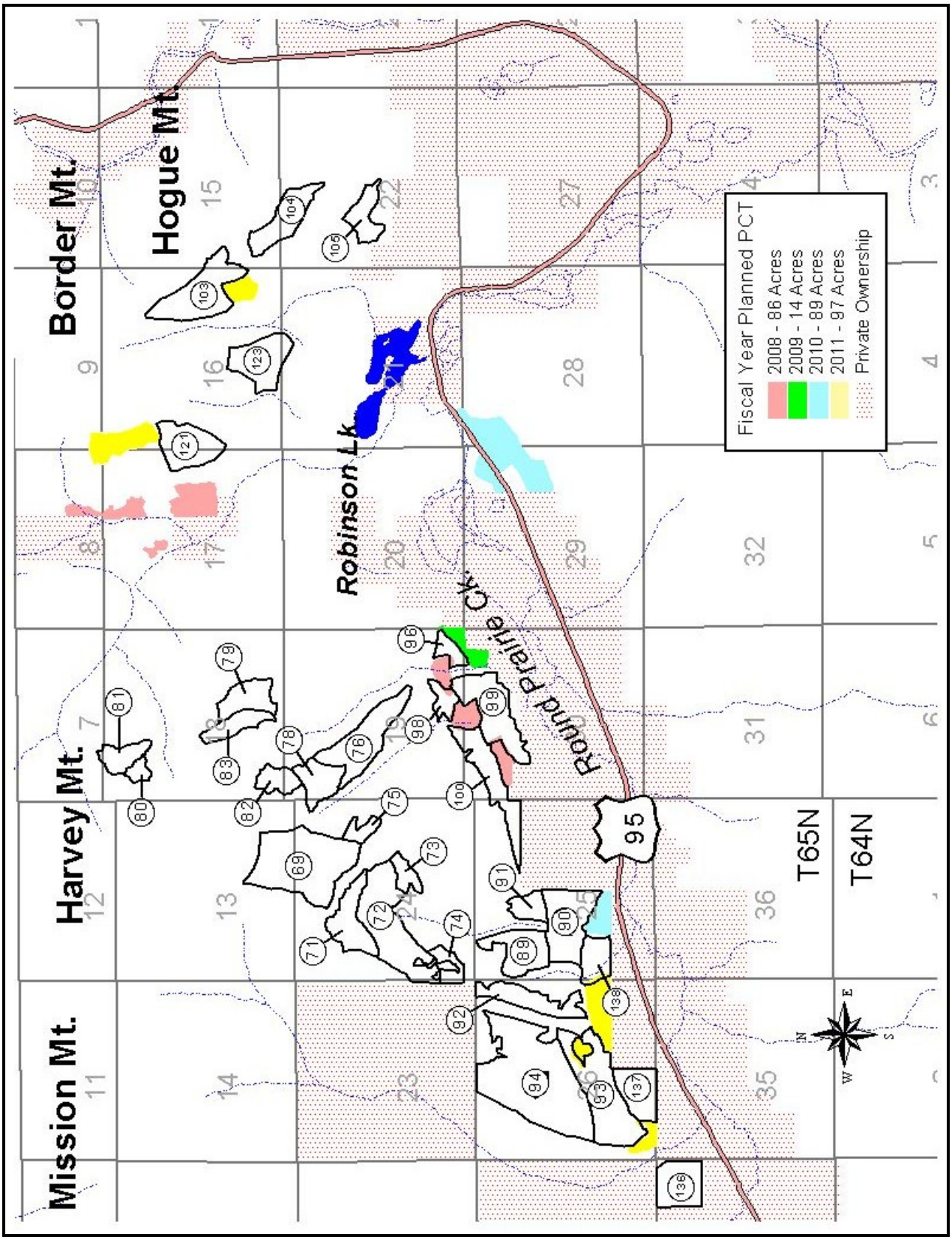
Figure E17 – Reasonably Foreeable Actions